

# INTER-STATE EQUALISATION OF HEALTH EXPENDITURES IN INDIAN UNION

**M. GOVINDA RAO  
MITA CHOUDHURY**

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**National Institute of Public Finance and Policy  
New Delhi**



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Email: [rachitprinter\\_2005@yahoo.co.in](mailto:rachitprinter_2005@yahoo.co.in)



**Smt. Ganga Murthy**

Economic Adviser

Telefax : 23061730

E-mail : g.murthy@nic.in



भारत सरकार  
स्वास्थ्य एवं परिवार कल्याण मंत्रालय  
निर्माण भवन, नई दिल्ली - 110011.

Government of India  
Ministry of Health & Family Welfare  
Nirman Bhavan, New Delhi - 110011

## FOREWORD

Considerable debate is taking place both within and outside the Government on the need to enhance public expenditure to make healthcare accessible and affordable to the less well to do sections particularly in the rural and remote areas. The National Health Policy 2002 and the National Common Minimum Programme 2004 have clearly argued for an increase in health expenditures at the central and state levels. Public spending in India constitutes around 20% of health expenditure with the balance coming from the private sector or what we typically term as Out of Pocket expenses. Low public spending, inadequate utilisation of our public facilities, non availability of required facilities have all been well documented. Coupled with these factors one also notices the wide inter state variations in per-capita spending on health and their outcomes. Poorer states even with higher allocations still tend to have comparably lower levels of per capita expenditure and outcomes.

Inadequate allocation of public resources and its inequitable spread across different States have resulted in the low access to public health facilities even by the poor. The 60<sup>th</sup> Round on **Morbidity and Healthcare** brought out by the National Sample Survey Organisation has found that only 22 % access public facilities in rural and 19% access it in urban areas. This study analyses the inter-state disparities in health spending and suggests a methodology for introducing appropriate equalisation systems to ensure a fair distribution of resources between States.

It is indeed fortunate that NIPFP undertook this study for the Ministry and with the vast expertise which Dr. Govinda Rao and his team have, the study should be able to assist in course correcting funding of programmes between states taking into account their customised requirements. I also take this opportunity to thank Shri Sunil Nandraj in the WHO for his support and suggestions.

New Delhi  
31<sup>st</sup> January, 2008

Ganga Murthy  
Economic Adviser

**Healthy Village, Healthy Nation**



एड्स - जानकारी ही बचाव है  
Talking about AIDS is taking care of each other



## Preface

Improvement in the health status of population not only contributes directly to human happiness, but also enhances capabilities and freedoms. It is a basic component of human development and hence, an important determinant of well-being of population. Therefore, ensuring universal access to healthcare is necessary for providing health security, particularly to the poor and disadvantaged sections of society. As improved health status enhances productivities and incomes, ensuring access to the poor is critical for inclusive development.

In India, there are formidable challenges in ensuring healthcare services to the needy. Inadequate allocation of public resources and its inequitable spread across different states have resulted in low access and poor quality of public health facilities. In addition, there are severe problems in delivery systems. The consequence of these has been to force the households to spend a significant proportion of their incomes on private healthcare facilities. Not surprisingly, private spending on healthcare is four times the amount spent through central and state budgets. Even within the low level of public expenditures, spending on preventive healthcare which has disproportionate benefits on the poor is small and an overwhelming proportion is spent on curative health. Again there are significant differences in per capita expenditures on health expenditures across states varying from a mere Rs. 100 in Bihar to Rs. 447 in Tamil Nadu in 2004-05.

This study analyses public health expenditure needs in different states. The National Common Minimum Programme (NCMP) of the government has indicated that public spending should increase to 2-3 percent of GDP. At the same time, ensuring universal access to healthcare would require a fair distribution of expenditures among different states. This calls for estimation of health expenditure needs in different states and introduction of a properly designed equalising transfer system. Unfortunately, the design of the prevailing central schemes on health

services including that of the National Rural Health Mission or the Twelfth Finance Commission's recommendations on health expenditure equalisation do not adequately address the issue.

This study advances the methodology for estimating health expenditure needs of different states and to design an appropriate specific purpose transfer system which will satisfy the canons of equity without involving perverse incentives. We hope that the methodology put forward in the study will be useful for policymakers as well as researchers. We are extremely grateful to the Ministry of Health and Family Welfare which assigned the study and to the World Health Organisation which provided financial assistance. Ganga Murthy, Economic Adviser in the Ministry of Health and Family Welfare took keen personal interest in the study and gave valuable comments on an earlier draft. Sunil Nandraj, Coordinator of Health Systems Development Project in the World Health Organisation was also kind in providing the necessary support. Thanks are also due to Diwan Chand and Gita Bhatnagar of the NIPFP who provided valuable data required for the study and Kavita Issar for secretarial support. Of course, the responsibility for the views expressed lies with the authors.

**M. Govinda Rao**  
**Mita Choudhury**



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# **I. Enhancing Human Development: Critical Role of Improving Health Status**

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## **The Setting**

Improvement in the health status directly contributes to human happiness and therefore, has an intrinsic value. Health is a basic component of human development, and hence, determines society's well being. Through human development, sound health enhances labour productivity and contributes to material progress. It is a means to empower the deprived sections of society and thus, an important element in the strategy for poverty alleviation. Access to preventive and protective healthcare enhances entitlements of the poor by enabling steady employment, improving productivity and facilitating demographic transition. As argued by Sen, "...poverty must be seen as the deprivation of basic capabilities rather than merely as lowness of incomes" (Sen, 1999; p.86). Capabilities provide freedom from hunger and poverty. Poor health condition can be a major source of capability deprivation and hence a cause for unemployment and poverty. Thus, enhancing health status by providing basic healthcare facilities has overwhelming importance in enhancing capabilities and hence, freedom.

By all accounts, India's performance in ensuring basic healthcare facilities has left much to be desired. The average life expectancy at birth during 2000-05 at 63.1 years was lower than not only the world (67 years) but also the developing countries' average (64.9 years). The infant mortality in India for 1000 live births at 63 years was higher than that of the world (54) as well as developing countries (60). Mortality of children under 5 years at 87 per 1000 live births in India too was higher than the world average at 80. The probability of surviving to age 65 in India was 67.4 for females and 59.2 for males as compared to the world average of 73.1 and 64.5 respectively. The maternal mortality rate in India at 540 for 100,000 live births in 2000 was much higher than not only the economically advanced economies but also many economies with comparable income levels and other south asian countries such as Pakistan (500), Bangladesh (380), and Srilanka (92). The poor health

infrastructure combined with low-income level and poverty has been a major cause of the poor health achievements of the country.

The government commitment of resources for the provision of health services too has left much to be desired. The salient features of health spending in India may be noted at just about 0.9 percent of GDP. Public spending on the health sector in India relative to international standards is very low. Even when complimentary expenditures on water supply, sanitation are added, the expenditure does not exceed 1.3 percent of GDP. Given the imperatives of spending, the low level of public expenditure has warranted private expenditure of 4.8 percent of GDP. Thus, the poor state of public health infrastructure has forced the less privileged to seek unregulated private healthcare with significant adverse impact. Low level of public spending has particularly resulted in poor infrastructure for preventive healthcare. Not surprisingly the health outcomes in India are poor. The immunisation rate against tuberculosis as well as measles was lower in India than in some of the south asian countries. This is also true of access to various health care services such as population coverage for protected water supply, contraceptive prevalence rate, births attended by skilled personnel and the ratio of physicians to total population.

The problem of resources is not merely confined to its inadequacy; it has to do with its distribution as well. First, much of the allocation of health expenditures is on curative health leaving very little resources for preventive healthcare. Even more important is the inter-state differences in per capita health expenditures. Generally, in the states with low per capita incomes and with high concentration of poverty, per capita public expenditure on health and family welfare is very low. Low per capita expenditure in states with larger concentration of poverty results in high out-of-pocket expenditure. The out-of-pocket expenditure being highly regressive in nature leads to low access to healthcare services to the poor. In some of these states, in rural areas, the formal private health services is non existent or scarce and this forces the poor to seek solace from local “experts” or quacks. Not surprisingly, poor not only suffer loss of income when they are sick, but have to bear higher insecurity from illness and higher cost of healthcare services.

The above discussion shows that uneven distribution of resources between the states is an important cause of uneven health status. The policies to increase the outlay and institutional reforms to bring efficiency in spending are important, but these issues have not been addressed in this study. The objective of the present study is to analyse inter-state disparities in health spending and work out appropriate equalisation systems to ensure a fair distribution of resources between different states. As mentioned above, although the National Common Minimum Programme (NCMP) underlines the need to more than double the allocation to the health sector, it is important to ensure that these expenditures are targeted to states with low health status. This calls for an appropriate design of the transfer system to equalise health services. The proposed study attempts to work out an implementable scheme of equalisation in health expenditures.

The low levels of allocation to health sector in poorer states arises from the inability of the fiscal transfer system to offset the general fiscal disabilities of poorer states arising from their low revenue raising capacities. This failure is compounded by the shortcomings in the design and implementation of the specific purpose transfers under various central schemes. The specific purpose transfers have failed to ensure minimum standards of health services in the low income states and as these are the states with high concentration of poverty, the poor people have little access to healthcare services. Analysis shows that the transfers given for the State Plan Schemes under the *Gadgil formula* and the specific purpose transfers given under centrally Sponsored Schemes have much weaker equalising impact than the shared taxes and grants given under the Finance Commissions' recommendations. On the whole, the equalisation under different transfers is not sufficient to offset the fiscal disabilities arising from low revenue raising capacity of poorer states. Not surprisingly, per capita development expenditures in low-income states are much lower than their more affluent counterparts. Thus, even when the low-income states allocate higher proportion of their GSDP for health expenditures, their per capita expenditure is much lower. This warrants a re-look at the prevailing equalising schemes.

Central government gives transfers to states based on the recommendations of the Finance Commission to meet states' non-plan

expenditure commitments and from the Planning Commission to meet plan expenditures. Besides these, there are central schemes designed from the Union Health Ministry and specific purpose transfers that are given to the states for implementing them. While the issue of appropriate method of designing general purpose transfers given for plan and non-plan purposes is left to the Finance and Planning Commissions, it is important that specific purpose transfers given to ensure minimum standards of health services by the Union Health Ministry should apply a proper equalisation scheme in its allocation.

## **Objective and Plan of the Study**

The present study attempts to analyse inter-state differences in health expenditures, evaluate the design and implementation of existing equalisation programmes in health expenditures to identify its shortcomings and present alternative approaches. Surely, equalising expenditure does not necessarily result in equalising healthcare services across the nation, but this is the first and in fact, a necessary step in that direction. It is therefore, important to work out a proper system of equalising transfers to ensure minimum standards of expenditure on healthcare in all the states. At the same time, the model of equalisation adopted should not involve a trade off in terms of efficiency and accountability. The present study attempts to work out alternative approaches to incentive compatible equalisation.

The report is presented in 9 sections. The second section analyses level of public expenditures on medical and public health and examines inter-state differences in per capita health expenditures. Theoretical rationale for equalising health expenditures and designing appropriate equalisation system is discussed in section 3. Section 4 examines the attempts by the Union Finance Commissions and the Union Ministry of Health to equalise health care services across various states in India. Alternative approaches to equalisation and methodology to be adopted to estimate the expenditure requirements in each of the states are examined in section 5. These include a physical norms approach, and the approach based on the estimated cost functions. In the former, expenditure required to provide the infrastructure, personnel and other facilities for the given demographic characteristics of the state are estimated. In the latter,

expenditure requirements are arrived at on the basis of the estimated cost functions for health expenditures in the states. Empirical estimates of expenditure needs of 15 large states in Indian Union based on the physical norms approach are presented in section 6, and section 7 presents the estimated expenditure needs according to the estimated cost functions. Based on these alternative approaches, additional expenditure requirements for equalisation are presented in section 8. The last section summarises the main findings of the study.

**Table 1:** Selected Health Indicators-South Asian Countries

Countries	Life expectancy at birth 2000-05 (years)	Infant mortality rate (per 1000 live births) 2003	Under-five mortality rate (per 1000 live births) 2003	Maternal mortality Rate (Per 100000 live births) adjusted 2000	Probability at birth of surviving to age 65 (% of cohort) (2000-05)	
					Female	Male
India	63.1	63	87	540	67.4	59.2
Pakistan	62.9	81	103	500	65.6	62.7
Bangladesh	62.6	46	69	380	63.7	59.3
Nepal	61.4	61	82	740	61	57.9
Srilanka	73.9	13	15	92	85.6	76.1
Bhutan	62.7	70	85	420	65.3	60.2
All developing countries	64.9	60	88	NA	69.6	62.3
All countries	67.0	54	80	NA	73.1	64.5

*Source:* Human Development Report, 2005.

## II. Healthcare Expenditures: Level and its Distribution

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### Public Expenditure on Healthcare in India

In terms of commitment to improve the health services too, India's performance is not very impressive. Public expenditure on healthcare including spending on water supply and sanitation at 1.3 percent of GDP in 2002, was one of the lowest, although it was higher than the expenditure in other south asian countries except Srilanka. Of 174 countries for which information was presented in the Human Development Report (UNDP, 2005), India's rank in proportion of health expenditures to GDP was 159 and only 15 countries incurred lower expenditure than India. In fact, public expenditure on health was just about 1.3 percent of GDP whereas private health expenditure was almost 4.8 percent or 3.7 times the public expenditure.

The low level of public expenditures is not the only concern; an overwhelming proportion of health spending is on curative rather than preventive healthcare. Spending on preventive healthcare has a pro-poor impact. This is because, affluent sections of population have already access to facilities like protected water supply and immunisation and additional spending enhances the coverage of the facilities to hitherto uncovered areas and provides greater access to the poor. Preventive health care also has greater impact in enhancing "capabilities" of the poor. The analysis shows that the coverage of immunisation for both tuberculosis and measles is lower than the world average as well as developing country average. In fact, the coverage in India is lower than all south asian countries except Pakistan. Indeed, percent of births attended by trained health personnel in India is lower than the developing country average though it is higher than other south asian countries except Srilanka. India has the second highest physician – population ratio – next only to Pakistan among the south asian countries, but this does not ensure easy access to the poor as predominant proportion of the physicians could be in the private sector and in urban areas and poor can not afford to pay for their services.



Table 2: Commitment to Health in India and other South Asian Countries

Country	Health expenditure 2002			One year olds fully immunised 2003 (%)		Percent contraceptive prevalence rate 1995-2003	Percent of births attended by skilled health personnel 1995-2003	Physicians per one population 1990-2004
	Public (% GDP)	Private (% GDP)	Per capita (PPP US\$)	Against tuberculosis	Against measles			
India	1.3	4.8	96	81	67	48	43	51
Pakistan	1.1	2.1	62	82	61	28	23	66
Bangladesh	0.8	2.3	54	95	77	58	14	23
Nepal	1.4	3.8	64	91	75	39	11	5
Srilanka	1.8	1.9	131	99	99	70	97	43
Bhutan	4.1	0.4	76	93	88	19	24	5
Developing countries	NA	NA	NA	85	75	NA	59	NA
All countries	NA	NA	NA	85	77	NA	62	NA

Source: Human Development Report, 2005.

Provision of healthcare services in India is predominantly the responsibility of the state governments. The item, "Public health and sanitation, hospitals and dispensaries" is placed under the State List in the 7<sup>th</sup> Schedule to the Constitution of India. The central government can, however, directly intervene in establishing major hospitals to assist medical education and research. Another way to intervene in health sector by the central government is to initiate central sector and centrally sponsored schemes, but the implementation of these will have to be done by the state governments. Not surprisingly, expenditures implemented at the state level including those implemented at local levels constitute around 85-90 percent of total public expenditure in the country.

Realising that health expenditures incurred in the country are inadequate, and that some important health services have nation-wide externality and therefore, minimum expenditure levels should be ensured across the country, the central government has initiated important interventions, the most important of them being, the National Rural Health Mission (NRHM). The mission is an umbrella programme subsuming various centrally sponsored schemes in health and family welfare including the Reproductive and Child Health II (RCH-II),

National Disease Control Programmes for *malaria, tuberculosis, kala azar, filaria, blindness* and *iodine deficiency* and Integrated Disease Surveillance Programme. As stated in the National Common Minimum Programme (NCMP), significant increase in the outlay, is proposed to be made for health, family welfare, water supply and sanitation, and the initiative in enhancing the outlay will have to come forth during the 11<sup>th</sup> Plan.<sup>1</sup> Until the 11<sup>th</sup> Plan, the funding for the scheme came entirely from the central budget. However, from the 11<sup>th</sup> Plan, this has been made a shared cost programme with central and state governments respectively contributing 85 and 15 percent. The mission covers the entire country but 18 states are chosen as high focus states. These include all special category states and the low-income general category states of Uttar Pradesh, Bihar, Chattisgarh, Jharkhand, Orissa, Madhya Pradesh, and Rajasthan.<sup>2</sup> The implementation of the program is done through the involvement of *Panchayat Raj* institutions. The District Health Mission is implemented by the *Zilla Parishads (district panchayats)*. It will control, guide and manage all public health institutions (PHI) in the district, sub-centres (SC), primary health centres (PHC) and community health centres (CHC). Funds are transferred from the centre to the district health missions through the State Health and Family Welfare Society. Village *panchayats* will select, appoint and supervise the Accredited Social Health Activist (ASHA) to act as an interface between community and public health system. The design also allows for the allocation of untied funds at SC, PHC and CHC level. The healthcare system and the estimated expenditure requirements, is expected to be built from the village upwards.

The direct transfer of funds to the *Zilla Parishads*, through the State Health and Family Welfare Society for implementing the NRHM makes it difficult to estimate the total spending in states. Until 2002-03, all central schemes were routed through the states and the funds were first transferred as grants to the states' consolidated funds. It was therefore, easy to arrive at the estimate of total expenditure on health incurred in the states. However, since then the grants for various central schemes on health are transferred from the central government directly to the implementing

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<sup>1</sup> The NCMP suggests that public expenditure on the sector should be increased from the prevailing 1.3 percent of GDP to 2-3 percent of GDP.

<sup>2</sup> The special category states include all the North-eastern, Sikkim, Himachal Pradesh, Uttarakhand, and Jammu and Kashmir.

agencies, it is necessary to take the distribution of this amount among the states to assess the inter-state differences in health expenditures. This is important also to design any inter-state equalisation scheme. The equalisation scheme of the Twelfth Finance Commission's (TFC) does not take the inter-state distribution of off-budget health expenditures into account. This will be discussed further later in the report.

## **Inter-state Differences in Public Health Expenditures**

Table 3 presents inter-state differences in per capita expenditure on health and family welfare incurred by state governments. The expenditures are shown in both per capita terms and as a percentage of Gross State Domestic Product (GSDP). The table brings out a number of important features in state government spending on health and family welfare services. First, the aggregate spending on health services as a ratio of GSDP has been extremely low and has been declining over time. The analysis shows that aggregate spending on health services relative to GSDP showed a marginal increase from 1.2 percent in 1995-96 to 1.37 percent in 2000-01 mainly due to the pay revision in the states in 1998-99 and declined thereafter to 1.18 percent in 2004-05. In other words even as the cost of providing health services showed a disproportionate increase, the expenditures exhibited a declining trend which implies that the decline in real spending was of a greater magnitude. This is also brought out in per capita expenditure which, in current prices increased from Rs. 131.4 in 1995-96 to Rs. 262.2 in 2004-05 but when adjusted for wholesale price increase, in constant (1993-94) prices, the increase was much less from Rs. 108 to Rs.140. In fact, the cost of providing health care increased much faster than the wholesale price index due to the sharp increase in the government salaries and therefore, it is safe to conclude that increase in per capita expenditure in real terms, if there was any, was negligible. Thus, not only that states' spending on healthcare is low but also it has been stagnant in real per capita terms and declining as a ratio of GSDP. Second, there are significant inter-state inequalities in per capita spending on health services and these have shown a steady increase over the years. Thus, per capita health expenditure varied from Rs. 100 in Bihar to Rs. 448 in Tamil Nadu, thus showing the difference of four and a half times between the lowest and highest expenditure. The coefficient of variation in per capita expenditure increased steadily from 0.31 in 1995-96 to 0.38 in

2004-05, which indicates a steady increase in inter-state inequalities. Although, the attempts to equalise expenditures through the transfer system has helped to reduce inter-state inequalities in the expenditure-GSDP ratio, it was not enough to equalise per capita expenditure and the inequalities have continued to increase.

Differences in per capita expenditure, by themselves, are not a matter for concern if it is due to the exercising of preferences by individual states. However, if the differences are due to fiscal disabilities of the states arising from unequal capacities in raising revenues or due to varying cost of providing health services, then the expenditure differences are not due to variations in preferences but due to their fiscal disabilities. The analysis shows that per capita health expenditure across states has a significant positive correlation with per capita GSDP (Figure 1). Thus, per capita expenditure are higher in states with higher per capita GSDP. The analysis presented in table 4 shows not only significant and high positive correlation between per capita health expenditure and per capita GSDP but also that the correlation has shown a steady increase from 0.75 in 1995-96 to 0.88 in 2003-04 before declining marginally to 0.86 in the next year. Over the years, inequality in per capita health expenditure across states has exhibited an increasing trend (Figure 2) and this is clearly a pointer to the failure of the system to equalise public expenditures on healthcare services.

Table 3: Inter -State Differences in Health Expenditures

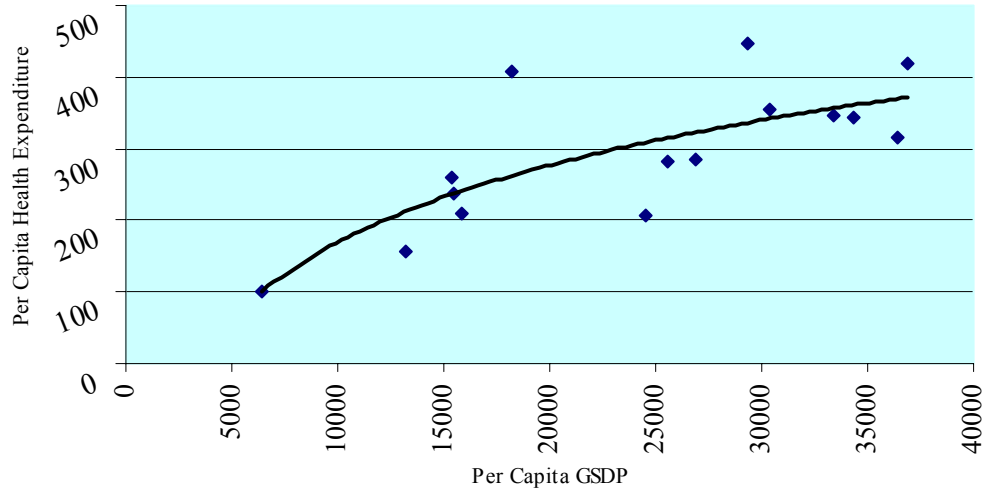
State	Per capita expenditures (Rs)			Percent of GSDP		
	1995-96	2000-01	2004-05	1995-96	2000-01	2004-05
Andhra Pradesh	117.33	229.03	282.09	1.06	1.24	1.10
Assam	128.58	208.09	259.29	1.63	1.74	1.69
Bihar	91.59	108.18	100.12	2.69	1.89	1.55
Gujarat	135.24	397.88	345.69	0.85	1.84	1.04
Haryana	171.42	297.16	418.42	1.06	1.13	1.14
Karnataka	149.13	263.70	284.10	1.30	1.32	1.06
Kerala	166.57	270.65	354.31	1.31	1.23	1.17
Madhya Pradesh	146.72	222.49	210.05	1.65	1.81	1.33
Maharashtra	141.78	252.50	316.33	0.78	1.02	0.87
Orissa	115.01	183.64	238.61	1.45	1.73	1.55
Punjab	159.22	324.32	344.68	0.91	1.19	1.00
Rajasthan	250.01	353.14	408.91	2.60	2.50	2.25
Tamil Nadu	166.07	299.00	447.51	1.25	1.31	1.53
Uttar Pradesh	87.88	99.59	156.58	1.21	0.95	1.19
West Bengal	101.38	236.36	206.90	1.02	1.35	0.84
Mean	131.37	224.29	262.24	1.23	1.37	1.18
Standard Deviation	40.33	81.74	98.98	0.57	0.42	0.37
Coefficient of Variation	0.307	0.36	0.38	0.467	0.31	0.315

**Source:** Finance Accounts of state governments (relevant years).

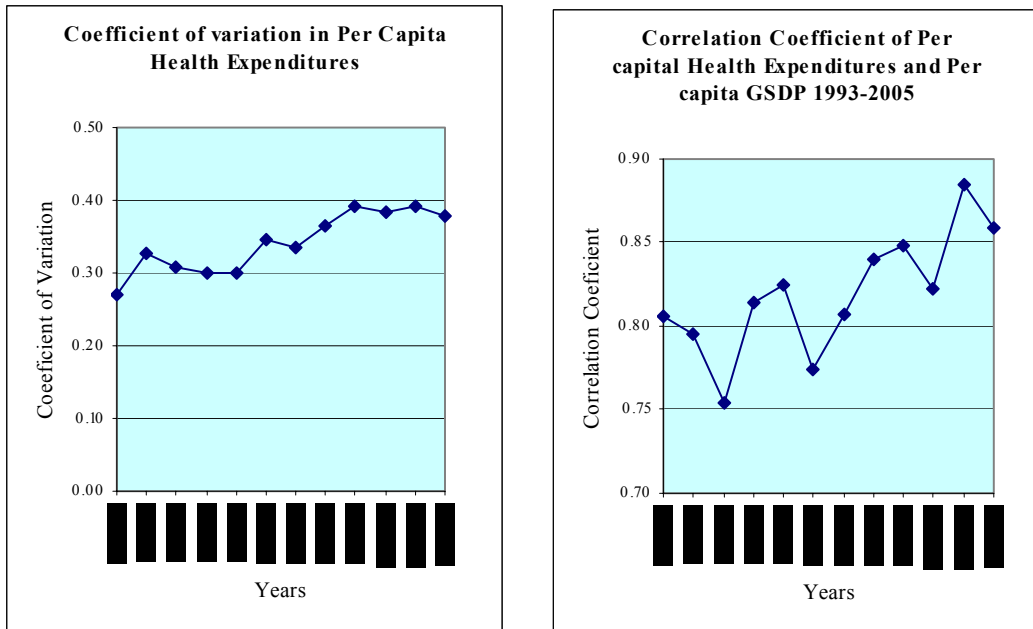
Table 4: Level and Variations in Per Capita Health Expenditures in States

	Per capita state average health expenditure (Rs) current prices	Coefficient of variation	Per capita health expenditures Rs. at 1993 prices	Correlation coefficient with per capita GSDP
1995-96	131.37	0.307	108.04	0.754
1996-97	144.69	0.301	113.75	0.814
1997-98	168.72	0.299	127.05	0.825
1998-99	198.26	0.347	140.91	0.774
1999-00	207.84	0.335	143.04	0.807
2000-01	224.29	0.364	144.05	0.840
2001-02	211.41	0.392	131.07	0.848
2002-03	224.00	0.385	134.29	0.823
2003-04	236.91	0.393	134.68	0.885
2004-05	262.24	0.377	140.01	0.858

**Figure 1**  
**Per Capita Health Expenditures According to Per Capita GDP**



**Figure 2**  
**Inter-State Disparities in Per Capita Health Expenditures**



### **III. Equalisation of Health Expenditures: Rationale and Design**

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#### **Rationale for Equalisation**

Inter-state differences in health expenditures, as mentioned above, can be due to differences in the preferences of the states for health services and/or due to differences in the capacity to allocate resources to the health sector. The differences due to the former can be justified as it comes from the deliberate choice of the states. Nevertheless, as health services have nationwide externalities, it is important to ensure that the prescribed minimum level of spending is incurred in each state and this has to be facilitated through specific transfers. The problem deserves serious attention, when, in addition, the low expenditure in health services in low income states are due to their inherent disadvantage in raising revenues. In such a situation, the general-purpose transfer should be designed to offset fiscal disabilities and if it fails to do so, the specific purpose transfer should be adequate to ensure that the state is provided with sufficient resources to incur prescribed levels of expenditure.

The argument for intergovernmental transfers on equity grounds has been made either in terms of ensuring horizontal equity of individuals residing in the states across the country, or simply to ensure inter-regional equity (Buchanan, 1950; Boadway and Flatters 1982; Musgrave, 1962). Both the approaches build a case for unconditional or general-purpose transfers from the centre to the states to offset the fiscal disabilities arising from low revenue capacity and high expenditure needs. Inter-state differences in the capacity to raise revenues and differences in the unit cost of providing public services due to factors that are beyond the control of the states can create inequity and therefore, transfers have to be given to offset these imbalances.

The fiscal disability argument, as mentioned above, provides justification for designing general equalising transfers to the states and not for any specific purpose. The transfers thus designed can be used by the recipient to augment any or all of the public services or to substitute it for own tax revenues. They merely enable the states to provide a given

standard of public services at the given tax rates and whether or not the states actually raising revenues at that tax rate is left to them.

Thus, intergovernmental transfers can be designed in a variety of ways, and the effect of transfers depends on the way they are designed (Wilde, 1971; Gramlich, 1977). While the theoretical rationale helps to identify the objectives of transfers and provides broad guidance on their design, a number of judgements have to be made in designing them. The method of transfers and the formula employed have implications both for equity and incentives. Naturally, each country has developed its own system of transfer design depending upon various political, historical and economic compulsions. In what follows, we discuss the designs of unconditional and specific purpose transfers, which minimise disincentive effects on recipients.

## General Purpose Transfers

General-purpose transfers are given to enable sub-national governments to offset the fiscal disadvantages arising from, a lower revenue raising capacity and/or a higher unit cost of providing public services. This is achieved by giving unconditional transfers in a variety of ways, but the least distorting way is to give transfers equivalent to their “need-revenue” gap (Bradbury *et.al*, 1984). The ‘need-revenue’ gap measures the difference between, what a state ought to spend, to provide specified levels of public services and the revenue it can raise at a given standard level of tax effort.

Thus, the need-revenue gap for the  $i^{\text{th}}$  state can be taken as:

$$G_i = \bar{Q}C_i - \bar{t}B_i \quad (1)$$

Where,  $G_i$  is the gap (per capita),  $\bar{Q}$  is the desired (normative) level of composite public service provided by the state per capita.  $C_i$  is the unit cost of the public service (reckoned at justifiable costs),  $\bar{t}$  is the standard tax effort, and  $B_i$  is the per capita tax base.  $C_i$  in turn, consists of two components: (i) unit cost within the control of the state governments, ( $C_{1i}$ ), and (ii) that beyond the states’ control ( $C_{2i}$ ). For need calculations the unit cost within the control of the state governments ( $C_{1i}$ ) would also



have to be reckoned at justifiable levels ( $C_i$ ). Thus,

$$G_i = \bar{Q}(C_{1i} + C_{2i}) - \bar{t}B_i \quad (2)$$

The fiscal disadvantage of the state ( $D_i$ ) is determined on the basis of the difference between a state's need-revenue ( $G_i$ ) gap and the normative gap ( $G^*$ ), or the gap of the baseline state. That is,

$$D_i = G_i - G^* = Q(C_{1i} + C_{2i}) - tB_i - G^* \quad (3)$$

A state with a disadvantage [ $D_i > 0$ ] is eligible to receive aid, whereas one without [ $D_i < 0$ ] is not. If the central government sets apart 'M' amount to be distributed to the eligible states on the basis of their fiscal disadvantage, the amount of funds the  $i^{\text{th}}$  eligible state would receive is given by:

$$S_i N_i = [(D_i N_i)^a / \sum_i (D_i N_i)^a] M \text{ for all } D_i > 0 \quad (4)$$

Where,  $S_i$  represents per capita transfers received by the  $i^{\text{th}}$  state and  $N_i$  its population. First, whether or not a state is eligible to receive aid depends on the normatively chosen  $G^*$ . It is possible to select  $G^*$  such that even the state with the lowest  $G_i$  (or the state with the highest fiscal strength) is also eligible to receive aid. Second, the states may not be given grants to fill the entire gap,  $G_i - G^*$ . The share of individual states in such a case is determined by the exponential 'a' of the gap to be equalised, the total amount of funds available for transfer (or perceived vertical fiscal imbalance), and gap of the state in relation to the total gap. The degree of equalisation achieved, thus, depends upon the normatively chosen ( $G^*$ ), the value of the exponential (a), and the amount of funds available for transfer (M).<sup>3</sup>

## Specific Purpose Transfers

The rationale for equalising specific services is grounded in the meritorious nature of the service in question or the service in question has significant inter-state spillovers. When the benefits of public services

<sup>3</sup> For a similar formula, see, Ahmad and Thomas (1997), pp. 363-4.

provided by a state spills over its jurisdiction, it ignores the benefits accruing to the non-residents while deciding the quantum of the service provided. The jurisdiction equates the marginal benefits from the public service with the marginal cost of providing it, and as such ignores the part of the benefit accruing to the non-residents. The result is non-optimal provision of the public service. Optimal provision of the service in question cannot be ensured through *coasian bribes* or voluntary action of the jurisdictions, to compensate for the spillovers (Gramlich, 1997). Therefore, spillovers have to be adjudicated through central grants akin to 'Pigovian' subsidies. These transfers must necessarily be for specific-purpose, requiring matching contributions from the states and the exact matching rate should depend upon the size of spillovers. This implies that the matching rate should vary with the degree of externality generated by various public services. Further, a uniform rate of matching transfers would have varied responsiveness in different states depending on their level of development, as complete equalisation in fiscal capacities is never achieved in any federation. This calls for varying the matching rates itself in favour of the poorer states (Feldstein, 1975; Rao and Dasgupta, 1995).

Thus, specific purpose transfers are intended to set the prices right to ensure optimal provision of sub-central services having spillovers. Under such a scheme, the additional per capita outlay ( $A_{ij}$ ) required to ensure a minimum level of the public service 'j' in the  $i^{\text{th}}$  state would be the difference between the justifiable cost of providing the required minimum level of the service per capita ( $\bar{Q}_j^* C_{ij}$ ), and the justifiable cost of the actual per capita service level provided in the state ( $Q_{ij}^* C_{ij}$ ). That is:

$$A_{ij} = \bar{Q}_j^* C_{ij} - Q_{ij}^* C_{ij} \quad (5)$$

The per capita grant to be given to each state to ensure the minimum standard of service is given by,

$$S_{ij} = r_c [\bar{Q}_j^* C_{ij} - Q_{ij}^* C_{ij}] \quad (6)$$

such that

$$r_c + r_s = 1 \quad (7)$$

where ' $r_c$ ' is the proportion of additional outlay the central government bears and ' $r_s$ ' is the matching proportion the state government contributes. As the response to a given  $r_c$  is lower in poorer states, to obtain a given uniform impact  $r_c$  should vary inversely with the per capita incomes. Similarly, to ensure the specified level of service, ' $r_c$ ' should be inversely related to the price elasticity of demand for the service. If the price elasticity is zero, then to ensure a minimum level of service it would be necessary for the central government to transfer the entire quantum of expenditure required to provide the prescribed level of public service.

In this study, we focus on the equalisation in healthcare services through specific purpose transfers. Given that the objective is to ensure minimum levels of expenditure on healthcare services in each of the states, the equalisation undertaken under the general purpose has limited relevance, as the specific purpose transfer scheme will have to be designed to ensure it. The important point to be taken into account in designing the scheme is that the specific purpose grants given for augmenting health expenditures should not substitute states' own resources used for spending on health services. As explained above, this can be done, by requiring the states to make a matching contribution. Equalising general purpose transfers are relevant only to the extent that offsetting the disadvantages from lower taxable capacity of the states would enable the low income states to take advantage of the matching provisions as much as their richer counterparts. In a situation where the general-purpose transfers do not fully offset the disadvantage arising from lower taxable capacities of low-income states, it is advisable to design the specific transfers itself with varying matching ratio requirements. In other words, the matching ratios can be made to vary with the per capita income levels of the states.

This study, therefore, does not go into evaluating the design and implementation of general-purpose transfers to states given on the basis of the recommendation of the Finance Commission as well as the Plan grants under the *Gadgil formula*. There is considerable literature to examine the shortcomings of these transfers. This study attempts to provide a detailed

methodology for determining the transfers for equalising healthcare expenditures among the states in India, and keeping that in the background, examine the TFC's recommendations on the equalisation on health expenditures.

## IV. Equalisation of Health Expenditures: Existing Approaches

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From time to time, Finance Commissions have given transfers to equalise specific services and yet, the inter-state differences in per capita expenditure, rather than declining, have only increased over the years. The first Finance commission made recommendations for equalising expenditures on primary education. The most comprehensive scheme of equalisation in important social services was however, attempted by the Sixth Finance Commission. The Commission broadly interpreted its term of reference relating to upgradation of standards of administration to include primary education and health expenditures in its scheme of equalisation. It estimated average per capita expenditure in respect of these services and gave grants to states with lower than average per capita expenditure to cover 50 percent of the shortfall. The Commission recommended that the next Commission should undertake the remaining part of equalisation, which was not followed. More importantly, the design of the transfer scheme was such that the states could substitute spending from their own resources and thus, the objective of equalisation itself was not fulfilled.

The most recent attempt in equalisation is the attempt by the Twelfth Finance Commission. The Commission worked out a two-stage scheme of equalisation. In the first stage, the share of revenue expenditure on medical and public health, both plan and non-plan, to total adjusted revenue expenditure, for each state was estimated. The adjustment in total revenue expenditure was made to exclude pensions, interest payments and some other expenditure, which were normatively considered inadmissible. The group averages for normal and special category states was estimated. The ratio in each state is considered to be the result of the preference exercised by it and if a state had lower than average ratio that was not considered for equalisation. Expenditures in states with lower than the group average were considered equivalent to the average for purposes of calculation.

In the second stage, per capita expenditure, actual in the case of states with higher than average health expenditure – adjusted revenue expenditure ratios and average in the case of lower than average were calculated and the shortfall from the group average was worked out. Equalisation grants were recommended for the states to cover 30 percent of the shortfall from the average per capita expenditure.

There are a number of problems with this scheme of equalisation. First, the scheme takes into account only the recurrent expenditure and ignores capital expenditure requirements altogether. Shortfalls in health centres, sub-centres and hospitals are as important as the shortage of doctors, nurses and drugs. Second, the assumption that the share of revenue expenditure on health to total (adjusted) revenue expenditure represents states' preferences and therefore, ignoring the short fall of lower than average states on that account is inappropriate. In fact, variation could be even more due to supply constraints arising from lower resource availability, particularly in poorer states, as much as due to different income elasticities of demand for health expenditures. The equalisation plan does not take into account the shortfall in expenditure due to this factor. Third, given that the purpose of the transfer system is to equalise the services and the Finance Commission has attempted equalisation of only two services, it does not make any sense to stop at 15 percent equalisation in the case of education and 30 percent in the case of healthcare. The equalisation grants given by the Finance Commission are much too small to make any significant equalisation in healthcare services. Fourth, the conditions that have been specified to avoid the substitution of own resources for grants are much too complicated and in cases where these are not fulfilled, the grants will not be given. This could only result in the really poor states losing out. There are better ways to design the grants as a shared cost programme. Fifth, the equalisation grants have been dealt with in an isolated manner from all other specific purpose transfers such as, grants given under the National Rural Health Mission. It would have been appropriate to work out equalisation in a holistic manner. It would have been preferable to work out the cost of providing an average standard of service and estimate the shortfall of the actual from the average. Finally, expenditure equalisation should be done in relation to equalising standards of health services rather than with reference to the

average expenditure incurred. This would require analysing the cost of providing essential services in each of the states on a normative basis.

Another major initiative to improve the health services is the National Rural Health Mission (2005-12). As mentioned above, the mission has been designed by subsuming various central schemes including the Reproductive and Child Health II (RCH – II), National Disease Control Programmes for *malaria, tuberculosis, kala azar, filaria, blindness* and *iodine deficiency* and Integrated Disease Surveillance Programme. Under this, public spending on health, and is proposed to be increased from the prevailing level of about one percent of GDP to 2-3 percent of GDP. The mission is expected to prioritise and allocate funds to address inter-state and intra-state disparities in both health infrastructure and indicators. The states included in the mission are required to sign a Memorandum of Understanding with the Government of India and increase their public health budget by 10 percent every year, increased devolution to *Panchayats* and lay down performance benchmarks for the release of funds. The mission envisages that the total budget allocation for the health sector will increase by 30 percent every year and as the states are required to increase by a minimum of 10 percent, the remaining funds will be provided by the central budget. As the funds would be devolved according to the requirements assessed based on the norms, equalisation is implicit. However, centre's contribution to the programme in 2005-06 was just about Rs. 6700 crore which is about 0.13 percent of GDP and its effectiveness both in allocating funds for healthcare and effectively implementing the programme remains to be seen.

The above discussion shows that despite the initiatives taken by the central government in initiating the programme to reduce inter-state disparities in health expenditures and services, and the recommendation of the Finance Commission to give grants to equalise health expenditures, not much is likely to happen in the medium term. In any case, there is a clear need to develop a detailed methodology for allocating funds to different states to equalise health expenditures in a scientific manner.

## V. Methodology for Estimating Equalising Transfers

Variations in expenditures among different states arise from the differences in the quantity of health services provided and the unit cost of providing the service (India, 1990, Rao and Agarwal, 1994). The quantity (including quality) of public services provided depends on the capacity of the state to generate the resources from the revenue sources assigned to it and the transfers received from the higher level government or the relative preference for health services *vis-à-vis* other services. Given that health services are in the nature of a meritorious service with significant inter-state spillovers, it is important to ensure minimum normative standards of services by giving specific purpose transfer.

The prescribed standards of health services can be ensured by providing grants equivalent to the difference between the cost of providing the prescribed quantity of the public service and existing expenditure on the services. This requires identification of the quantity of health services to be provided and its cost of provision. There are significant conceptual and empirical problems of measuring the quantity of health services and often the only possible way to measure the output is through the input purchases such as the health centres, hospital beds, medicines, number of doctors and paramedical health personnel. Difficulties in measuring the quantity are compounded by difficulties in measuring the unit cost of providing health services.

We have adopted two different approaches for measuring the health expenditure needs, which is defined as the cost of providing the normative bundle of health services. The normative bundle to be determined is the policy variable. It could be pegged at the average level, at the highest level or any other level depending on the priority assigned to the sector and resources available. Of course, the normative level need not be relative, as even the highest level can be considered inadequate. Therefore, it can be set at even higher than the highest level if the resources permit. As the National Common Minimum Programme (NCMP) indicates that over the next few years the allocation to the health sector as a ratio of GDP will be increased to two to three percent, the normative level should be



appropriately determined. In other words, it is important to peg the normative standard at successively higher levels to increasingly absorb planned increase in expenditure as indicated in the NCMP.

As mentioned above, we have, in this study, followed alternative approaches to measuring expenditure needs. In the first approach, we estimate the expenditure requirements according to the physical norms prescribed by the Ministry in its various policy statements. Thus, requirements of health centres and sub-centres, hospital beds, on the capital expenditure side, and the requirements of doctors, paramedical personnel and drugs, on the recurring expenditure side, may be estimated for the given population and its demographic composition. In fact, such a study was done by the NIPFP for the National Commission on Macroeconomics of Health. The analysis indicates that significant additional resources will have to be incurred to provide minimum standards of services. As per the accepted norms almost 60 percent of the shortfall in expenditure, were in just two states of Uttar Pradesh and Bihar (Rao, Choudhury, and Anand, 2005). Based on the norms, detailed work will be carried out to estimate normative expenditure on the lines indicated in the above study, which could form the basis of equalisation. In doing so, it would be useful to consolidate the various centrally sponsored schemes and undertake equalisation.

In the second approach, the cost of providing the normative standard of health services is estimated. The equalisation is worked out in relation to these normative expenditure based on the estimated cost functions. This would require estimation of the cost function by regressing expenditure on various factors determining the 'quantity' (including quality) of health services and cost factors. The cost factors can be within the control of state governments or beyond their control. By substituting the normative value of the 'quantity' and cost factors within the states' control, and actual value of cost factors beyond their control in the estimated cost functions, it is possible to estimate the cost of providing the average standard of service. This estimate of expenditure need can be used for equalisation. This is the approach followed by the Ninth Finance Commission for estimating expenditure needs in respect of a number of services including health services (India, 1990; Rao and Agarwal, 1994).

This study employs both the approaches, with suitable modifications to estimate the additional resource requirements across states. In the former approach we adjust the national norms for the density of population and tribal population in each state for estimating the additional requirement of resources across states. States like Madhya Pradesh, Orissa, and Rajasthan have a much lower density of population than the national average and providing health facilities as per the national norms underestimates their requirements in terms of health facilities required within a specified area. Also, we use the norms separately specified for the tribal areas in each state, to adjust the resource requirements for this population. In the latter approach, although we estimate resource requirements across states based on an expenditure function, estimated through *ordinary least squares* in a pooled regression, we explore the possibility of using a panel data regression (using state-specific fixed effects) and highlight the methodological limitations that render such an analysis less reliable for predicting the state-wise resource requirements. Although, conceptually, a panel data analysis using state-specific effects could capture the effect of a number of state-specific factors other than those included in the model to determine the unit costs of service provision, data limitation and interlinkages between different variables within the health sector restricts such an analysis. Importantly, unlike the Finance Commissions, both the approaches refer to norms declared at the national level and not state-level averages as the benchmark for equalisation.

## VI. Estimation of Resource Requirements Based on Exogenous Norms

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The first approach uses national norms and standards to estimate the state-wise additional resource requirement for providing health infrastructure in the rural areas. Specifically, the estimate of additional resource requirement for providing rural health infrastructure across states has three components. The first component deals with the additional capital and recurring costs that need to be incurred to provide new Sub Centres (SCs), Primary Health Centres (PHCs) and Community Health Centres (CHCs) as per the national norms. The second component deals with the additional recurring costs that need to be incurred if the existing SCs, PHCs and CHCs need to be provided with manpower to meet the Indian Public Health Standards (IPHS). The third component deals with the additional requirement for providing the existing health facilities with equipments and drugs as per the IPHS standards. Although additional requirement of resources should include requirements for urban infrastructure as well, the absence of norms or standards for urban infrastructure restricts our analysis to the requirement in the rural areas.

For estimating the first component, we use the national norms on rural health infrastructure, which suggest a minimum of 1 SC for every 5000 population, 1 PHC for every 30,000 population and 1 CHC for 1,20,000 population in plain areas. The corresponding norms for tribal areas are 3,000, 20,000 and 80,000 respectively. To take into account the increased requirement due to low density of population in certain states, these norms are adjusted for the density of population before estimating the resource requirements at the state level. Using the adjusted norms, the estimation of resource requirement at the state-level is carried out in three stages. First, using the projected rural population of 2005 provided by the Registrar General, and the ratio of tribal and non-tribal population as per *Census 2001*, we estimate the number of SCs, PHCs and CHCs required in the rural areas of each state to meet the adjusted national norms. Using information on the existing number of SCs, PHCs and CHCs in each state in 2005 from the *Bulletin on Rural Health Statistics 2006*, we then derive the additional facilities that need to be built in each state. The additional

requirement of health facilities is then multiplied by the unit cost of building an SC, PHC and CHC and the annual recurring cost to be incurred in these facilities to arrive at the total estimate of resources required for building new facilities to meet the national norms. The unit cost of building SCs, PHCs and CHCs and the annual recurring cost to be incurred is sourced from the details provided in the framework for implementation of the National Rural Health Mission. The capital cost of building a SC, PHC and CHC includes the cost of building the facility, associated staff quarters and providing equipment and furniture in the facility as per the IPHS standards. The required annual recurring cost includes the cost of meeting the salary expenses of the required staff, providing drugs as per IPHS standards and meeting some of the other miscellaneous expenses.

The estimation of the second component is carried out in three stages. First, the required manpower in specific positions is evaluated using information on the existing number of facilities (sourced from the *Bulletin on Rural Health Statistics, 2006*) and the required manpower in each facility based on the IPHS standard. Second, the additional manpower required in specific positions is then derived using information on the existing number of personnel in specific positions in SCs, PHCs and CHCs in each state. The additional recurring cost to be incurred to meet the manpower requirements as per IPHS standards is then estimated using the annual cost of each personnel in specific positions provided in the framework for implementation of the National Rural Health Mission. The required additional manpower is then estimated for each position in each state. As information on the existing number of personnel in various medical and paramedical positions is sourced from the *Bulletin on Rural Health Statistics 2006*, the analysis is limited to the categories of manpower available in the *Bulletin*. These categories include auxiliary nurses and midwives (ANMs) at SCs and PHCs, male health workers at SCs, health assistants (LHVs) at PHCs, doctors at PHCs, specialists at CHCs, , pharmacists, laboratory technicians, and nurses/midwives at PHCs and CHCs and block extension educators. To the extent that the category of manpower for which information is available is not exhaustive, the additional requirement for this component is an underestimation.

The estimate for the third component is an approximate one. The need for approximation arises from the fact that data on the extent of availability of equipments and drugs in rural health facilities is extremely limited. The only comparable state wise information is available from the facility survey conducted by the Indian Institute of Population Studies (IIPS), Mumbai in 2002-04. The survey provides information on the percentage of PHCs and CHCs having at least 60 percent of a pre-defined set of equipments and drugs. We apply this percentage to the set of equipments and drugs defined by the IPHS standards. Using information on the cost of providing the entire set of IPHS equipments (provided by the NRHM) and the percentage available based on the facility survey conducted by IIPS, we estimate the additional requirement of resources for providing equipments and drugs as per IPHS standards in the existing PHCs and CHCs.

The sum total of the three components for each state constitutes the total additional requirement of resources for the year 2005. The resource requirement for the period 2005-06 to 2009-10 is estimated assuming that the required capital investment will be spread equally over the period 2005-06 to 2009-10 and the additional recurring expenditure will be incurred every year. Further, the requirement of resources for building new facilities for the additional rural population every year based on population projections provided by the Registrar General is added to each year's resource requirement in the period 2005-06 to 2009-10.

Estimates suggest that an additional investment (over and above the expenditure levels of 2004-05) of about Rs. 34283 crore or over one percent of GDP is required to fill in the gap in physical facilities, manpower, drugs and equipments in SCs, PHCs, and CHCs in the 15 major states under analysis (Table 5). Of this additional requirement, the four states of Uttar Pradesh, Madhya Pradesh, Rajasthan, and Bihar account for more than 50 percent. In fact, these four states along with West Bengal, Orissa, and Andhra Pradesh account for around three-fourths of the total requirement of resources. As percent of GSDP, the low income states of Bihar, Madhya Pradesh, Rajasthan, Orissa, Uttar Pradesh, and Assam occupy the first six positions in terms of additional requirement of resources. The additional requirement of resources is particularly high in the states of Bihar and Madhya Pradesh with an additional investment

requirement of 4.3 and 3 percent of GSDP respectively in 2009-10. With this additional requirement, as a percent of GSDP, at least five states (primarily states with low incomes and low health achievements) would require an expenditure of 3 percent of GSDP or more in 2009-10. On the whole, to provide the basic requirements of healthcare in different states, an additional commitment of at least one percentage point to GDP would be required. This implies, that basic health sector infrastructure would require an additional one percent of GDP to be committed from the government budget and a more satisfactory provision would require, substantially higher amounts. From this perspective, the commitment to increase health expenditures, from the prevailing level to 2-3 percent of GDP, seems to be certainly appropriate.

Table 5: Additional Requirement of Resources in the Health Sector, 2005-06 to 2009-10

States	(as percent of GSDP)												Additional Resources required 2005-10	
	Actual		Estimated Additional				Estimated Total					Total (Rs. crore 2004-05 prices)	Percent of total	
	I		II				I+II							
2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2005-06	2006-07	2007-08	2008-09	2009-10				
Andhra Pradesh	0.77	1.02	0.99	0.97	0.94	0.92	1.79	1.76	1.73	1.71	1.68	2740	7.99	
Assam	0.97	1.86	1.85	1.83	1.82	1.81	2.83	2.82	2.80	2.79	2.77	988	2.88	
Bihar	1.10	4.11	4.16	4.21	4.26	4.32	5.21	5.26	5.31	5.37	5.42	3233	9.43	
Gujarat	0.54	0.76	0.71	0.67	0.64	0.60	1.30	1.26	1.21	1.18	1.14	1752	5.11	
Haryana	0.47	0.46	0.44	0.43	0.41	0.40	0.93	0.92	0.90	0.89	0.87	503	1.47	
Karnataka	0.70	0.71	0.68	0.66	0.64	0.62	1.41	1.39	1.37	1.35	1.33	1226	3.57	
Kerala	0.92	0.53	0.51	0.50	0.48	0.46	1.45	1.43	1.41	1.40	1.38	640	1.87	
Madhya Pradesh	0.87	3.08	3.06	3.04	3.02	3.00	3.96	3.93	3.91	3.89	3.87	4405	12.85	
Maharashtra	0.53	0.42	0.41	0.39	0.38	0.36	0.95	0.94	0.93	0.91	0.90	1956	5.71	
Orissa	1.06	2.67	2.54	2.42	2.30	2.18	3.74	3.60	3.48	3.36	3.25	2104	6.14	
Punjab	0.69	0.50	0.50	0.49	0.49	0.49	1.19	1.18	1.18	1.18	1.18	502	1.47	
Rajasthan	0.98	2.42	2.38	2.34	2.29	2.25	3.40	3.36	3.31	3.27	3.23	3874	11.30	
Tamil Nadu	0.72	0.62	0.60	0.59	0.58	0.57	1.33	1.32	1.31	1.30	1.29	1395	4.07	
Uttar Pradesh	0.96	2.14	2.11	2.07	2.04	2.01	3.10	3.06	3.03	3.00	2.96	6290	18.35	
West Bengal	0.68	0.95	0.92	0.89	0.87	0.84	1.63	1.60	1.58	1.55	1.53	2676	7.81	
Total												34284	100.00	

**Note:** Projections of GSDP have been made using the trend growth rate between 2001-02 and 2004-05

Estimated required expenditure have been converted to current year prices assuming a 7 percent inflation rate

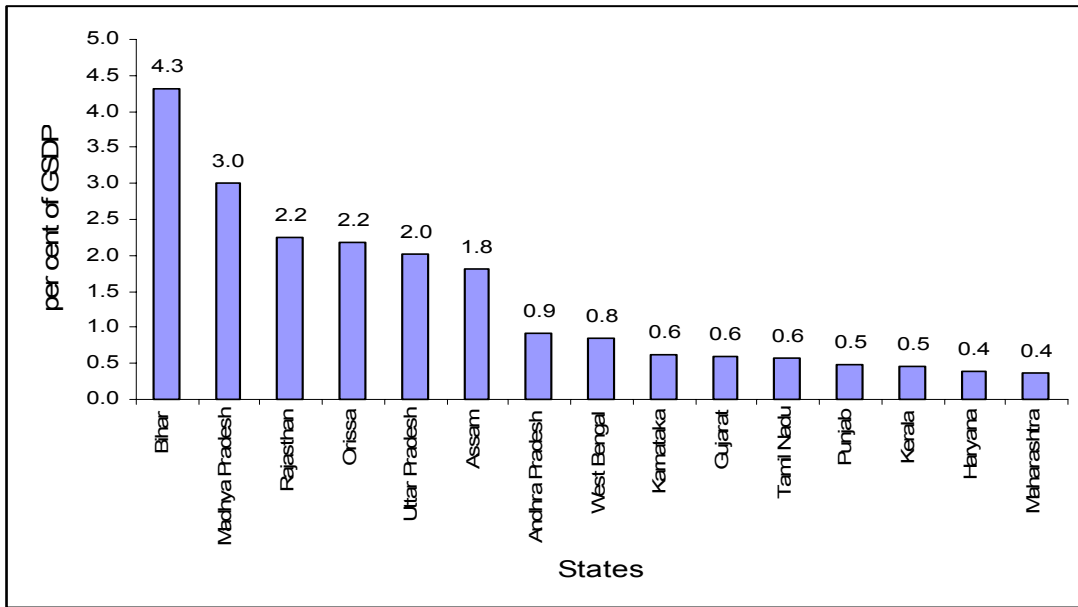
Table 6: Additional Requirement of Resources in the Health Sector, 2005-06 to 2009-10

(Rs. per capita, 2004-05 prices)

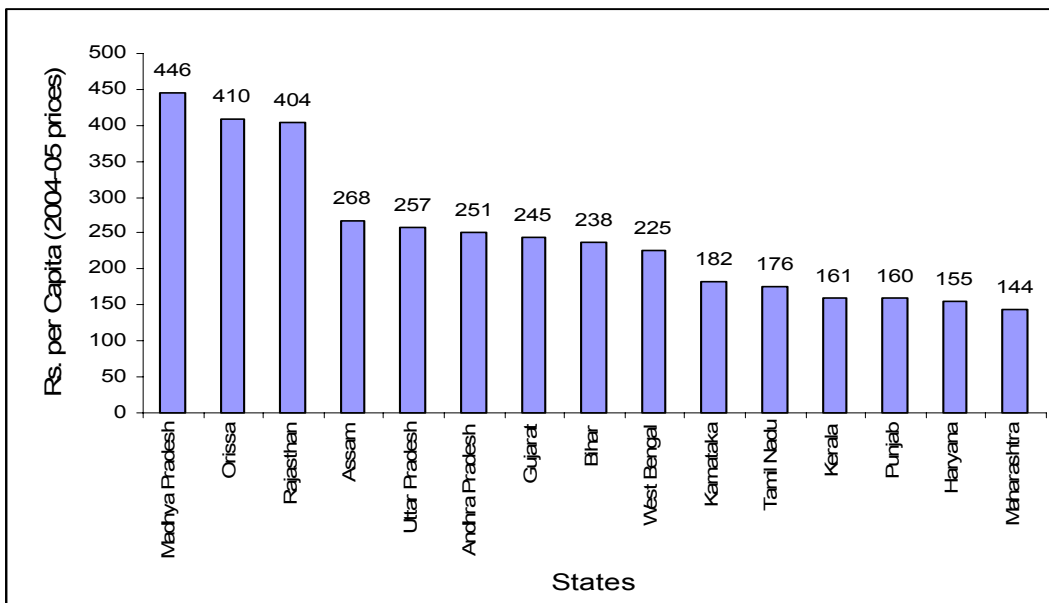
State	Actual		Estimated Additional				Estimated Total				
	I		II				I+II				
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2005-06	2006-07	2007-08	2008-09	2009-10
Andhra Pradesh	196	262	259	256	254	251	458	455	452	450	447
Assam	149	283	279	275	271	268	432	428	424	420	417
Bihar	71	253	249	245	242	238	324	320	316	313	309
Gujarat	181	260	256	252	249	245	441	437	433	429	426
Haryana	174	167	164	161	158	155	341	338	335	332	329
Karnataka	189	191	189	187	184	182	380	378	376	374	372
Kerala	279	166	165	163	162	161	445	443	442	441	439
Madhya Pradesh	138	477	469	461	453	446	615	607	599	591	584
Maharashtra	194	153	151	149	147	144	348	345	343	341	339
Orissa	164	426	422	418	414	410	590	586	582	578	574
Punjab	237	168	166	164	162	160	405	403	401	399	397
Rajasthan	177	433	425	418	411	404	611	603	595	588	581
Tamil Nadu	210	181	180	178	177	176	391	390	388	387	386
Uttar Pradesh	126	277	272	267	262	257	403	398	393	388	383
West Bengal	168	235	232	230	227	225	403	400	398	396	393



**Figure 3:** Additional Resources required for the Health Sector as a Proportion of GSDP, by State, 2009-10 (percent)



**Figure 4:** Additional Resources required for the Health Sector Per Capita, by State, 2009-10 Rs. Per Capita (2004-05 prices)



In per capita terms, the five low income states of Madhya Pradesh, Orissa, Rajasthan, Assam, and Uttar Pradesh again occupy the top five positions (Table 6). It may be noted that because of the high density of population in Bihar, it ranks relatively low in per capita terms.

Interestingly, an estimate of the GSDP required to meet the expenditure requirements in 2009-10 (assuming that the state will spend the same proportion of GSDP on health as in 2004-05), suggests that the five low income states of Bihar, Madhya Pradesh, Orissa, Rajasthan, and Uttar Pradesh require significant increases in their GSDP (Table 7). In states like Bihar, Madhya Pradesh, and Uttar Pradesh, the required growth rate of GSDP between 2004-05 and 2009-10 is more than double the actual growth rate in the last 6 years. For states like Rajasthan and Orissa also, the required growth rates are substantially high. Given the past growth rate, it is extremely unlikely that the states would be able to achieve such high growth rates in GSDP and this underlines the importance of central transfers in the form of health sector equalisation grants in these states.

**Table 7:** Actual and Required Real Growth Rate of GSDP in Selected Low-Income States (percent)

States	<i>Actual</i> rate of growth of GSDP between 1999-2000 and 2004-05 (constant prices)	<i>Required</i> rate of growth of GSDP between 2004-05 and 2009-10 to meet health expenditure needs (constant prices)
Bihar	3.6	8.3
Madhya Pradesh	2.7	9.3
Orissa	6.0	8.3
Rajasthan	5.4	9.5
Uttar Pradesh	4.0	11.1

## VII. Expenditure Need Estimation Based on the Expenditure Function Approach

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The second approach involves estimation of a health expenditure function across states and using the estimated function to assess state wise expenditure requirements. The estimation is carried out using a regression analysis and the normative values are replaced in the estimated function to derive the additional expenditure requirements across states.

The estimated health expenditure function attempts to relate health expenditure to its determinants (explanatory variables). In particular, we focus on five variables to explain variations in health expenditures across states. First, to capture quantity of health services provided in the states, we focus on the number of health facilities and manpower (in specific categories mentioned earlier) in the rural areas and number of hospital beds in states. Secondly, we use per employee salary across states to control for any effect of increase in health expenditures arising out of differences in salary structure, which in turn can affect the unit cost of service provision across states. The third category of variables, relates to the factors that are likely to affect the unit cost of service provision, but are beyond the control of the state. These include the density of population and population below the age of five.<sup>4</sup>

Data limitations on health infrastructure, constrain the choice of model used in this analysis. Although, some data on infrastructure and manpower in the rural areas is available from the *Bulletin on Rural Health Statistics* published by the Ministry of Health and Family Welfare, limited data exists for the urban areas. Much of the health facilities in the urban areas are in the form of hospitals and the only related information available is the number of hospital beds. Even this information is available for states as a whole and not disaggregated by rural and urban areas. Moreover, this is not available consistently for all states on an annual basis. Years for which data on hospital beds were available had to be matched with data on rural health

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<sup>4</sup> Proportion of population below the age of five has a significant positive association with the proportion of population in the reproductive age group. We therefore use only one of the two i.e. the proportion of population below the age of five to capture the higher need for medical services among child population and population in the reproductive age group.

infrastructure for the same time period and if both the sets of information were available for a particular year could a state's observation for that year be included for the analysis. This reduced the number of observations available for analysis. Besides, information for each state was not available for the same years and therefore the available data was inadequate to carry out a panel data analysis. We therefore pooled the observations for each state for the year for which it was available (in the period 1996-97 to 2004-05) and estimated the expenditure function using an *ordinary least squares* method.

Interlinkages between the chosen variables impose a further constraint on the choice of explanatory variables in the regression specification. An examination of the correlation coefficients between different variables, suggest that a number of them under consideration are highly correlated (Table 8). The number of rural health facilities has a significant positive association with the extent of manpower in the rural areas across states (correlation coefficient 0.88). This restricts the inclusion of both these variables simultaneously in the regression specification due to possible multicollinearity problems. Also, the number of rural health facilities is highly correlated with population below the age of five. This restricts the simultaneous inclusion of both these variables in the regression specification. Similarly per employee salary and the extent of manpower in the rural areas cannot be simultaneously included in the regression specification.

Data on the number of SCs, PHCs and CHCs and the manpower in rural areas has been taken from various issues of the *Bulletin on Rural Health Statistics*. The total number of SCs, PHCs and CHCs is used as a proxy to represent the number of health facilities in the rural areas. Similarly, the total number of manpower in specific positions is used to represent manpower in the rural areas.<sup>5</sup> Data on the number of hospital beds has been taken from various issues of Health Information of India published by the Central Bureau of Health Intelligence. State-wise per employee salary for various years have been taken from the report of the Twelfth Finance Commission. Density of population over the years has been arrived at by dividing the number of

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<sup>5</sup> Specific positions include auxiliary nurse and midwives (ANMs) at SCs and PHCs, male health workers at SCs, health assistants/LHVs at PHCs, doctors at PHCs, specialists at CHCs, , pharmacists, laboratory technicians and nurses/midwives at PHCs and CHCs and block extension educators

population over the years, by the respective area of states. Data on proportion of population below the age of five reported by the Registrar General has been applied on year wise population to derive population below the age of five. Data on health expenditure across states have been taken from Finance Accounts of individual states for various years. Health expenditure includes the sum of expenditure under revenue account, capital account, loans, and advances less, repayments made under the budgetary head of health and family welfare.

Table 8: Correlation Coefficients between Variables used in the Analysis

Variables	Health Expenditure	Number of Health Facilities in Rural Areas	Number of Health Personnel in Rural Areas	Number of Hospital Beds	Tribal Population	Density of Population	Salary per Employee	Population below 5 years of age
Health expenditure	1	0.86**	0.86**	0.66**	0.41	0.08	0.68**	0.73**
Number of health facilities in rural areas		1	0.88**	0.33	0.27	0.06	0.68**	0.90**
Number of health personnel in rural areas			1	0.56**	0.45*	-0.08	0.83**	0.69**
Number of hospital beds				1	0.64**	0.05	0.46*	0.16
Tribal population					1	-0.54*	0.71**	0.03
Density of population						1	-0.58**	0.28
Salary per employee							1	0.42
Population below 5 years of age								1

**Note:** \*- Significant at 5 percent level.

\*\* - Significant at 1 percent level.

Given the interlinkage between various explanatory variables we first try out five alternative models using *ordinary least squares* (Table 9). The overall expenditure function is assumed as follows:

*Health expenditure = f (number of health facilities in rural areas, number of health personnel in rural areas, number of hospital beds, density of population, per employee salary, population below the age of five)*

Model 1 includes all the variables under consideration. Results indicate that the primary determinant of health expenditure is the extent of health infrastructure across states. Despite the correlations, both the number of rural health facilities and the number of hospital beds have a significant positive association with health expenditure across states. In model 2 and model 3, we try out dropping the two interlinked variables, namely number of health facilities and manpower in the rural areas, keeping the other variables constant. Results indicate that the model including the number of health facilities has a higher explanatory power than the model including manpower in rural areas. We therefore prefer model 2 over model 3. In model 4, model 5 and model 6, we try out estimating the regression dropping density of population and tribal population separately and together. Estimates suggest that model 6 including only variables on the number of health facilities in the rural areas and hospital beds has the highest explanatory power.

It may be useful to recall that the use of panel data analysis was restricted by the availability of data for the same time period on both rural infrastructure/manpower and hospital beds. In particular, the lower number of time-series observations on hospital beds restricted the use of a panel data regression. To enable introduction of state-specific effects that can potentially capture the effect of a large number of factors affecting unit cost, we attempted to estimate a panel data model using state-specific fixed effects, dropping the variable on the number of hospital beds to increase the number of observations for the analysis. The major problem in the analysis arose from the fact that many of the important explanatory variables like health infrastructure and the density of population did not have much variation over time. As a result of this, the state-specific fixed effects captured the effect of a wide range of variables. Although the number of manpower in rural areas was significantly associated with health expenditure, the low variation in the

number of health facilities in the rural areas over time, led to its effect being captured by the state-specific dummies resulting in significantly lower state-specific effects for states like Bihar, Uttar Pradesh, and Madhya Pradesh where the existing health infrastructure are relatively low. This would lead to problems in predicting resource requirements based on the above model.

We therefore use the OLS model with the highest explanatory power (Model 6) to assess the additional resource requirements across states. Specifically, the model used for estimating the resource requirements is as follows:

$$\text{(Health expenditure)}_{it} = \alpha + \beta_1 (\text{number of health facilities in rural areas})_{it} + \beta_2 (\text{number of hospital beds})_{it} + \varepsilon_{it}$$

Where,  $it$  represents the  $i^{\text{th}}$  state at year  $t$  and  $\varepsilon_{it}$  is the error term

The additional resource requirements across states are estimated by replacing the values of the required number of additional rural health facilities and hospital beds in the regression specification. Due to absence of any norms or standards at the national level on the number of hospital beds required in the urban areas, we estimate the additional resource requirements for providing infrastructure as per the national norms for rural areas. This is done by replacing the additional number of rural health facilities estimated as per the national norms (adjusted for the density of population) in the regression specification. The value for the additional hospital beds replaced in the regression specification is taken to be nil, which implies that the additional resource requirements are estimated for existing level of hospital beds. Results of this approach are therefore comparable with those in the first approach.



**Table 9:** Regression Results of Various Models used in the Analysis

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	12964913.41 (1.31)	8466693.1 (0.10)	-4243086.01 (-0.304)	-26806231 (-0.042)	1651766.1 (0.33)	546943.9 (0.11)
Number of health facilities in rural areas	5554.71** (4.69)	4579.22** (9.55)		444539** (9.108)	4496.35** (9.53)	4450.62** (9.38)
Number of health personnel in rural areas	-616.04 (-0.90)		2311.25** (5.47)			
Number of hospital beds	814.73** (4.34)	714.58** (4.75)	356.71 (1.46)	54138** (5.417)	625.59** (5.17)	542.01** (5.58)
Tribal population	-1.61 (-1.66)	-1.40 (-1.50)	-0.29 (-0.21)		-0.70 (-1.14)	
Density of population	-20619.07 (-1.28)	-14409.52 (-0.10)	13713.30 (0.63)	206163 (0.211)		
Adj. R2	0.90	0.90	0.76	0.89	0.90	0.89
F Value	35.12**	44.22**	16.64**	54.23**	58.67**	85.89**
No. of observations	21	21	21	21	21	21

**Note:** \*- Significant at 5 percent level.

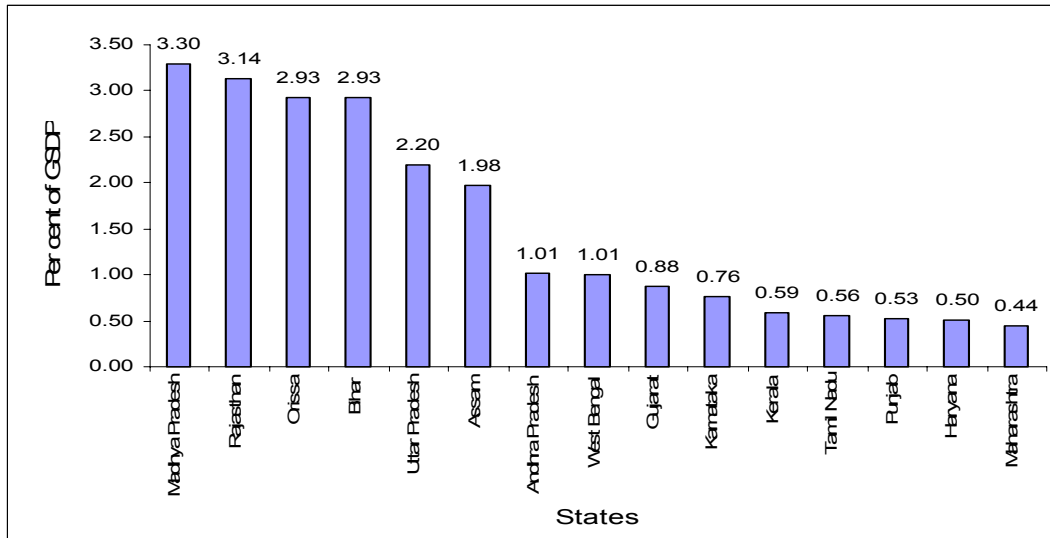
\*\* - Significant at 1 percent level.

Results indicate that the total additional resource requirement across states for providing rural health facilities as per the national norms is about Rs. 27361 crore (Table 10). This is comparatively lower than the estimated amount of Rs. 34283 crore from the first approach. The lower estimate of the required resources in the second approach arises from the fact that the model used for predicting it is primarily based on the infrastructure variable in the form of health facilities. The three states of Madhya Pradesh, Rajasthan, and Uttar Pradesh account for about 45 percent of the total requirement. These states, along with West Bengal, Orissa, Bihar, and Uttar Pradesh, account for more than 70 percent of the requirement. Also, as a percent of GSDP, the five states of Bihar, Uttar Pradesh, Madhya Pradesh, Orissa, and Rajasthan account for the highest additional requirements among states (Figure 5). In per capita terms, Rajasthan, Madhya Pradesh, and Orissa require the highest increases (Figure 6).

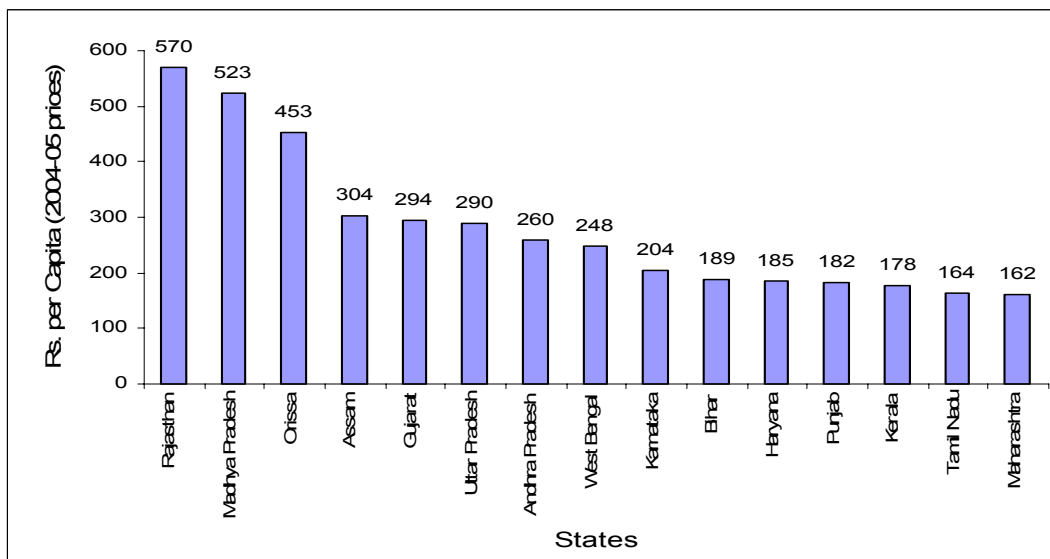
**Table 10:** Additional Resource requirement across States, 2004-05 Estimated through the Regression Approach

	Total Additional Requirement, 2004-05 (Rs. crore)	Requirement 2004-05 (as % of GSDP)	Requirement 2004-05 (Rs. per capita)
Andhra Pradesh	2054	1.01	260
Assam	861	1.98	304
Bihar	1673	2.93	189
Gujarat	1583	0.88	294
Haryana	416	0.50	185
Karnataka	1126	0.76	204
Kerala	590	0.59	178
Madhya Pradesh	3402	3.30	523
Maharashtra	1651	0.44	162
Orissa	1738	2.93	453
Punjab	469	0.53	182
Rajasthan	3465	3.14	570
Tamil Nadu	1057	0.56	164
Uttar Pradesh	5190	2.20	290
West Bengal	2086	1.01	248
Total	27361		

**Figure 5:** Additional Resources required for the Health Sector as a Proportion of GSDP, by State, 2004-05 (percent)



**Figure 6:** Additional Resources required for the Health Sector, by State, 2004-05 (Rs. per capita)



## VIII. Equalisation Grants Required for the Health Sector across States

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Both the approaches indicate that the five states of Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, and Orissa require the highest increases in expenditure as a percentage of GSDP. These are the states with low-incomes and low health achievements, and given their past trend in growth rates, are unlikely to meet their expenditure needs for the health sector. Equalisation grants from the Centre are therefore particularly important in these states. In per capita terms, the three states of Rajasthan, Madhya Pradesh, and Orissa followed by Uttar Pradesh, and Assam require the highest increases in both the approaches.<sup>6</sup>

The extent of equalisation grants required across states in the next three years is the gap between the additional resource requirements in 2004-05 (estimated in this study) and any additional central transfers that have been provided to the states following 2004-05. The Twelfth Finance Commission (TFC) and the National Rural Health Mission (NRHM) have provided some transfers for the health sector across states. The additional transfers under the National Rural Health Mission are primarily those allocated under the Mission Flexible Pool. However, allocations made under the Mission Flexible Pool are not entirely for the heads for which resource requirements have been estimated in this study. Also, while the allocations made under the Twelfth Finance Commission in the period 2005-06 and 2009-10 are known, the allocations to be made under the National Rural Health Mission in the years 2008-09 and 2009-10 are not known. Assuming that at least the allocations made under the Mission Flexible Pool in 2007-08 will continue for the next two years and 50 percent of this would be allocated for the heads for which additional requirements have been estimated in this study, an examination, of the total transfers from the TFC and the NRHM under the Mission Flexible Pool, suggests that the transfers from these two channels are negligible in comparison to the additional resource requirement in most states, excluding Assam, Bihar, and Uttar Pradesh (Table 11).

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<sup>6</sup> The estimates of Bihar in per capita terms however differ significantly in the two approaches.

**Table 11:** Additional Resource Requirement, Central Transfers and Resource Gap, by State, 2005-06 to 2009-10

	Estimated Additional Requirement (Rs. crore)			TFC	Additional Central Transfers (Rs. crore)			Gap (Rs. crore)
	Based on exogenous norms	Based on regression approach	Higher of the two estimates		National Rural Health Mission*	Total	Percentage of total requirement met	
Andhra Pradesh	2740	2054	2740	0	282.79	283	10.3	2457
Assam	988	861	988	829	603.50	1433	100.0	0
Bihar	3233	1673	3233	1881	402.93	2284	70.6	949
Gujarat	1752	1583	1752	0	189.31	189	10.8	1563
Haryana	503	416	503	0	79.00	79	15.7	424
Karnataka	1226	1126	1226	0	197.26	197	16.1	1029
Kerala	640	590	640	0	119.19	119	18.6	521
Madhya Pradesh	4405	3402	4405	169	293.55	463	10.5	3942
Maharashtra	1956	1651	1956	0	360.86	361	18.4	1595
Orissa	2104	1738	2104	163	178.55	342	16.2	1762
Punjab	502	469	502	0	90.68	91	18.1	411
Rajasthan	3874	3465	3874	0	274.38	274	7.1	3600
Tamil Nadu	1395	1057	1395	0	231.38	231	16.6	1164
<b>Uttar Pradesh</b>	<b>6290</b>	<b>5190</b>	<b>6290</b>	<b>2068</b>	<b>806.80</b>	<b>2875</b>	<b>45.7</b>	<b>3415</b>
<b>West Bengal</b>	<b>2676</b>	<b>2086</b>	<b>2676</b>	<b>0</b>	<b>299.63</b>	<b>300</b>	<b>11.2</b>	<b>2376</b>
<b>Total</b>	<b>31607</b>	<b>27361</b>	<b>31607</b>	<b>5110</b>	<b>4409.81</b>	<b>9520</b>	<b>30.1</b>	<b>22087</b>

**Note:** \* Includes 50 percent of allocations under the Mission Flexible Pool of the National Rural Health Mission.

## **IX. Concluding Remarks**

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Ensuring adequate health infrastructure is necessary to ensure access to basic healthcare facilities. This is necessary because, not only health is a basic component of happiness and wellbeing but also is a means to empowering people with capabilities and freedoms. Empowering the people with capabilities is critical for development and improvement in the health status of population. As capabilities provide freedom from hunger and poverty, ensuring access to basic preventive and curative healthcare is an essential component of anti poverty intervention.

Access to basic healthcare is necessary for improving the health status of the population. The analysis shows that the prevailing public health infrastructure is poor and its distribution is skewed towards more affluent states. Lack of adequate public health facilities forces the people to seek private healthcare. This results in lack of access and very high cost of health facilities to the poor. Typically, the public health infrastructure is abysmal in low-income states where the poor are concentrated. Thus, the poor do not have adequate access to health care and what little exists is often beyond their means. It is therefore, important to augment public spending on healthcare in the country and target the increased spending on low-income states where the overwhelming proportion of the poor live and health spending is abysmally low.

Concerned with the problem of inadequacy and uneven spread of health infrastructure, the Twelfth Finance Commission worked out an equalisation scheme and recommended equalising transfers to states. Similarly, the Government of India introduced a National Rural Health Mission by combining a number of centrally sponsored schemes to provide better access to health services in rural areas. Although these schemes are important, their adequacy and design leave much to be desired. The study makes an in depth analysis of these schemes and brings out their shortcomings.

The important objective of this study is to work out an equalisation scheme that would address the questions of both adequacy and spread of

healthcare facilities. To achieve this, the study attempts to estimate expenditure needs of healthcare using alternative approaches. In the first, it estimates the expenditure requirement for ensuring both physical and human infrastructure involved in the healthcare. In the second approach, the study estimates the cost functions in an econometric model and based on this estimates the cost of providing the prescribed standard of services, which is taken as, expenditure need.

Even with a limited focus on the additional requirements for the rural areas, our estimates suggest that public expenditure on health in the country has to be raised to at least 2.2 percent of GDP.<sup>7</sup> It is important to remember that our estimates *do not* include the additional requirements for the urban areas. Absence of norms and data limitations on urban areas restricts our analysis to the rural areas. With secondary and tertiary health facilities located in urban areas, it is likely that if one adds up the additional expenditure requirement for the urban areas, the overall expenditure requirement for the health sector for the country as a whole would be above 3 percent of GDP. Importantly, this also excludes any additional expenditure requirement towards reduction of malnourishment and providing safe drinking water and sanitation, which have a close bearing on health status.

The overall requirement masks the inter-state disparities in expenditure requirement for the health sector. The requirement of expenditure for the health sector is particularly high in some states of the country. Even while considering the additional requirements for the rural areas only, expenditure requirement in states like Bihar, Uttar Pradesh, Orissa, Madhya Pradesh, and Rajasthan is more than 3 percent of their GSDP. These are low income states and have limited capability in meeting their expenditure requirement for the health sector. These are also the states, which have low health achievements and pull down the health indicators for the country as a whole. Achieving health goals in the country would therefore require central transfers for the health sector to be specifically targeted at these states.

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<sup>7</sup> The estimate of 2.2 percent of GDP is an approximate figure based on average requirement across states.

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**National Institute of Public Finance and Policy**  
18/2, Satsang Vihar Marg,  
Special Institutional Area, New Delhi-110067  
Website : [www.nipfp.org.in](http://www.nipfp.org.in)