

Annexure I

Core Package of Essential Health Interventions for Universal Free Services as Out Patients

List of diseases / health conditions	Approx. no. of cases for 2005 population	Unit cost of treatment (Rs.)	Total cost for treating (Rs. in crores)	Proportionate distribution of costs component-wise (in %)				
				Manpower	Equipment	Test	Drugs	System
Core package								
1. Childhood diseases / health conditions								
a. Immunization	26,315,925	84.51	222.39	32	21	0	12	35
b. Acute Respiratory Infections : Pneumonia	34,184,386	141.49	483.68	12	0	0	4	84
c. Diarrhoea : With some dehydration	34,184,386	269.82	922.37	51	0	0	5	44
d. Diarrhoea : With Severe dehydration	3,418,439	742.99	253.99	78	0	2	7	13
e. Dysentery	3,418,439	77.47	26.48	22	0	0	1	76
2. Maternal diseases / health conditions								
a. Antenatal care	26,315,925	278.46	732.80	11	0	0	56	34
b. Abortions	540,346	422.59	22.83	16	10	0	67	8
c. Female sterilization	4,726,882	886.99	419.27	59	2	5	32	3
d. Vasectomy	236,344	200.27	4.73	64	5	0	17	15
e. IUD insertion	6,202,399	86.89	53.89	30	2	0	0	68
f. Oral contraceptives	8,619,508	79.96	68.92	25	0	0	1	74
g. Condoms	17,476,568	79.96	139.74	25	0	0	1	74
h. Postnatal care	26,315,925	236.88	623.37	13	0	0	33	55
3 Blindness								
a. Blindness due to refractive errors & Low Vision	2,884,777	165.97	47.88	42	4	0	16	38
4 Leprosy								
a. Paucibacillary	404,957	393.01	15.92	24	0	0	28	48
b. Multibacillary	213,036	1,167.53	24.87	21	0	0	57	21
5 Tuberculosis								
a. New sputum positive	3,900,000	840.98	327.98	38	0	4	28	30

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Core Package of Essential Health Interventions for Universal Free Services as Out Patients [Continued]

List of diseases / health conditions	Approx. no. of cases for 2005 population	Unit cost of treatment (Rs.)	Total cost for treating (Rs. in crores)	Proportionate distribution of costs component-wise (in %)				
				Manpower	Equipment	Test	Drugs	System
b. New sputum negative	3,800,000	780.02	296.41	41	0	0	26	32
c. Treatment after default / Retreatment / Failure	397,922	1,240.36	49.36	32	0	0	38	30
d. Extrapulmonary	800,000	780.02	62.40	41	0	0	26	32
6 Vector borne diseases								
a. Malaria : P. falciparum	814,800	150.60	12.27	19	0	13	6	62
b. Malaria : P. vivax and P. ovale	1,222,200	148.81	18.19	19	0	13	5	63
c. Kala azar	17,321	1,677.09	2.90	36	0	21	6	37
7 RTIs / STIs	4,929,763	956.90	471.73	41	0	0	13	46
8 Preventive and promotive activities @ Rs. 20 per capita to be spent by Gram Panchayats / Village Health Committees	1,061,126,000		2122.25					
9 Minor injuries including falls	23,746,056	225.85	536.31	33	0	0	41	26
10 Other minor ailments	265,281,500	57.54	1526.50	40	0	0	8	51
11 Snake bite	3,957,676	462.65	183.10	49	0	0	27	24
Grand Total (Rs. in crores)			9,700					
Total cost per capita (Rs.)			90					
GRAND TOTAL FOR CORE PACKAGE OF SERVICES (OUTPATIENT AND INPATIENT) (Rs. in crores)				9,700				

N.B. Manpower includes the time devoted by doctors, nurses and other staff directly for patient care
Equipment includes depreciated annual cost of equipment per patient for treating a particular disease.
Equipments that can be used by many departments (like weighing machine, BP instrument, Boyle's apparatus, etc) were not included here and instead included in systems cost.
Laboratory & diagnostic equipments were not included here as the charges of tests charged by some govt. hospitals were used for costing of tests.
Cost of test includes the user charges for tests charged by some govt. hospitals.
Cost of drugs include the minimum cost of treatment of a particular disease / health condition.
Systems cost include salaries of doctors & nurses / ANMs apportioned on estimated time spent on administration, cost of equipment used by many departments, depreciated cost of building & its maintenance & other operational costs like consumables.
Estimation of manpower costs are based on salaries in government sector; salaries of manpower in private sector could be 100 to 200% higher
Estimation of costs of drugs is based on government procurement prices; in private sector cost of drugs could be 50 to 100% higher
System cost per case could be reduced by improving quality and hence efficiencies by more number of cases coming to each health facility

Annexure II

Basic Health Care Services to be provided at 30-bed Community Health Facility located at 1,00,000 population

(including all inpatient treatment required at CHC for Core Package)

List of diseases / health conditions	Unit cost of treatment (Rs.)	Approx. no. of cases for 1 lakh population	Total cost for treating (Rs. in lakhs)	Proportionate distribution of costs component-wise (in %)				
				Manpower	Equipment	Test	Drugs	System
A. Inpatient treatment required at CHC for Core package								
1. Childhood diseases / health conditions								
a. Birth asphyxia	1,621.14	25	0.40	36	47	0	10	7
b. Neonatal sepsis	7,086.53	25	1.76	83	0	1	7	8
c. Low birth weight (Bwt 1500-1800g)	1,604.73	99	1.59	49	6	1	21	22
d. Low birth weight (Bwt 1800-2500g)	1,460.20	570	8.33	13	6	0	0	81
e. Acute Respiratory Infections: Severe pneumonia	4,435.18	322	14.29	66	0	2	21	10
2. Maternal diseases / health conditions (to be provided free to 50% and user charges collected for cases from APL families)								
a. Normal delivery	509.89	2,108	10.75	82	7	0	0	12
b. Puerperal sepsis	1,102.66	18	0.20	51	0	4	21	25
c. Septic abortion	1,102.66	5	0.06	51	0	4	21	25
d. Antepartum hemorrhage	4,657.31	12	0.56	73	2	0	6	19
e. Postpartum hemorrhage	3,568.40	21	0.75	72	3	4	4	17
f. Eclampsia	8,115.83	25	2.03	88	1	2	2	6
g. Obstructed labour	2,192.23	32	0.70	53	4	2	11	30
h. Remaining Caesarean Sections	2,192.23	92	2.02	53	4	2	11	30
i. Severe anemia	2,333.79	248	5.79	27	0	0	61	12
3 Blindness								
a. Cataract blindness (to be provided free to 50% and user charges collected for cases from APL families)	1,737.01	452	7.85	24	37.00	1	4	34
4 Vector borne diseases								
Malaria : Complicated	914.78	40	0.36	46	0	2	23	30
Sub-total (Rs. in lakhs)			60					
Per capita cost (Rs.)			60					
Total cost of providing inpatient care for Core Package of			6,300					
* Recovery from households includes recovery from BPL families N.B. These costs are based on the assumption of recovery of total cost of treatment from all cases from APL families								

Annexure II

Basic Health Care Services to be provided at 30-bed Community Health Facility located at 1,00,000 population [Continued]
(including all inpatient treatment required at CHC for Core Package)

List of diseases / health conditions	Unit cost of treatment (Rs.)	Approx. no. of cases for 1 lakh population	Total cost for treating (Rs. in lakhs)	Proportionate distribution of costs component-wise (in %)				
				Manpower	Equipment	Test	Drugs	System
services (Rs. in crores)								
Total cost of providing outpatient care for Core Package of services (Rs. in crores)			9,700					
services (Rs. in crores)								
GRAND TOTAL FOR CORE PACKAGE OF SERVICES (OUTPATIENT AND INPATIENT) (Rs. in crores)			16,000					
B. Additional services to be performed at CHC for Basic Package								
1 Chronic otitis media	163.88	3,000	4.92	33	2	0	29	36
2 Diabetes mellitus								
Without insulin	1,139.43	2,065	23.53	13	0	25	51	11
With insulin	5,109.46	885	45.23	3	0	21	73	2
3 Hypertension				8	0	56	28	8
With diet & exercise	424.84	857	3.64	21	0	56	0	22
With one drug	456.12	1,714	7.82	20	0	53	7	21
With two drugs	740.82	857	6.35	12	0	32	43	13
4 Chronic Obstructive Pulmonary Disease	1,008.81	1,461	14.74	20	0	54	16	11
5 Asthma	673.32	2,330	15.69	5	0	6	86	2
6 Major Surgeries	7,997.00	438	35.03					
7 Accidents / major injuries	8,777.77	438	38.45					
8 Counselling for Psychiatric Care	318.87	6993	22.30	63	0	0	0	37
Per capita costs (Rs.) @ 70%			310					
Total costs for 7951 CHCs (Rs. in crores) in rural areas			24,650					

N.B. These calculations are based on the assumption of about 70% estimated cases availing of services
 These calculations are based on the assumption of recovery of cost for a utilization by an estimated 70% of population
 Manpower includes the time devoted by doctors, nurses and other staff directly for patient care
 Equipment includes depreciated annual cost of equipment per patient for treating a particular disease.
 Equipments that can be used by many departments (like weighing machine, BP instrument, Boyle's apparatus, etc) were not included here and instead included in systems cost.
 Laboratory & diagnostic equipments were not included here as the charges of tests charged by some govt. hospitals were used for costing of tests.
 Cost of test includes the user charges for tests charged by some govt. hospitals.
 Cost of drugs include the minimum cost of treatment of a particular disease / health condition.
 Systems cost include salaries of doctors & nurses / ANMs apportioned on estimated time spent on administration, cost of equipment used by many departments, depreciated cost of building & its maintenance & other operational costs like consumables.
 Estimation of manpower costs are based on salaries in government sector; salaries of manpower in private sector could be 100 to 200% higher
 Estimation of costs of drugs is based on government procurement prices; in private sector cost of drugs could be 50 to 100% higher
 System cost per case could be reduced by improving quality and hence efficiencies by more number of cases coming to each health facility

Annexure III

Cost of providing Secondary Care services at District Hospital

List of diseases / health conditions	Unit cost of treatment (Rs.)	No. of cases per lakh population	Total cost (Rs. in lakhs)	Cost in percentage (per case)						
				Manpower	Equipment	Test	Drugs	System Cost	Total Cost	
Secondary Care Package										
1	Cardiovascular diseases									
a.	Coronary Artery Disease									
	Incident cases	12,324.18	283	34.84	48	2	10	34	6	100
	Prevalent cases	5,069.10	3,353	169.97	6	-	23	67	4	100
b.	Rheumatic Heart Disease									
		1,406.43	72	1.01	34	15	25	8	18	100
2	Acute Hypertensive stroke									
		10,028.87	118	11.79	60	-	11	24	5	100
3	Cancers									
a.	Breast cancer									
		4,289.44	11	0.46	54	-	14	8	23	100
b.	Cancer of cervix									
		10,016.04	10	1.00	23	-	4	63	10	100
c.	Lung cancer									
		3,854.44	2	0.08	60	-	2	12	26	100
d.	Stomach cancer									
		7,106.55	3	0.21	33	-	5	55	7	100
4	Mental diseases / health conditions									
a.	Schizophrenia									
	Without Hospitalisation	1,844.40	289	5.33	44	-		40	16	100
	With Hospitalisation of 10 Days in 5%	5,093.80	15	0.78	57	-		14	29	100
b.	Mood / Bipolar disorders									
	Without Hospitalisation	2,982.34	1,543	46.01	27	-		63	10	100
	With Hospitalisation of 10 Days in 5%	6,053.76	81	4.92	45	-		31	24	100
c.	Common Mental disorders									
		1,987.25	2,030	40.34	20	-		65	15	100
d.	Child and adolescent psychiatric disorders									
		2,023.10	2,517	50.92	47	-		36	17	100
e.	Geriatric problems including Dementia									
		6,273.69	406	25.47	13	-		81	5	100
f.	Epilepsy									
		2,461.63	913	22.48	33	-		53	14	100
5	Major injuries & emergencies (50%)									
		8,777.77	438	38.45						100
6	Other major surgeries (50%)									
		7,997.00	438	35.03						100
	Total cost (Rs. in lakhs)			489						
	Premium per capita @ 70%			699						
	Total cost for a district of 18 lakhs population (Rs. in crores)			126						
	Total cost @ 70% (Rs. in crores) for 500 Districts			62,882						
N.B. These calculations are based on the assumption of about 70% estimated cases availing of services										

Annexure IV

Methodology for Unit Cost Estimates of Essential Health Investment (EHI) and Primary Health Infrastructure

I. Unit Cost Estimation of EHI :

1. The costs were estimated under five heads:
 - a. Manpower cost
 - b. Cost of equipment
 - c. Cost of laboratory investigations
 - d. Cost of drugs
 - e. Systems cost
2. These costs are based on managing diseases / health conditions only upto the District Hospital level, i.e., at sub-centres, at PHCs, at CHCs and at District Hospitals. Tertiary level care has not been included for the purpose of costing. Therefore, cost of operation for Rheumatic Heart Disease has not been included as part of these costs, just as radiotherapy / surgery for cancers, etc.
3. Manpower cost:
 - a. This was estimated based on time of health care providers (directly linked with providing health care) required for managing a case (one episode in case of acute disease, annually for chronic diseases and per child for immunization and per pregnant mother for ANC, etc.). The salaries of ward boys, sweepers, clerks, and administrative staff were not taken into account for managing the case - these were included as part of systems cost. Time taken for managing a disease / health condition was obtained from experts / clinicians.
 - b. Since there is a whole spectrum of severity of illness, the lower limit of time range provided by clinicians was taken for estimating manpower cost. E.g., for managing a case of birth asphyxia at a CHC, the clinician suggested inpatient treatment for 1-2 days, specialist's time of 1 hr / day and nurses' time of 2 hr / day. In this case, taking the lower limit of inpatient management, i.e., 1 day, it was estimated that a specialist would spend $1 \times 60 = 60$ min and a nurse would spend $1 \times 120 = 120$ min per case. Similarly, for managing a case of low birth weight baby with weight 1500-1800 g at CHC, the clinician suggested inpatient care for 3-5 days and specialist's time of $\frac{1}{2}$ hr, the manpower time of specialist was taken as $3 \times \frac{1}{2}$ hr = 90 min.
 - c. For estimating the manpower cost, the Central Government pay scales were considered. The middle of the scale was taken as the base and Non-Practicing Allowance (for doctors), Dearness Allowance, House Rent Allowance, City Conveyance Allowance, etc. were taken for calculation of total monthly salary. 24 working days per month and 6 hrs of work per day were taken into account for estimating the manpower cost per minute. Manpower salary for different categories was apportioned as per the time recommended by clinicians for managing a case.
 - d. For ICU / chemotherapy for cancers, clinicians recommended 24-hrs nurses' time. For apportioning this time, three shifts of nurses per day and one nurse for three beds was considered.
4. Cost of equipment:
 - a. Cost of different equipments was obtained from the market. There is a wide range in rates and specifications of same equipment. In most cases, the opinion of clinicians was taken for the specification to be taken. E.g., a labour table is available for Rs. 3500 (enamel coated), Rs. 10000 (stainless steel) and Rs. 150000 (with advanced features). The clinician recommended we take the cost of stainless steel labour table because of its intermediate cost and longer life.
 - b. Similar information on costs, maintenance and life of equipments was obtained from other institutions of repute.
 - c. The clinicians were consulted for knowing the life of equipment (in years or in terms of number of procedures). The cost of equipments was depreciated accordingly and annual costs apportioned to one case to arrive at unit cost of equipments.
 - d. Diagnostic equipments were not taken into account as the cost of laboratory tests were taken as such as explained below.
 - e. Cost of equipments required in specific clinical specialities was apportioned to management of a case of a disease. Cost of equipments that were used by many departments were not apportioned here, and were included as part of systems cost. E.g., Operating table, Boyle's apparatus, weighing machine, Blood Pressure instrument, etc. are used by many departments and costs of these were included in systems cost.
5. Cost of laboratory investigations:
 - a. An effort was made to estimate the cost of laboratory tests. But, arriving at the cost of one sputum examination took almost 5 working hours. This appeared to be not feasible and it was decided that some other mechanism would be followed.
 - b. These days many hospitals in India charge user fees from clients for various investigations. The costs of laboratory investigations charged by Rajasthan Medicare Relief Societies (RMRS) were taken into consideration for costing purpose.
 - c. Costs of those investigations that were not available from RMRS were taken from other such institutions. E.g., for spirometry and other pulmonary function tests, the charges of Patel Chest Institute, Delhi were considered.

6. Cost of Drugs:
 - a. The treatment regimen (drug, dosage and duration) provided by clinicians was taken into consideration for arriving at the cost of drugs. This was based on the bare minimum required for managing a case of a particular disease / health condition. Thus, for the management of a case of diabetes only the cost of the drugs Metformin and Glibenclamide for managing uncomplicated diabetes were considered (and costs of Aspirin, Atorvastatin and Enalapril for managing complicated diabetes were not considered for the purpose of our costings).
 - b. Initially, the retail cost of drugs was considered for arriving at the cost of drugs. For this, the retail cost of different drugs available in MIMS INDIA - Monthly Index of Medical Specialities - was considered. If there were more than one brand drugs available in MIMS, the minimum cost was taken.
 - c. Later on, the tender rates of Tamil Nadu Medical Supplies Corporation (TNMCS) were incorporated (if they were available for the particular drug). After that, the tender prices of drugs procured by Central Procurement Agency of Government of Delhi, if any, were also incorporated to arrive at the drugs cost.
 - d. As regards vaccines for immunization, the purchase prices of Government of India were considered.
 - e. In short, now the drug rates used in the entire costing exercise contain rates from MIMS, TNMCS and CPA Delhi.
7. Systems cost:
 - a. An exercise was undertaken by National Productivity Council (NPC), Delhi by survey of a number of health facilities for arriving at systems costs. The costs of building, equipment for general use (that had not been included in costs for managing a case of diseases / health conditions under consideration) and salary of staff (as explained in point 4(a)) were included as systems cost.
 - b. The systems cost were estimated separately for OPD (at all levels), IPD (at PHC, CHC and District Hospital) and OT (at PHC (for Family Planning camps), CHC and District Hospital).
 - c. Systems costs were estimated per case for OPD, per inpatient day for IPD and per operation for OT.
 - d. In addition to attending to patients, medical (doctors) and paramedical staff (nurses, ANMs, etc.) are also involved in administrative work. 25% of salaries of doctors and 50% of salaries of paramedical staff (based on actuals as surveyed by NPC) were apportioned for administrative work and were included in systems cost.
8. Total Cost:
 - a. The systems costs thus derived were then added to care of individual cases based on number of OPD visits, or number of days of inpatient stay, etc. to arrive at the total cost of managing a case of a disease / health condition.

Basis of estimating funds requirement for primary health care infrastructure

1. Number of institutions:
 - a. Census 2001 population was considered for estimating the number of subcentres, PHCs and CHCs. The norm of one subcentre for 5,000 population in plains and 3,000 population in tribal areas, one PHC for 30,000 population in plains and 20,000 population in tribal areas, and one CHC for 1,20,000 population in plains and 80,000 population in plains was considered.
 - b. State-wise tribal population was considered first for estimating number of primary health care institutions required in tribal areas. The remaining rural population was then considered for estimating number of institutions required in remaining rural areas. The requirement was estimated as 1,59,714 subcentres, 26,150 PHCs and 7,951 CHCs respectively.
 - c. There are 1,37,311 subcentres in the country, and some States had an excess of subcentres, PHCs and CHCs even according to 2001 population. The estimates of budgetary requirements for strengthening primary health care institutions are based on the aggregate institutions required at country level and are based on the assumption that a redistribution of the institutions would be done.
2. Funds requirement:
 - a. Funds requirement was estimated separately for new institutions and for already existing institutions, and separately for capital and recurring costs.
 - b. Subcentres:
 - i. New subcentres:
 1. Capital: For subcentre building, constructed area of 400 sq ft @ Rs. 400 per sq ft was considered. Two staff quarters of 375 sq ft each @ Rs. 400 per sq ft were considered. The requirement of equipment was estimated as Rs. 25,680 for providing services at the subcentre.
 2. Recurring: Keeping in view the workload of ANM, two ANMs were considered for one subcentre. In addition, a male worker could be considered for selected areas where health programme indicators are poor. In addition, provision was also made for drugs @ Rs. 18,135 annually, and also for TA and other contingencies.
 - ii. Existing subcentres:
 1. Capital: Two staff quarters of 375 sq ft each @ Rs. 400 per sq ft were considered. For renovation of subcentre, the estimates are based on the assumption that 50% subcentres require renovation @ 25% of estimated cost of constructing a subcentre. Similarly, all subcentres require equipment @ 25% of estimated cost of equipment.
 2. Recurring: Recurring costs of a new subcentre were considered for already existing subcentre.

- c. PHCs:
 - i. New PHCs:
 - 1. Capital: For PHC building, constructed area of 1,500 sq ft @ Rs. 600 per sq ft was considered. Staff quarters for 1 MO and 3 Staff Nurses were considered. The requirement of equipment was estimated at Rs. 1,11,500.
 - 2. Recurring: It was assumed that one AYUSH doctor would be posted at PHC and there will be 3 Staff Nurses. In addition, there will be one Public Health Nurse practitioner (on contract to be arranged by the community), and no ANM or Health Educator or LHV at the PHC. Since there is no vehicle at the PHC, there will be no driver, and the services of Pharmacist and Class IV will be hired on contract. Funds for telephone, drugs, TA, for hiring services on contract and other contingencies have also been considered. Also, some provision has been made for transporting patients in need to the CHC / District Hospital (@ Rs. 300 per case for an estimated 80 cases per year). As regards drugs, an estimated Rs. 3.00 lakhs would be required for the treatment of essential health interventions covered under core package, which includes drugs for leprosy, malaria, TB, etc. also.
 - ii. Existing PHCs:
 - 1. Capital: Since there is already one staff quarter for MO at most PHCs, costs were estimated for staff quarters for 3 Staff Nurses. Based on RCH facility survey, it had been estimated that on an average each PHC requires about Rs. 9.7 lakhs for improvement of infrastructure (which includes civil works and equipment). This figure was considered for strengthening capital infrastructure of PHC.
 - 2. Recurring: Recurring costs of a new PHC were considered for running an already existing PHC.
- d. CHCs:
 - i. New CHCs:
 - 1. Capital: Constructed area of 4000 sq ft @ Rs. 600 per sq ft was considered for a CHC. Staff quarters for 4 MOs, 4 Staff Nurses and one chowkidar were considered. Requirement of equipment was estimated as Rs. 22.19 lakhs and an ambulance was also considered.
 - 2. Recurring: 8 Medical Officers and 10 Staff Nurses were considered at the CHC. An epidemiologist and a computer clerk were also included at the CHC for strengthening public health work in the CHC area. The services of mali, dhobi, ayah and Class IV would be hired on contract. In addition, some provision was also made for TA, Telephone and other contingency expenses. No provision for an ambulance has been made. However, for transportation of serious cases to a District Hospital, contractual arrangements could be made by the CHC as per local need.
 - ii. Existing CHCs:
 - 1. Based on RCH facility survey, it had been estimated that on an average each CHC requires about Rs. 44.0 lakhs for improvement of infrastructure (which includes civil works and equipment). This figure was considered for strengthening capital infrastructure of PHC. Since many CHCs already have some staff quarters for MO, costs were estimated for staff quarters for 3 MOs, 4 Staff Nurses and one chowkidar.
 - 2. Recurring: Recurring costs of a new CHC were considered for already existing CHC.

Annexure V

Estimated funds requirement for operationalizing Village Health Units

S. No.	Activity / expenditure head	Calculation	Estimated funds required (Rs.)
1	Salary / Honorarium to village health providers		
a	RMP	1200*12	14400
b	Dai	400*12	4800
c	Village level worker	400*12	4800
	Total		24000
2	Incentive to village health providers	2000*12	24000
	TOTAL for one village		48000
	TOTAL for five villages		240000

Assumption: On an average five villages in each subcentre area

Savings on account of replacing subcentres by Village Health Units

S. No.	Activity / Expenditure Head	Subcentres (Rs.)	Village Health Units (Rs.)	Savings per subcentre on capital (Rs.)	Annual savings for 159714 subcentres in recurring costs (Rs. in crores)
1	Capital* (building, staff quarters, furniture, equipment)	493,680	8,000	485,680	
2	Recurring	333,855	240,000		1,499
	Total per subcentre	827,535	248,000	485,680	1,499

At present there are 137311 subcentres, but as per 2001 population and as per norms, 159714 subcentres are being recommended
* Only equipment for Village Health Unit

Annexure VI

Annual funds requirement for Subcentres

S. No.	Item	As per existing norms		As per revised norms		Difference between current & suggested norms (Rs.) for one SC
		Norms	Costs (Rs.)	Norms	Costs (Rs.)	
A Capital / Non-recurring						
1	SC building*		513000	400sft@Rs.400/sft	160000	
2	Staff Quarters*	None	0	375sft@Rs.400/sft for 2 ANMs	300000	
3	Equipment		22100	Rs. 25680	25680	
4	Furniture	None	0	5% of bldg cost	8000	
	Sub-total		535100		493680	(41420)
B Recurring						
1	Staff					
	Health Worker (F) / ANM	1	136260	2	272520	
	Health Worker (M)#	1	118800	0	0	
	Voluntary Worker	1	1200	1	1200	
2	Drugs* (at govt. prices)	Kits A&B 2/yr	5650		18135	
3	Travel allowance	Rs. 75/day		Rs.100/visitx10 visits	36000	
4	Other expenses	Contingency	2000	Rs. 500/mth	6000	
	Sub-total		263910		333855	69945
<p>At present there are 137311 subcentres, and as per 2001 population, 159714 subcentres are being recommended *(Under RCH NPIP) Includes one ANM residential quarter # Proposing 845 Health Workers (M) to be funded by Govt. of India for a period of 3 years in each CHC in 65 districts having leprosy prevalence rate of more than 5 / 10,000 and 29000 Health Workers (M) at each subcentre for five years in 108 malaria intensive districts having API more than 2. Figures in parenthesis reflects savings.</p>						

Annexure VII

Annual funds requirement for Primary Health Centers (for outpatient care and public health)

S. No.	Item	As per existing norms		As per revised norms		Difference between current & suggested norms (Rs.) for one PHC
		Norms	Costs (Rs.)	Norms	Costs (Rs.)	
A Capital / Non-recurring						
1	PHC building	4000sft@Rs. 600/sft	2,400,000	1500sft@Rs.600/sft	900,000	
2	Staff Quarters	1 for MO @ 1200 sft	720,000	1200sft@Rs.600/sft x 4 (1 for MO & 3 for Staff Nurses)	2,880,000	
3	Equipment	1 kit each per district	41,500		111,500	
4	Furniture			5% of bldg cost	45,000	
Sub-total			3,161,500		3,936,500	775,000
B Recurring						
1	Staff					
	Medical Officer	1	315,225	1 (AYUSH)	252,660	
	Pharmacist	1	153,720	(on contract)	153,720	
	Staff Nurse	1	153,720	3	461,160	
	Health Worker (F) / ANM	1	136,260	0	-	
	Health Educator	1	153,720	0	-	
	Health Assistant (Male)	1	171,180	0	-	
	Health Assistant (F) / LHV	1	171,180	0	-	
	Public Health Nurse practitioner	0	-	(on contract)	-	
	UDC / Computer clerk	1	118,800	1	-	
	LDC	1	91,330	1	91,330	
	Laboratory Technician	1	118,800	1	118,800	
	Driver	1	79,806	0	-	
	Class IV	4	277,320	(on contract)	-	
	Sub-total for salaries	15	1,941,061	8	1,077,670	(863,391)
2	Drugs	Under RCH	9,025		300,000	
3	Travel allowance	Rs. 75/visit		12visits/mth x 2 persons	28,800	
4	For contractual Class IV, Pharmacist	None	-	Rs. 3500 + 1500 / mth	60,000	
5	Telephone	None	-	Rs/ 1000/mth	12,000	
6	For hiring transport in emergency	None	-	Rs. 300/case x 80 cases	24,000	
7	Other expenses	No norms	-	Rs. 2000/mth	24,000	
Sub-total			1,950,086		1,526,470	(423,616)
At present there are 22842 PHCs, but according to 2001 Census population, 26150 PHCs are being recommended Figures in parenthesis reflect savings						

Annexure VIII

Annual funds requirement for Community Health Centers

S. No.	Item	As per existing norms		As per revised norms		Difference between current & suggested norms (Rs.) for one CHC
		Norms	Costs (Rs.)	Norms	Costs (Rs.)	
A Capital / Non-recurring						
1	CHC building	OT & LR	1,000,000	4000sft@Rs. 600/sft	2,400,000	
2	Staff Quarters	No norms	-			
	For MOs	1 MOs	1,440,000	1200sft@Rs.600/sft x 4 MOs	2,880,000	
	For Staff Nurses	No norms	1,200,000	1000sft@Rs.600/sft x 4 SNs	2,400,000	
	For chowkidar	No norms	240,000	400sft@Rs. 600/sft x 1	240,000	
3	Equipment	1 kit each type per distt	601,000		2,219,000	
4	Furniture	No norm	-	5% of CHC bldg cost	120,000	
	Sub-total		4,481,000		10,259,000	5,778,000
B Recurring						
1	Staff					
	Specialists / Medical Officers	4	1,476,240	7	2,206,575	
	Staff Nurses	7	1,076,040	10	1,537,200	
	Public Health Nurse	0	-	1	171,180	
	Computer Clerk	0	-	1	91,330	
	Dresser	1	69,330	1	69,330	
	Pharmacist / Compounder	1	153,720	1	153,720	
	Laboratory Technician	1	118,800	1	118,800	
	Block Extension Educator	1	153,720	1	153,720	
	Radiographer	1	118,800	1	118,800	
	Ward Boy	2	138,660	(on contract)	-	
	Dhobi	1	69,330	(on contract)	-	
	Sweepers	3	207,990	(on contract)	-	
	Chowkidar	1	69,330			
	Aya	1	69,330	(on contract)	-	
	Peon	1	69,330	(on contract)	-	
	Mali	1	69,330	0	-	
	UDC	0	0	2	193,368	
	LDC	0	0	1	79,806	
	Epidemiologist (Medical Doctor)	0	0	1	275,822	
	Driver	0	0	(vehicle on contract)	-	
	Sub-total of salaries	26	3,859,950	28	5,169,650	1,309,700
2	Drugs	1 kit each type / distt	110,713		1,000,000	
3	Travel allowance	No norm	-	Rs. 75/day x 24 visits/mth	21,600	
4	For contractual dhobi, mali, ward boys, aya, peon	None	-	Rs. 1000/person/mth x 8 persons	96,000	
6	For vehicle on contract	None	-	Rs. 400/case x 150 cases	60,000	
7	Telephone	None	-	Rs. 2000 / mth	24,000	
8	Mobility support to MOs for holding clinics in PHCs	No norm	-	2 clinics per week in each PHC; Rs. 86940 / CHC	86,940	
9	Other expenses	No norm	-	Rs. 4000 / mth	48,000	
	Sub-total		3,970,663		6,506,190	2,535,527
	TOTAL		8,451,663		16,765,190	8,313,527
At present there are 3043 CHC, but as per 2001 population and as per norms, 7951 CHCs are being recommended						

Annexure IX

Funding Requirements for Differential Planning Based on Performance for Leprosy, Malaria & RCH

Description of problem	No. of districts*	estimated amount of additional Central Assistance (Rs. in lakhs)				
		1st year	4th year	6th year	Grand total for 10 years	
Category I	High leprosy	14	216	-	-	649
Category II	High malaria	28	9,051	9,051	-	45,257
Category III	Poor performance on RCH indicators	158	18,267	18,267	18,267	182,671
Category IV	High leprosy & high malaria	2	677	647	-	3,325
Category V	High leprosy & poor performance in RCH	41	5,373	4,740	4,740	49,302
Category VI	High malaria & poor performance in RCH	70	30,721	30,721	8,093	194,072
Category VII	High leprosy, high malaria & poor performance in RCH	8	3,635	3,511	925	22,550
	Total (Rs. in lakhs)	321	67,941	66,938	32,025	497,826
	Total (Rs. in crores)		679	669	320	4,978
	Rounded off to the nearest '000 (Rs. in crores)					5,000
	* Names as per Annexure					
	Suggested interventions by Govt. of India in identified districts					
	a) For 65 Leprosy districts of leprosy		1 leprosy worker at every CHC for 3 years			
	b) For 96 Malaria districts with problem of malaria		1 Malaria Worker at every subcentre & 1 Malaria Officer at district for 5 years			
	c) For 276 districts with adverse RCH indicators		1 Nurse Practitioner at every PHC & 1 Gynaecologist at every CHC for 10 years			
	Estimated number of subcentres per district	269				
	Estimated number of PHCs per district	44				
	Estimated number of CHCs per district	13				

Annexure X

Investment requirements (These are based on bare minimum standards, costs and needs, largely Government prices which are 30%-50% lower than Private)

S. No.	Activity	No. of institutions / units / persons	Unit cost (Rs. in lakhs)	Funds required (Rs. in crores)		
				Non-recurring	Recurring	Total
I	Health Promotion			0.00	2000.00	2000.00
	Publicity & dissemination of information through mass media @ 10 per capita per year					
	Community involvement for preventive activities (Village Health Fund) and Gram Panchayats for Mandatory Functions @ Rs. 10 each per capita per year	250,000		0.00	2000.00	2000.00
	Sub-total I			0.00	4000.00	4000.00
II	Regulatory Systems					
(a)	National Drugs Authority (as recommended by Mashelkar Committee)	1	100.00	1.00	2.00	3.00
	Institute for Health Information and Disease Surveillance	1		0.50	3.00	3.50
	Commission for Excellence in Health Care (to be provided Rs. 1.0 crore as seed money, and to be self-financed thereafter) and recurring grants for Research	1	100.00	1.00	2.00	3.00
	National Council for Quality Assurance	1		0.50	1.00	1.50
	Health Infrastructure Finance Corporation (HSCC can be developed into this Corporation; need money of Rs. 1.0 crore)	1	100.00	1.00	0.00	1.00
	Indian Medical Devices Regulatory Authority (to be provided a seed money of Rs. 1.0 crore & to be self-financed thereafter) and Grant for Research	1	100.00	1.00	1.00	2.00
	Sub-Total			5.00	9.00	14.00
(b)	Enforcement of regulations					
	Quality Assurance Cells for Central, levels State, District and facility	8500 Facilities of Govt. upto CHC level	5.00	425.00	435.00	860.00
	Epidemiological Health Units at Centre, State, District and CHC levels			10.00	425.00	435.00
	Professional Councils (MCI, DCI, PCI, INC)	95	5.26	3.00	2.00	5.00
	Drug Inspectors as recommended in Mashelkar Committee	1,265	1.44		18.00	18.00
	Sub-total			438.00	880.00	1318.00
	Sub-total II			443.00	889.00	1332.00
III	Human Resources for Health					
	<i>Capital infrastructure requirements for Human Resource Development</i>					
	Opening New Nursing Colleges	225	650	1350.00	112.50	1463
	Upgrading Nursing Schools into Nursing Colleges	769	340	2307.00	307.60	2615
	Strengthening existing Nursing Colleges	266	140	266.00	106.40	372
	Opening new Medical Colleges	60	8,000	3360.00	1440.00	4800
	Upgradation & Strengthening existing govt. Medical Colleges	125	400	400.00	100.00	500
	Establishing Schools of Public Health	6	3,100	113.00	73.00	186
	Sub-total III			7796.00	2139.50	9936
IV	Training					
(a)	<i>Training of Village level functionaries</i>					
	Training of Village Health Committees, (15 /VHC) Gram Panchayats (10/GP) Clerical staff (2/GP) = 27-30 per Village. @ Rs 300 per Person and Administrative overheads	250,000	300 per person	0.00	225.00	225.00
	Training unqualified RMPs on a pilot basis for six months over a period of one year, which could be followed up by reorientation trainings over the next two years; the costs calculated here do not contain cost of reorientation training	100,000	0.34	0.00	58.00	58.00
	Training, development & supervision of Village Level Worker	250,000	-	390.00	250.00	640.00
	Sub-total			390.00	533.00	923.00

Annexure X

Investment requirements [Continued]

S. No.	Activity	No. of institutions / units / persons	Unit cost (Rs. in lakhs)	Funds required (Rs. in crores)		
				Non-recurring	Recurring	Total
(b)	<i>In-service health personnel</i>					
	Training of MOs for 9 months for multi-skilling in different specialities (Gynae/Obs, Peds, Public Health, Anesthesia)	32,000	1.45	463.00	0.00	463.00
	Posting 2nd & 3rd yr PGs in Sub-district and District Hospitals for 6 months	4,600	0.11	0.00	13.98	13.98
	Creating more posts of PG students	440	2.64	0.00	11.54	11.54
	Fellowships for Doctors, Nurses, Social Scientists and Public Health Specialists	1,350	0.74	0.00	10.00	10.00
	Non-practising allowance to Teaching faculty	11,100	0.36	0.00	40.00	40.00
	Rural allowance for health personnel	63,600	0.24	0.00	153.00	153.00
	Training of Pharmacists	559,000	74.96	0.00	4.00	4.00
	Sub-total			463.00	232.52	695.52
	Sub-total IV			853.00	765.00	1618.00
V	Research and Development (ICMR for Basic Research, & Operational Research)			750.00	3250.00	4000.00
	Sub total V			750.00	3250.00	4000.00
VI	Delivery of health care services (Bare Minimum Requirements)					0.00
	Primary care					0.00
(i)	Subcentres-Norm - Subcentre Building & 2 Residential Quarters					0.00
	Strengthening and maintaining existing subcentres (Gaps in Building & Equipment)	137,311	5.74	5431	4584.00	10015
	Opening new subcentres	22,403	8.28	1106	748.00	1854
	Sub-total			6537	5332.00	11869
(ii)	PHCs - Norm - PHC Building & 4 Residential Quarters					
	Strengthening and maintaining existing PHCs	22,842	34.16	7150	3798.00	10948
	Opening new PHCs	3,308	55.99	1302	550.00	1852
	Organizing mobile clinics in selected remote areas	818	1.48	0	12.11	12
	Sub-total			8452	4360.11	12812
(iii)	CHCs - Norm - Hospital Buiding & 8 Residential Quarters					
	Strengthening and maintaining existing CHCs	3,043	126.60	2800	2130.00	4930
	Opening new CHCs	4,908	172.58	5035	3435.00	8470
	Sub-total			7835	5565.00	13400
(iv)	Strengthening Secondary level institutions (DH & SDH) in all except 9 States	900	150	750	450.00	1200
	Sub total			750	450.00	1200
(v)	TNMSC type organization for 20 States (taking Depots on Rent)	20	1,000.00	60.00	140.00	200.00
	Sub-total			60.00	140.00	200.00
(vi)	Additional Staff Support for Intensified implementation of programmes in 321 districts based on differential planning	321		0.00	5000.00	5000.00
	Sub-total			0.00	5000.00	5000.00
(vii)	Information Technology in Health			335.25	111.75	447.00
	Sub- total			335.25	111.75	447.00
	Sub- total VI			23968.92	20958.86	44927.78
VII	Social Health Insurance					
	Merger of ESIS & CGHS					
(a)	Orientation training of staff on patient charter	5,000	0.07	0.00	3.38	3.38
(b)	30% Premium Subsidy for BPL Families				9000.00	9000.00
	Sub-total VII				9003.38	9003.38
	GRAND TOTAL			33,811	41006	74,817
	Inflation factor for adjusting fund requirement (@ 7% inflation rate per year) Inflation adjusted annual funds requirement (Rs. in crores)					

Annexure XI

Generation of additional revenues

The issue of tax potential has attracted the attention of the researchers in the past. At one level, there are some scholars like Colin Clarke who preferred to make judgements about tax revenue that should/could be mobilised and he suggested that the ratio of 25 per cent of GDP as the normative number. In contrast, there are others such as Musgrave who suggested that absolute taxable capacity is a myth and specifying this involves making arbitrary judgements. Therefore, the scholars should be concerned with "optimal budgets" which meant that each country should determine decisions to raise revenues depending on the degree of market failure and the extent of state intervention envisaged. Here again, he suggests the need to make a crucial difference between public provision and public production of services (Musgrave, 1973)

While absolute taxable capacity is difficult to conceptualise and impossible to measure in any objective sense, Musgrave (1959) emphasises the relevance and importance of relative taxable capacity. This can be estimated by comparing different countries or sub-national units in a federation. Thus, two countries or sub-national units in a country which are similar in economic circumstances should be able to generate equal amount of revenue and the differences could then be attributed to the differences in their preference patterns. Thus taxable capacity of different units in a federation can be estimated by estimating the "average" behaviour of the states in raising revenues after controlling for economic factors that can cause differences in taxable capacity.

Thus, taxable capacity of a country/state is defined as the revenue it can generate if it levied an average effective rate of tax on its base (Bahl, 1971, 1972). Alternatively, one can also specify and estimate taxable capacity with respect to the highest effective tax rate or any other exogenously specified effective tax rate. Given that the ability to raise tax revenues may be more than proportionately higher in a more developed country/state, the effective tax rate will have to be determined with respect to the development of a particular state and a simple average would not serve the purpose. This, therefore, has to be estimated using statistical techniques to take account of the non-linear relationship between the level of development and taxable capacity.

Variations (variance) in tax revenues between different States (σ_t^2) may be due to variations in their capacity to raise revenues (σ_{tc}^2) or variations in the efforts put in by them (σ_{te}^2).

$$\sigma_t^2 = \sigma_{tc}^2 + \sigma_{te}^2 \dots\dots\dots(1)$$

If one were able to identify all the factors that contributed to taxable capacity variation, it would be possible to estimate it. Alternatively, if one controlled for variations in tax effort among states, it would be possible to derive their taxable capacity.

There are three alternative methods employed to estimate taxable capacities of the states. These are (a) Aggregate Regression (AR), (b) Representative Tax System (RTS) (c) Tax Frontier Approach. Appropriateness of the method to be employed

to estimate taxable capacity depends on the availability of disaggregated data, the extent to which the relationship between taxable capacity and the variables representing it are perceived to be non-linear, and the degree of interdependence of the tax base with tax rate. It is useful to discuss the three methods used in some detail.

Aggregate Regression approach:

In the Aggregate Regression (AR) method, the actual tax revenue (termed as tax performance) is regressed on all factors representing variations in taxable capacity. Thus, tax - GSDP ratios or per capita tax revenue of the States are regressed on taxable capacity variables. Taxable capacity variables essentially represent the variables representing the tax bases or their proxies. This can be done in a cross-section model or, in order to get greater degrees of freedom, by combining cross-sections in a co-variance model. The estimated parameters of the equation provide behavioural relationship between tax-GSDP ratio (or per capita tax revenue) and various capacity factors estimated in the equation. If it is hypothesised that the taxable capacity is a non-linear function of taxable capacity variables, it is possible to make the hypothesised functional specification in the model.

Once the behavioural relationship is estimated, it is easy to estimate the taxable capacity by substituting the actual values of the taxable capacity variables in the equation. The estimated coefficient for each capacity variable gives the "average" behavioural relationship and substituting the actual capacity variables provides the estimate of taxable capacity of each state. The estimation of tax capacity above assumes that the coefficients of the respective bases (which indicate the average effective rate at which the bases are used across States) represent the normative rates at which States ought to raise taxes. The residual term, which is the difference between the actual tax revenue and the estimated tax capacity, is then used to indicate the tax effort of the respective states.

There are a number of shortcomings in this approach. First, it may not be able to include exhaustible list of taxable capacity factors and therefore, the unexplained variation, which is attributed to tax effort may actually be due to omitted variables. Second, even if it is assumed that all taxable capacity factors are included, the residual variation is the combination of variations in tax effort and the random error term and to attribute it entirely to tax effort may not be appropriate. Finally, some variables may impact on both taxable capacity and tax effort and it may not always be possible to isolate the effect of capacity from effort variables. Thus, higher per capita GSDP or urbanisation in State may also represent better organisation of the economy and ensure greater effort.

Later studies have tried to improve upon this implicit assumption by separating out the effect of tax effort of individual states from the random error element by combining cross-section observations over time and introducing state-specific fixed effects in the regression specification using panel

data (First Report of the Ninth Finance Commission 1988, Coondoo et.al, 2000). However, it is important to note that the state-specific (fixed) effect may also be due to a variety of other factors and not entirely due to tax effort. Any omitted variable that is specific to the State and changes slowly (or does not) over time will also be captured by the State-specific fixed effect. Hence, what portion of the State-specific fixed effect can be attributed exclusively to tax effort may be an arguable issue.

Representative tax system approach:

The Representative Tax System (RTS) approach to measuring taxable capacity was first employed by the Advisory Commission on Intergovernmental Relations (ACIR) in the United States. In this approach, taxable capacity is estimated for each of the taxes levied by the States. The taxable capacity of each tax is estimated by applying the "representative" rate to the tax base of the state. The generally taken representative rate is the average effective rate of each of the taxes levied in States. This is estimated by dividing all states' revenue collection from the tax with the sum of the value of the tax base over all the States. As in the AR approach, this assumes that the average effective tax rate of the States is the normative rate at which the States ought to levy. The taxable capacity of different taxes is summed to arrive at the aggregate taxable capacity of a state. The ratio of actual tax collection to the tax capacity (as estimated above) then provides an indicator of the relative tax efforts of different States.

The major shortcoming of this approach is that it assumes that individual tax bases are independent of each other (Second Report of the Ninth Finance Commission). Secondly, the approach assumes that tax bases and rates are independent of each other and the average effective rates adequately capture the non-linear relationship between the tax bases and rates (Sen and Tulasidhar, 1988). Besides, the data requirement for applying this approach is large and in most cases disaggregated data on various tax bases or even their close proxies are simply not available. The method is also suitable only when there is significant homogeneity in the tax structures (Chelliah and Sinha 1983).

Tax frontier approach:

In the Tax Frontier (TF) approach, the taxable capacity of states is conceived as a production frontier and the distance from the frontier is considered as the tax effort. Thus, technical efficiency is interpreted as the tax efficiency of states or the tax effort. The main difference of the TF approach with the AR and the RTS approach is in the way in which the normative rate for estimating tax capacity is indexed. While in the TF approach the normative rate is equated with the highest rate,

in the AR and RTS approach, it is the 'average' rate that is used as the norm. The TF approach has however been criticized on the grounds that the formulation of tax capacity as a production frontier is ill-conceived. It is argued that unlike firms, whose objective is to maximize profits, the primary objective of States is not to maximize tax revenue (Coondoo et. al. 2000).

Thus, all the existing methods to measuring taxable capacity and effort have shortcomings. In addition,, there is a serious problem in the States' tax system in India which prevents the objective assessment of the taxable capacities of the states. It must be noted that states' sales taxes which contribute to about two-thirds of own tax revenues are not destination based. The system of cascading sales taxes coupled with the levy of inter-state sales tax results in significant inter-state tax exportation (Rao and Singh, 2005, Ch.9). When there is full forward shifting of the tax, inter-state tax exportation is from the richer to poorer states. Thus, the tax revenues collected by the State governments include collections from non-residents.

In this exercise, we have used the aggregate regression approach to measure taxable capacity of the States with some modifications. As the emphasis is in generating additional revenues to create fiscal space for financing incremental expenditures in the health sector, the study first tries to project tax revenues at average effort and then, tries to measure the revenue gains through increase in the effort itself.

As mentioned earlier, relative taxable capacity using the regression approach is estimated by regressing the variables representing the tax bases and their proxies on the tax-GSDP ratio of the States in cross-section regression. Apart from tax bases, it also requires the identification of other factors that facilitate revenue collections, particularly those representing organisation of the economy. Earlier studies have used various indicators to estimate tax performance. The most common indicator that has been used in almost all studies on the issue is State income (Nambiar and Rao 1972, Sen (1983), Oommen 1987, Finance Commission 1988, Coondoo, Majumdar and Neogi 2000). Along with State income, Oommen (1987) also used its components such as the proportion of income from agriculture, proportion of income from manufacturing and proportion of income from hotels, trade and commerce to explain variation in tax performance.¹ He argued that income from hotels, trade and commerce would affect the sales tax revenue while income from manufacturing would affect both the sales and excise tax revenue. Nambiar and Rao (1972), Sen (1983) and Finance Commission (1988) also used non-agricultural income and non-primary sectoral SDP in addition to State income to explain tax performance. However, these variables are components of State income causing multicollinearity problems.² Sen (1983) also used percentage of population below the poverty line. Also, Coondoo, Majumdar and Neogi (2000) used per capita bank deposits and per capita power consumption of States in addition to State income. Apart from these variables, Nambiar

¹ • However, due to the inclusion of the individual components of State income, the variable for aggregate State income was insignificant (possibly due to multicollinearity problems) and was later dropped.

² • Finance Commission (1988) included both State income and non-primary sectoral SDP in the regression equation. Possibly due to the multicollinearity, they found that while the coefficient of State income was significant, the coefficient of non-primary sectoral SDP was insignificant

and Rao (1972) and Sen (1983) used the degree of urbanisation, Finance Commission (1988) used inequality of consumption expenditure (indicated by Lorenz ratio) and Coondoo, Majumdar and Neogi (2000) used the proportion of SC and ST population to explain tax performance across States.

Based on the above studies, our model employs the four commonly used determinants of taxable capacity namely: per capita State Domestic Product (SDP), share of manufacturing SDP, headcount measure of poverty and urbanisation. Per capita SDP has been used in almost every study on taxable capacity. Given the level of per capita SDP, the share of non-primary sector SDP or manufacturing SDP has been used to capture the effect of industrialisation. The inclusion of poverty has been primarily to measure income distribution. Urbanisation has been used to denote the organisation of the economy and the extent of monetised transactions that could be taxed. While these four indicators were used as explanatory variables in the model, either the tax -GSDP ratio or per capita tax has been employed as the dependent variable. Given that the objective of this exercise is to make future projections of tax revenue, per capita tax revenue (which gives a better fit of the model) is used as the dependent variable.³

Of the various capacity variables, after the 1990s, data on poverty ratio is available only for 1993-94 and 1999-00. Further, regression estimates for these years showed that poverty was highly correlated with GSDP and the share of manufacturing sector GSDP with total GSDP. Only the GSDP and urbanisation had the highest explanatory power. Therefore, a pooled model using data for the period 1995-06 to 2002-03 was estimated using state-specific fixed effects. While GSDP figures were available from the TFC, actual figures of urbanisation were not readily available. However, projected urbanisation estimates of the Registrar General (Census of India 1991), were employed to estimate the model.⁴

The specification of the panel data model including the cross section observations for the years 1995-96 to 2002-03, was as follows:

$$\text{Per capita tax revenue} = \alpha_i + \beta_1(\text{per capita GSDP})_{it} + \beta_2(\text{urbanization})_{it} + u_{it}$$

Where α_i = State-specific effect for the i^{th} State.

As in the OLS model, results in the pooled model including State-specific fixed effects indicated that both per capita GSDP and urbanisation had a significant effect on per capita tax revenue (Model 1 in Table 13). The above regression specification was further modified keeping in view the first report of the ninth finance commission, which highlighted that the slope coefficients of the tax function were homogeneous within similar income groups but not across groups. States were classified into relatively high and low income groups and an interaction term of per capita GSDP and the dummy variable distinguishing the two groups was included in the regression specification to account for any differences of slopes between the two groups. The dummy variable assumed the value of 1 if a State belonged to the lower income group and zero otherwise. Results indicated that the effect of per capita GSDP on tax revenue was higher for States with relatively higher income (Model 2 in Table 13). To take into account the nonlinearity in the relationship, the model was re-estimated in the log linear form. The model in the log form was used for projecting future tax revenues, specifically for the period 2005-06 to 2009-2010 (Model 3 in Table 13).

The projection of taxable capacity from 2005-06 to 2009-2010 was made by substituting the actual/projected values of taxable capacity variables in the equation. For the same period, projections of own tax revenues were also made based on the past trend during the period from 1993-94 to 2002-03. The higher of the two estimates was used to indicate the likely generation of own taxes across States in the period 2005-06 and 2009-2010. It may be noted that at the past rate, four States viz., Gujarat, Kerala, Karnataka, and West Bengal will fall short of the projections made through the regression model and will have to generate additional taxes to reach the levels predicted by the model.

³ • The source of per capita SDP was CSO, poverty figures from Sen and Himanshu (2004) and urbanisation figures from NSSO.

⁴ • Analysis of the projected values of urbanisation compiled by the Registrar General and the actual census figures of 2001 show that the correlation between the two was about 0.97 and the rank correlation is 1.