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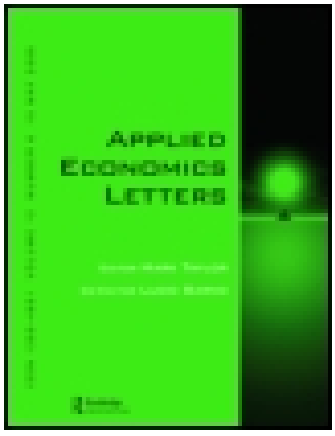

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Determinants of public health expenditure: some evidence from Indian states

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Determinants of public health expenditure: some evidence from Indian states

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This study examines the evolution of public health expenditure in India. A panel data model is used to explain the main factors which affect public health expenditure in the period 1971 to 1991. The empirical results show that the key determinants in the explanation of the regional health expenditure are real state per capita income and literacy rate, while other structural demand variables such as the proportion of the state population over age 60, population per primary health care center and population per doctor are statistically insignificant factors. An income elasticity of 0.47 implies that health care is not a luxury good.

I. Introduction

Cantarero (2005) examined the determinants of public health care expenditure in Spain. His empirical results show that the most important determinant in the explanation of the volume of regional health care expenditure is the ageing population while other factors like the regional income and the relative structural characteristics of the supply variables have less importance. Following Cantarero (2005) this study examines the determinants of public health expenditure and their regional differences across Indian states, while emphasizing the structural characteristics of health care demand instead of health care supply. Over the years empirical literature on the determinants of health care expenditure in developed countries has been growing while there have been few studies that have looked at factors of health expenditure in developing countries.[1] By examining the determinants of health expenditure in Indian states, this study builds upon previous studies and it constitutes an addition to empirical literature from the experience of a developing country.

Remainder of this article is organized as follows. In Section II, I provide a brief account of public healthcare expenditure in India. The empirical model of the determinants of health care expenditure and results are presented in Section III. Finally, Section V concludes by summarizing the major findings and policy issues.

II. Public Healthcare Expenditure in India

The Indian constitution charges states with 'the raising of the level of nutrition and the standard of living of its people and the improvement of public health' (see The Constitutional Framework, Ch. 8). Central government efforts at influencing public health have focused on the 5-year plans, on coordinated planning with the states and on sponsoring major health programs. Public expenditures are

[1] See Pauly (1986), Schieber and Poullier (1989), Hitiris and Posnett (1992), Blomqvist and Carter (1997), Hitiris (1997), Di Matteo and Di Matteo (1998), Gionnoni and Hitiris (1999), Cantarero (2005).

Table 1. Public health expenditure as % of total health expenditure, 2001

Country	Percentage
Bhutan	90.6
Maldives	83.5
Democratic People's Republic of Korea	73.4
Timor-Leste	59.5
Thailand	57.1
Sri Lanka	48.9
Bangladesh	44.2
Nepal	29.7
Indonesia	25.1
India	17.9
Myanmar	17.8

Source: Bhat and Jain (2004).

Table 2. State-wise public spending on health (% of state GDP)

States	1981	1991	1998–1999
Andhra Pradesh	1.44	0.99	1.61
Assam	1.48	1.32	1.05
Bihar	1.31	1.37	0.75
Gujarat	1.17	1.18	0.94
Haryana	1.24	0.71	0.71
Himachal Pradesh	4.77	2.75	2.63
Karnataka	1.19	1.32	1.01
Kerala	2.02	1.49	0.95
Madhya Pradesh	1.57	0.99	0.94
Maharashtra	1.13	0.84	0.61
Orissa	1.6	1.37	1.25
Punjab	1.04	0.89	0.86
Rajasthan	2.51	1.35	1.35
Tamil Nadu	1.5	1.94	1.35
Uttar Pradesh	1.06	1.14	0.91
West Bengal	1.39	1.18	0.94
All India (States)	0.2	0.25	0.25

Source: Government of India (2002), India: National Human Development Report 2001.
Notes: Ratios are a moving average of 2 years, i.e. 1980–1981 is average for the years 1980–1981 and 1981–1982. For the Central Government, ratios are expressed as a proportion of GDP.
The Central Government figure for 1998–1999 is a moving average of the period 1996 to 1998.

jointly shared by the central and state governments. However, the condition of health services in India is dismal. As a ratio of GDP, public expenditure on health in India is among the lowest in the world about 1%. In fact, the health system is almost totally privatized. To illustrate, only 17.9% (Table 1) of total health expenditure in India is public expenditure; the rest is private expenditure, such as over-the-counter drug purchases from chemist shops. By contrast, the ratio of public expenditure to total health expenditure is a 90.6% in Bhutan, 83.5% in Maldives and India is only second to Myanmar (with 17.8%) among the south Asian countries (Table 1). The condition of public health expenditure at state level is no less dismal (Table 2).

Table 3 shows the growth of public healthcare expenditure per capita (PCHE) in real terms across various states of India. On comparing Tables 2 and 3 few interesting points emerge. First, we notice that PCHE of all the states except Assam went down in the period 1990 to 1996 but increased during the 1996 to 2002 for all states except Uttar Pradesh and Assam. Overall in this period PCHE increased for most of the states except Assam, Gujarat, Orissa and Uttar Pradesh. Second, if we observe public health expenditure as percentage of state GDP, a different picture emerges. The percentage spending of state governments shows a declining trend for every state. From this a very important point emerges that government priority for health care expenditure is decreasing over the years in all the states which means that less and less money is being spent by government on healthcare as a percentage of state income. When we look at conditions of health facilities across Indian states, such as primary health centers (PHCs), the picture is chilling around the country. To illustrate, only 69% of PHCs have at least one bed, 20% have a telephone and 12% enjoy 'regular maintenance'. These are national averages and the corresponding figures for the poorest states are much worse. In Bihar, for instance, a large majority of PHCs do without *luxuries* such as electricity, a weighing machine or even a toilet. It is worth remembering that a PHC is supposed to be a facility of major importance, serving a population of 30 000 or so (Dreze, 2004). On the positive side, some states (Kerala, Tamil Nadu, Himachal Pradesh, among others) have recognized the importance of good public health facilities and planned accordingly. In Tamil Nadu, according to the latest National Family Health Survey, 99% of births are preceded by antenatal checkups and 89% of children are fully vaccinated. The corresponding figures in, say, Uttar Pradesh are 35% and 21% – most women and children there are left to their own devices as far as health is concerned (Dreze, 2004).

III. Determinants of Health Expenditure: An Empirical Approach

The subject of this study is 14 major states of India. The choice of states is governed by the data

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Table 3. Growth of public healthcare expenditure (PCHE) per capita (in real terms)

	Change*			Percentage change		
	1990–1996	1996–2002	1990–2002	1990–1996	1996–2002	1990–2002
Andhra Pradesh	−211.1	263.4	52.3	−28.16%	48.92%	6.98%
Assam	3.4	−15.5	−12.1	0.56%	−2.56%	−2.01%
Bihar	−111.7	160	48.2	−26.25%	50.96%	11.33%
Gujarat	−156.6	110.3	−46.3	−17.48%	14.91%	−5.17%
Karnataka	−103.6	270.3	166.7	−13.23%	39.79%	21.30%
Kerala	−73.2	172.2	99.1	−7.99%	20.43%	10.81%
Madhya Pradesh	−103.6	161.1	57.5	−18.54%	35.41%	10.30%
Maharashtra	−144.2	278.3	134.1	−16.80%	38.97%	15.62%
Orissa	−186.9	154.3	−32.6	−30.32%	35.92%	−5.29%
Punjab	−414.9	583.8	168.9	−33.29%	70.20%	13.55%
Rajasthan	−86.7	152.1	65.5	−10.95%	21.60%	8.28%
Tamil Nadu	−44.6	134.5	89.9	−5.07%	16.09%	10.20%
Uttar Pradesh	−160	−5.3	−165.2	−26.40%	−1.18%	−27.27%
West Bengal	−35.5	251.8	216.3	−5.69%	42.76%	34.64%
All India (States)	−107.8	160.8	53.1	−14.90%	26.14%	7.34%

Source: Bhat and Jain (2004).
Note: *Figures are in Rs. Millions.

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availability for variables present in the empirical specification. The data used in this article are drawn from official publications of India including CMIE, Basic Statistics Relating to the Indian Economy; various issues of the census of India (1971, 1981, and 1991); NCERT, All India Educational Survey (third, fourth, sixth rounds) and Health Information of India (1971, 1981, 1991). In order to be able to analyse the emergent differences among states, I examine the factors of public health expenditure. In this sense, it focuses on the estimation of panel data models for the period 1971 to 1991.

Methodology

Empirical literature suggests that the per capita health expenditure is determined by several socio-economic, demographic and lifestyle variables (Hitiris and Posnett, 1992). Following previous practice (Blomqvist and Carter, 1997; Hitiris, 1997; Shieber and Poullier, 1989; Giannoni and Hitiris, 1999 and Cantarero, 2005), in our model PCHE in constant rupees is used as dependent variable and regressed over the following variables: per capita state domestic product (PCSDP) in log terms (constant rupees); percentage of population above 60 years of age (AP); literacy rate (LR); structural characteristics of health care demand, such as (a) population per primary health centre (PPHC), as a possible measure of pressure of health care demand on a primary health centre and (b) population per doctor (PPD), as a measure of adequacy of supply of doctors; and the error term (Table 4).

Therefore, our empirical model is specified as follows:

$$\begin{aligned}\mathrm{PCHE}_{nt} = {} & \alpha_n + \alpha_1 \mathrm{LogPCSDP}_{nt} + \alpha_2 \mathrm{AP}_{nt} \\ & + \alpha_3 \mathrm{PPHC}_{nt} + \alpha_4 \mathrm{PPD}_{nt} \\ & + \alpha_5 \mathrm{LR}_{nt} + \varepsilon_{nt} \end{aligned} \quad (1)$$

where n refers to Indian states ($n = 1, \ldots, 14$), t refers to time ($t = 1971, 1981, 1991$) and $\alpha_n, \alpha_1, \ldots, \alpha_5$ are corresponding unknown parameters to be estimated. An issue which must be examined before proceeding with the estimation is the functional relationship between health expenditure and income. Since there is no reason to assume that health expenditure is different from other public expenditures, in a second step PCHE is considered in log terms and the model is specified as:

$$\begin{aligned}\mathrm{LogPCHE}_{nt} = {} & \alpha_n + \alpha_1 \mathrm{LogPCSDP}_{nt} + \alpha_2 \mathrm{AP}_{nt} \\ & + \alpha_3 \mathrm{PPHC}_{nt} + \alpha_4 \mathrm{PPD}_{nt} \\ & + \alpha_5 \mathrm{LR}_{nt} + \varepsilon_{nt} \end{aligned} \quad (2)$$

An important consideration in analysis of panel data is the choice between fixed effect (FE) and random effect (RE) models. If we can be sure that the differences between units can be viewed as parametric shifts of the regression function, the fixed effect model is a reasonable choice. For example, an inter-state comparison may well include the full set of states for which it is reasonable to assume the model is constant. In other settings, it might be more appropriate to view state specific constant terms as randomly distributed across states. This would be

Table 4. Sample statistics

Variables	Year	Mean	SD	Minimum	Maximum
PCHE	1971	6.37	1.87	3.10	8.88
	1981	10.49	2.99	5.58	14.46
	1991	10.94	3.10	5.42	17.15
PCSDP	1971	655.93	183.99	402.00	1070.00
	1981	721.36	263.31	441.00	1354.00
	1991	1119.50	382.99	626.00	1794.00
AP	1971	6.01	0.59	5.26	7.48
	1981	6.55	0.58	5.55	7.80
	1991	7.00	0.76	6.10	8.82
PPHC	1971	112 413.57	25 819.59	70 015.00	185 810.00
	1981	112 595.29	41 218.55	13 705.00	156 157.00
	1991	42 086.21	11 770.11	9921.00	58 479.00
PPD	1971	5577.64	2660.47	1954.00	10 656.00
	1981	5467.93	2927.61	1798.00	11 273.00
	1991	3058.29	1942.88	820.00	7758.00
LR	1971	36.93	11.99	23.00	70.00
	1981	46.15	13.12	30.10	81.60
	1991	53.91	13.43	38.50	89.80

Source: Government of India (1971, 1981, and 1991).
Note: Variables and definitions.
PCHE: Per capita public health expenditure (monthly) in Rs. at constant prices, 1970–1971.
PCSDP: Per capita state domestic product (constant prices, 1970–1971 in Rs.).
AP: Proportion of persons over sixty years of age (%).
PPHC: Population per primary health centre.
PPD: Population per doctor.
LR: Literacy rate (%).

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appropriate if we believed that sampled states were drawn from a large set of states. For example, present analysis consists of 14 out of 30 states in India. One way of choosing between FE and RE models is running a Hausman test, which provides evidence of the existence of correlations between individual effects and the regressors. If the Hausman test statistic is significant, one can use a FE model, otherwise RE model may be used.

IV. Results

Table 5 shows the results using panel data techniques. Also, we include Hausman test for the every specification of the model and in this case it favours RE model. Therefore, results in Table 5 are the estimates of RE models for Indian states. A Wald statistic is included to evaluate the joint significance of the variables. The signs of statistically significant variables, PCSDP and LR are those to be expected. As concerning the effect of per capita income, one major question of health economics is the value of health expenditure income elasticity. If this elasticity is greater than unity, health care are a luxury good and their increase is a natural outcome of economic growth. As we can see from earlier table (model 2) values of income elasticities across all three specifications are significantly smaller than unity (0.686, 0.769 and 0.475 respectively), which implies health care is not a luxury good amongst Indian states.

V. Concluding Remarks

The aim of this study was to analyse the determinants of regional public health care expenditure in India because Indian states vary greatly in terms of health care expenditure and services. The empirical results of the model show that the statistically significant determinants in the explanation of the volume of regional health care expenditure are regional income (state per capita GDP) and literacy rate and factors such as ageing population and other relative structural characteristics of the demand variables are not statistically significant, unlike in the case of Cantarero (2005). Since per capita state GDP is a significant variable in

Table 5. Results, dependent variable: PCHE (Model 1); LogPCHE (Model 2)

Variables	Model 1						Model 2					
Intercept	−28.48*	(−3.83)	−39.85*	(−3.45)	−26.85*	(−2.14)	−1.045*	(−2.79)	−1.595*	(−2.68)	−0.862*	(−1.38)
LogPCSDP	13.072*	(+5.08)	14.652*	(+3.79)	9.306*	(+2.13)	0.686*	(+5.30)	0.769*	(+3.82)	0.473*	(+2.15)
AP			0.781	(+1.13)	0.179	(+0.24)			0.355	(+1.00)	−0.187	(−0.05)
PPHC			0.000012	(+1.10)	1.10E−05	(+1.06)			7.36E−07	(+1.32)	8.82E−07	(+1.35)
PPD			0.00013	(+0.78)	0.00016	(+1.00)			2.75E−06	(+0.32)	4.48E−06	(+0.59)
LR			...		0.139*	(+2.89)			...		0.008*	(+3.28)
R^2	0.4074		0.4384		0.4401		0.4337		0.4529		0.4657	
Wald statistic**	25.84		28.16		42.24		28.11		29.81		48.48	
Hausman statistic	2.98		2.11		2.5		3.59		3.05		3.34	
Prob (Hausman)***	0.0841		0.1461		0.1137		0.0582		0.081		0.07	

Notes: Values in bracket are corresponding *t*-values.
*Significant at 5% level of significance.
**Wald tests are statistically significant.
***Hausman test favours random effect model.

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explaining the public health expenditure in Indian states, one would expect that with an increasing state per capita GDP, expenditure on health would increase. However, this has not happened in India. In fact, public spending on health in India has itself declined during 'liberalization' process that began in 1991 from 1.3% of GDP in 1990 to 0.9% in 1999, even though per capita income has been increasing steadily since then. One explanation for this contradiction is that health is virtually absent from public debates and democratic politics in India. For example, in Tamil Nadu the state which made some progress in health, health care has been brought within the democratic politics. Health and health related issues, such as mid-day meals, are subject of public debate and play an important role in election campaigns. In north India (that comprises the worst performing states of Bihar, Uttar Pradesh and Orissa) health does not figure on the political agenda. Thus, economic growth on its own is not a sufficient factor that can ensure delivery of adequate health services in Indian states. It would require political decisions to recognize the importance of good public health services and plan and invest accordingly. Given that health has been recognized as an important determinant of economic growth, regional health care inequality can be one of the factors that can explain the regional inequality of economic development in India.

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