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Catastrophic Payments and Impoverishment Due to Out-of-Pocket Health Spending: The Effects of Recent Health Sector Reforms in India

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Catastrophic Payments and Impoverishment Due to Out-of-Pocket Health Spending: The Effects of Recent Health Sector Reforms in India

Soumitra Ghosh[i]

Abstract

Out-of-pocket payments are the principal source of health care finance in most Asian countries, and India is no exception. This fact has important consequences for household living standards. In this paper the author explores significant changes in the 1990s and early 2000s that appear to have occurred as a result of out-of-pocket spending on health care in 16 Indian states. Using data from the National Sample Survey on consumption expenditure undertaken in 1993–94 and 2004–05, the author measures catastrophic payments and impoverishment due to out-of-pocket payments for health care. Considerable data on the magnitude, distribution and economic consequences of out-of-pocket payments in India are provided; when compared over the study period, these indicate that new policies have significantly increased both catastrophic expenditure and impoverishment.

Keywords: out-of-pocket payments, catastrophic expenditure, impoverishment, India

1. Introduction

Out-of-pocket (OOP) payments are the principal source of health care finance in most Asian countries, and India is no exception. This fact has important consequences for household living standards. Individuals can fall below the poverty line when they pay for health care at the expense of meeting their basic needs (their level of impoverishment can be determined by subtracting OOP expenditures on health care from household resources). But too often, families have no choice but to pay for care. Medical spending is regarded as catastrophic if it exceeds a predetermined share of household income or total expenditure in a given period (Wagstaff and van Doorslaer, 2003; Xu et al., 2003).

India was one of the poorest countries in the world in 1990, with an estimated gross domestic product (GDP) per capita of US$331. In 1991 major macroeconomic structural adjustment policies (SAPs) were introduced to replace the mixed economy with a regulated market economy. The liberalisation of the Indian economy spurred GDP growth to an unprecedented level, but it also led to a widening of income inequality in the post-reform period (Pal and Ghosh, 2007; Sen and Himanshu, 2005). Although the level of poverty has declined since the reforms were initiated, the pace of decline has slowed since the 1980s (World Bank, 2001; Deaton, 2005). If current trends continue, India may not meet the poverty reduction target set by the Millennium Development Goals.

The macroeconomic adjustments of the 1990s prompted some major policy shifts in the health sector. While health sector reforms in India can be traced to as early as the 1980s, as the state began to reduce its role in the provision of health care services, it was only in the 1990s that reforms began

in earnest. In India, health sector reforms have been piecemeal and incremental but have led to extensive changes in the organisation, structure and delivery of health care services and financing (Sen, Iyer and George, 2002).

One of the important policy shifts in the public health sector was the introduction of user fees during the eighth five-year plan (1992–97). Because health policy is administered at the state level in India, user fees were implemented at different times in different states. The majority of states introduced the fees in the mid- to late 1990s. Also, during the late 1990s to early 2000s, many states initiated World Bank–sponsored health system reforms that further increased user fees in government hospitals. Although user fees were waived for people living below the poverty line, the definition of *poor* was arbitrary, leading to limited relief for most poor people (Thakur and Ghosh, 2009).

The second policy change was mainly related to the decline of government spending on health. The SAPs forced the central and state governments to drastically reduce funding for the social sector. Public expenditure in the health sector was further squeezed at the state level in the 1990s (Mooij and Dev, 2002), leading to a government failure to meet the public's health care needs. As public health investment decreased and user fees in the public sector increased, the private sector moved in to exploit the market opportunity (Peters et al., 2002; Bhat, 1996).

Another major development in the health sector occurred with the introduction of the new Drug Price Control Order (DPCO) in 1994. According to the DPCO (1995), only 74 out of 500 commonly used bulk drugs were to be kept under statutory price control. The pharmaceutical sector was further liberalised in 2002. The impact of these drug policy changes could be seen in the

spiralling increase in drug prices during the period 1994–2004 (National Commission on Macroeconomics and Health, 2005).

All these developments in the health sector are expected to push OOP health payments upward in both public and private facilities, and these increases, in turn, are likely to affect health care utilisation and overall health. They can also have a disrupting effect on household living standards. In the absence of adequate insurance coverage—and more than 95 percent of India's population has no health insurance—expenditures to treat illness can lead to financial catastrophe, pushing individuals or households into poverty or deepening their existing poverty (van Doorslaer et al., 2006; Wagstaff and van Doorslaer, 2003; Xu et al., 2003).

It is therefore important to assess how the increase in OOP health payments might impact household living standards in India, especially in the context of the ongoing health sector reforms. Empirical studies conducted in many countries on the effects of these policies point to severe negative consequences (Wagstaff and van Doorslaer, 2003; O'Donnell et al., 2007; Chaudhuri and Roy, 2008; Garg and Karan, 2009). Such findings have become a major concern for policy makers working on the financing of health care throughout the world (Commission on Macroeconomics and Health, 2001; OECD and WHO, 2003; World Bank, 2004; WHO, 2005; World Health Report, 2008).

In this paper, the author explores significant changes that appear to have occurred in the 1990s and early 2000s as a result of an increase in OOP spending on health care in India in general and 16 major Indian states in particular. The data given are from the National Sample Survey (NSS) on consumption expenditure undertaken in 1993–94 and 2004–05. The author seeks to analyse (i) the

changes in OOP spending during this period, (ii) health-financing contributions and composition in both periods, (iii) the magnitude and distribution of OOP payments relative to total household consumption expenditure across economic classes, (iv) the extent of catastrophic health care expenditure due to OOP payments and (v) the changes in the magnitude and depth of impoverishment because of OOP payments for health care.

This paper is organised as follows: the next section describes the data and the methods used. Section 3 presents background information on the financing contribution and composition of OOP payments. Section 4 deals with the changes in the magnitude and distribution of OOP payments relative to total household consumption expenditure across economic classes. Section 5 shows the changes in the incidence and intensity of catastrophic expenditure. Section 6 presents the changes in the level and depth of impoverishment due to OOP payments across states. And, finally, section 7 presents a discussion of the data.

2. Methods

Catastrophic payments for health care

The methodology applied by this study to measure catastrophic payments for health care has been discussed by Wagstaff and van Doorslaer (2003). An OOP payment for health care is considered catastrophic when the payment exceeds some threshold (Z_{cat}), defined as a fraction of total household consumption or non-food consumption. If T represents OOP payments for health care, x represents total household expenditure and $f(x)$ stands for food expenditure, then a household is said to have incurred catastrophic payments when T/x or $T/[x-f(x)]$ exceeds a specified threshold, Z_{car}.

One of the approaches used to measure catastrophic payments for health care involves analysing the incidence of catastrophic payments—that is, the percentage of households that spend more on health care than the threshold, which can be measured by the headcount (H_{cat}). H_{cat} is the fraction of the sample whose expenditures as a proportion of total income exceed the threshold Z_{cat}. Meanwhile, O_i is the 'catastrophic overshoot', which equals $T_i/x_i - Z_{cat}$ *if* $T_i/x_i > Z_{cat}$ and zero otherwise. The catastrophic overshoot captures the average degree by which payments (as a proportion of total expenditure) exceed the threshold Z_{cat}. If we let $E_i = 1$ if $O_i > 0$ and $E_i = 0$ otherwise, then the headcount is given by expression (1):

$$H_{cat} = (1/N)\sum_{i=1}^{n} E_i, = \mu_E, \qquad (1)$$

where N is the sample size and μ_E is the mean of E_i, while H_{cat} captures only the incidence of any catastrophes occurring and O captures the intensity of the occurrence as well.

In order to determine whether poor households incur more catastrophic payments than rich households, the concentration index (CI) of E_i can be calculated. Positive values of the CI for E_i indicate a greater tendency for rich households to exceed the threshold, while negative values indicate a greater tendency for poor households to exceed the threshold.

Measuring impoverishment due to health care expenditure

In measuring impoverishment—that is, the extent to which households are made poor or poorer by making OOP payments for health care—two measures of poverty can be used: the poverty headcount and the poverty gap. While the poverty headcount measures the number of households living below the poverty line as a percentage of total households, the poverty gap captures the depth of poverty or the amount by which poor households fall short of reaching the poverty line.

If we let x_i be household *i*'s consumption per capita (which also refers to pre-payment), Z_{pov}^{pre} the poverty line and x_i the individual *i*'s pre-payment income, then we can define $P_i^{pre} = 1 \text{if } x_i < Z_{pov}^{pre}$, and zero otherwise. The pre-payment poverty headcount is then expressed as

$$H_{pov}^{pre} = (1/N)\sum_{i=1}^{N} P_i^{pre} = \mu_{Ppre}, \qquad (2)$$

where N is the sample size.

The average pre-payment poverty gap is defined as

$$G_{pov}^{pre} = (1/N)\sum_{i=1}^{N} g_i^{pre} = \mu_{g^{pre}}, \qquad (3)$$

where N is the sample size and $g_i^{pre} = x_i - z_{pov}^{pre}$.

It is possible to define a normalised pre-payment poverty gap, given by

$$NG_{pov}^{pre} = G_{pov}^{pre} / Z_{pov}^{pre}, \qquad (4)$$

which allows comparative analysis as it eliminates differences in currency or the choice of the poverty line. Post-payment is defined as x_i after the subtraction of payments for health care. Post-payments can be calculated following the same formula as for pre-payment. The effects of OOP payments on poverty, termed 'poverty impact' (PI), are then defined as the difference between the relevant pre-payment and post-payment measures, such as:

$$PI^{H} = H_{pov}^{post} - H_{pov}^{pre} \qquad (4)$$

$$PI^{G} = G_{pov}^{post} - G_{pov}^{pre} \qquad (5)$$

$$PI^{NG} = NG_{pov}^{post} - NG_{pov}^{pre} \qquad (6)$$

3. Data

Cross-sectional data are taken from the fiftieth (1993–94) and sixty-first (2005) rounds of national and state representative surveys on 'consumption expenditure', collected by the National Sample Survey Organisation (NSSO, 2006) in India. The surveys include responses from 115,254 and 124,644 households, respectively, comprising 564,537 and 609,736 individuals. By collecting detailed information on both OOP payments for health care and total household consumption expenditure, these surveys offer robust estimates of the magnitude of OOP payments relative to household budgets. The OOP payments for health care include expenditure for institutional and non-institutional care.[ii] All the variables related to expenditure are converted to a monthly figure.

In both these rounds, a stratified multistage sample design was adopted, using census villages for the rural areas and urban blocks for the urban areas as the first-stage units (FSUs) and households as the second-stage units. In the case of large villages or blocks requiring the formation of hamlet groups or sub-blocks, two hamlet groups or sub-blocks from each FSU were surveyed at an intermediate stage. The survey periods for the fiftieth and sixty-first rounds were from July 1993 to June 1994 and from July 2004 to June 2005, respectively. The survey period of one year was divided into four sub-rounds of three months each, and an equal number of villages and households were allotted to each round. Since data were collected over a full year, the estimates of health expenditure were expected to be largely free from seasonal fluctuations. The analysis was done at the country and state level. However, smaller states—those with a population of less than 10 million—were not included.

4. Findings

Out-of-pocket financing composition of health care in India

We analyse the impact of OOP payments for health care across consumption expenditure quintiles in 16 states for the periods 1993–94 and 2004–05. Household health-care expenditure rose steeply both in absolute terms and as a proportion of total consumption expenditure between the two periods: while in 1993–94, the mean OOP expenditure for households was Rs. 75, it increased to Rs. 198 in 2004–05 (Table 1).

Table 1: Mean Health Care Spending (Rs.) for Rural and Urban Households in 1993-94 & 2004-05

	Rural			Urban			Combined		
	Inpatient	Outpatient	Total	Inpatient	Outpatient	Total	Inpatient	Outpatient	Total
1993-94	8.80	62.46	71.26	14.60	69.09	83.68	10.34	64.22	74.56
2004-05	46.56	131.49	178.04	70.24	181.26	251.50	53.07	145.17	198.24

The mean share of OOP health care expenditure in relation to monthly household consumption expenditure significantly increased from 4.39 percent in 1993–94 to 5.51 percent (Table 3).

Table 2: The composition of out-of-pocket payments for health care in 1993–94 and 2004–05 (percent)

	1993–94				2004–05			
State	**Inpatient care**	**Ambulatory care**	**Medicine**	**Other**	**Inpatient care**	**Ambulatory care**	**Medicine**	**Other**
Bihar	0.73	7.71	90.00	1.57	3.95	10.51	84.14	1.4
Orissa	0.81	4.86	93.13	1.20	5.53	5.58	85.2	3.7
Rajasthan	1.64	4.48	86.81	7.08	7.62	4.41	83.11	4.86
UP	1.79	3.84	92.19	2.18	8.32	5.38	81.86	4.43
Himachal Pradesh	2.21	2.55	94.48	0.77	6.60	1.73	87.95	3.71
Punjab	2.27	5.29	91.44	1.00	17.91	7.68	67.46	6.94
MP	2.84	7.74	85.92	3.51	12.21	13.92	71.27	2.59
Haryana	4.18	5.24	89.10	1.47	15.71	9.07	70.11	5.11
Assam	4.26	6.41	83.03	6.30	9.17	7.42	78.77	4.63
WB	6.60	13.67	77.87	1.87	12.36	17.30	65.80	4.54
Karnataka	7.07	13.18	67.49	12.26	14.98	16.06	65.17	3.79
Andhra	7.64	14.98	75.61	1.78	12.37	17.00	67.09	3.54
MAH	7.83	18.54	71.00	2.62	17.66	15.37	60.82	6.15
Gujarat	8.33	13.05	75.57	3.05	18.2	12.94	64.16	4.7
TN	9.61	17.77	67.63	4.99	13.69	18.09	66.56	1.67
Kerala	11.05	5.48	77.45	6.03	23.08	9.89	62.68	4.34
India	**5.06**	**11.39**	**81.60**	**1.95**	**12.94**	**11.58**	**71.17**	**4.31**

Note: UP (Uttar Pradesh), MP (Madhya Pradesh), WB (West Bengal), MAH (Maharashtra) and TN (Tamil Nadu). Drugs and medicine are the same.

The percentage shares of total OOP payments on inpatient care, ambulatory care, medicines and other types of care are given in Table 2. Drugs and medicine, the most vital component of OOP expenditure, account for a substantial part of household payments. However, estimates reveal that spending on drugs declined from 81.6 percent of household expenditure in 1993–94 to 71.17 percent in 2004–05. While expenditure on ambulatory care remained stable, spending on inpatient care increased by a factor of 2.5.

The distribution of OOP expenditure varies substantially among the states: drug spending is high (79–85 percent) in lesser-developed states such as Orissa, Bihar, Uttar Pradesh and Assam, while economically prosperous states such as Maharashtra, Kerala, Gujarat, Karnataka and Punjab spend less (60–67 percent) on drugs.

However, OOP spending on inpatient care is much higher in these richer states (15–23 percent of total OOP expenditure) than in their poorer counterparts. Though average OOP payments on health care as a share of total consumption expenditure have registered a substantial increase for the majority of the states, significant differences in the mean OOP budget across states persist. There is a positive relationship between the share of OOP health payments and the level of economic development of states, as measured by the per capita state domestic product (SDP) (Figure 1). However, the gradient is not very steep, indicating that this relationship is rather weak.

During the study period, the highest increase in OOP payments on health care as a share of total household consumption expenditure was observed in Kerala (4.7 percent), Himachal Pradesh (2.5 percent), Maharashtra (2.0 percent) and Gujarat (1.9 percent) (Table 3). This reflects the increase in health care utilisation in these states over the study period.

Uttar Pradesh, one of the poorest states of India, has a very high OOP share compared with many high-income states, and this share increased during the period considered. This could be explained by the fact that government expenditure on health care declined at an annual rate of 1.54 percent from 1993–94 to 2002–03 (Economic Research Foundation, 2006). Furthermore, the high health care utilisation of private providers (The proportion of population utilising health care services from the private sector is almost 90 percent[1]) due to insufficient public health care infrastructure may have also contributed to the prevailing high OOP share in Uttar Pradesh.

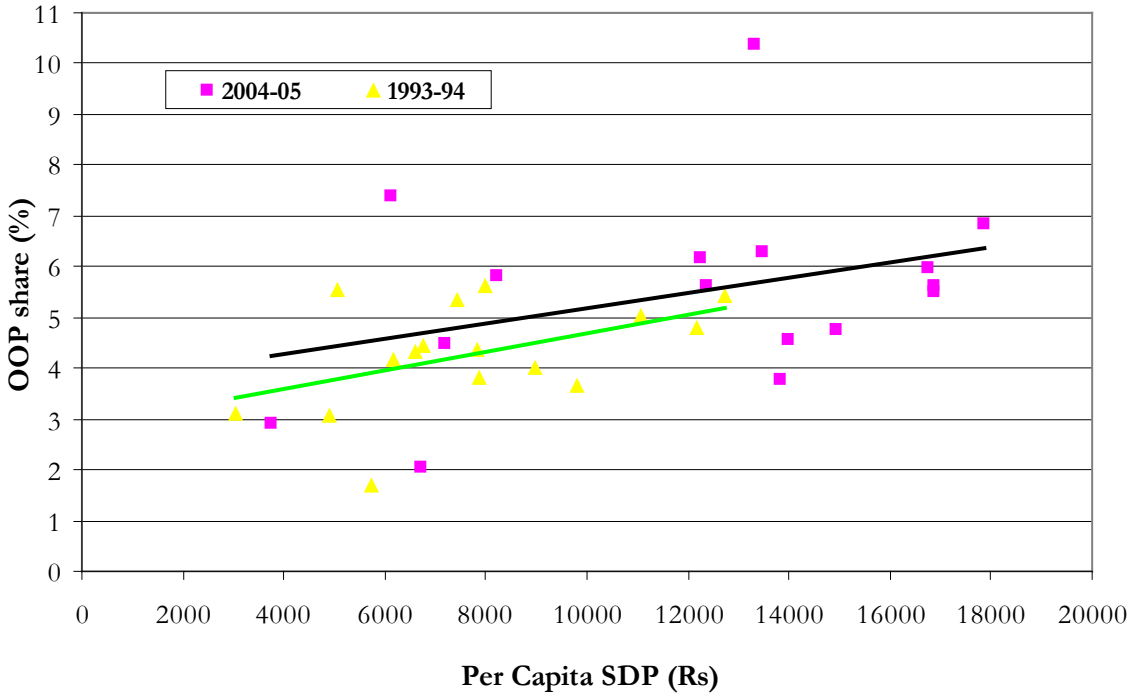
[1] author's own calculation from the sixtieth round of the NSSO data collected in 2004 on health care utilisation

Table 3: Out-of-pocket payments for health care as a percentage of household consumption expenditure, 1993–94 and 2004–05

	IND	AS	BIH	MP	OR	WB	UP	KAR	AP	GUJ	TN	RAJ	MAH	PUN	HP	HAR	KER
2004–05																	
Mean	5.51	2.05	2.92	5.82	4.48	6.15	7.38	3.78	5.62	5.51	4.56	4.76	6.82	5.96	6.30	5.60	10.36
C.V.	2.37	2.35	2.06	2.52	2.2	1.82	1.98	2.57	2.06	2.67	2.36	2.42	2.71	2.07	2.38	2.22	2.19
C.I.	0.122	0.093	0.094	0.109	0.182	0.129	0.085	0.174	0.142	0.068	0.167	0.125	0.092	0.127	0.121	0.047	0.023
Quintile means																	
Poorest	4.00	1.66	2.50	4.61	3.30	4.61	5.81	2.22	3.92	4.47	3.12	2.82	5.42	3.52	3.61	3.76	11.57
2nd poorest	5.01	1.86	2.65	5.60	5.55	5.41	6.73	3.56	5.61	4.55	4.16	3.92	6.48	4.67	4.91	4.92	8.87
Middle	5.92	2.02	3.12	6.31	6.21	6.38	7.64	4.18	6.66	6.29	5.55	5.24	6.94	4.94	6.68	5.70	9.30
2nd richest	6.69	2.29	3.38	6.90	5.51	7.91	8.82	5.41	7.51	6.43	5.65	5.23	6.77	7.20	7.66	6.51	11.59
Richest	7.09	2.79	5.70	7.95	6.26	8.12	8.69	5.00	6.79	5.77	6.89	6.38	8.81	7.11	7.33	5.92	10.47
1993–94																	
Mean	4.39	1.68	3.10	4.34	3.05	4.45	5.52	4.37	5.36	3.64	3.99	4.15	4.80	5.43	3.82	5.03	5.62
C.V.	1.97	1.82	1.92	1.82	1.87	1.94	1.68	1.82	1.78	2.03	2.12	2.31	2.33	1.32	1.99	1.80	1.90
C.I.	0.106	0.096	0.141	0.166	0.164	0.170	0.101	0.055	0.097	0.044	0.139	0.091	0.0307	0.044	0.147	0.113	0.018
Quintile means																	
Poorest	3.25	1.31	2.14	2.81	1.97	2.66	4.19	3.63	3.91	3.37	2.72	3.35	4.19	4.83	2.40	3.58	5.00
2nd poorest	4.19	1.61	2.78	3.75	2.59	3.86	5.20	4.32	5.29	3.67	3.51	3.84	5.06	5.29	3.15	5.07	6.08
Middle	4.68	1.60	3.18	4.49	3.09	4.74	5.79	4.79	6.05	3.49	4.44	4.00	4.98	5.58	4.41	4.73	5.36
2nd richest	5.23	1.73	3.45	5.41	4.18	5.88	6.54	5.01	6.23	3.87	5.06	4.42	5.41	5.99	4.22	5.31	6.51
Richest	5.45	2.39	4.67	6.62	4.22	6.15	6.76	4.40	6.07	4.09	5.12	5.61	4.52	5.69	5.43	7.04	5.04

Note: IND (India), AS (Assam), BIH (Bihar), MP(Madhya Pradesh), OR (Orissa), WB (West Bengal),UP (Uttar Pradesh), KAR (Karnataka), AP (Andhra Pradesh), GUJ (Gujarat), TN (Tamil Nadu), RAJ (Rajasthan), MAH (Maharashtra), PUN (Punjab), HP (Himachal Pradesh), HAR (Haryana) and KER (Kerala). C.V. (Coefficient of variation) and C.I. (Concentration index).

Figure 1: Average OOP share in Indian states ranked by per capita SDP, 1993–94 and 2004–05



Two states, Bihar and Karnataka, have reduced their OOP share over time. Since Bihar continues to be the poorest state in India, households have little choice but to divert their resources for other necessary food and non-food consumption. This could also be due to the poor availability of health care services, which has led to low health care utilisation (NSSO, 2006). Karnataka's decreasing OOP share is due to other factors. The annual growth rate of public expenditure on health in Karnataka (7.31 percent) sharply increased between 1993–94 and 2003–04, and per capita spending by the government of Karnataka on health care is the second highest in the country (Economic Research Foundation, 2006). In addition to this, the state is also ahead of others in protecting households from uncertain health risks by a better risk-pooling mechanism, with nearly 10.5 percent of households reporting having at least one member covered by health insurance in 2005–06 (International Institute for Population Sciences and ORC Macro, 2007).

There is significant variation in the OOP payments for health care within the country and its different states. During the period between 1993–94 and 2004–05, the distribution of OOP share in India became more skewed (Table 3). Except for West Bengal and Uttar Pradesh, the standard deviation of the share was at least twice the mean for all the other states. This feature is typical of health care expenditure distribution, indicating that many people spend little or nothing on health care, while a few sick individuals have high expenditures. The coefficient of variation is the greatest in Maharashtra, which also has a greater mean OOP share. On the other hand, West Bengal, with a high OOP share, had the lowest coefficient of variation, one that further declined from 1.94 in 1993–94 to 1.82 in 2004–05.

The CIs of OOP payment for health care, which rank households according to their income on the *x*-axis and their health care expenditure on the *y*-axis, indicate the progressivity of household health care payments. These indices show whether health care payments account for an increasing proportion of income as the latter rises. The CIs are positive for both periods, indicating that OOP payments on health care are disproportionately concentrated among the rich. The value of the CI marginally increased from 1993–94 to 2004–05 (from 0.1062 to 0.1222), suggesting a greater concentration of OOP payments among the rich. The quintile-specific means of OOP payments also confirm this result.

The distribution of OOP payments as a share of monthly total household consumption expenditure across consumption quintiles was significantly skewed in favour of richer quintiles in West Bengal, Madhya Pradesh and Orissa in 1993–94 and Orissa, Karnataka and Tamil Nadu in 2004–05. With the exception of Assam, Bihar, Madhya Pradesh, West Bengal and Uttar Pradesh, the gradient

became steeper in all other states. Income inequalities in OOP payments were highest in Orissa and lowest in Kerala. However, it would be wrong to infer that health care payments are very progressive in Orissa, which has the highest incidence of poverty. Rather, the high inequality in the OOP payments share is more likely due to the fact that the households of the poorer quintiles have far fewer resources with which to respond to their health care needs than the richer quintiles. The same argument is applicable for India as a whole, which showed an increase in the CI of OOP payments over the study period.

On the other hand, it is interesting to note that although Kerala has the highest average OOP health care spending share (10.5 percent of total consumption), there is very little variation in this share across consumption expenditure quintiles. This might be explained by the fact that Kerala is India's most literate state, a place where households across the socio-economic strata have been exposed to an extensive health care infrastructure. Consequently, they are more conscious about their health care needs and are willing to spend a larger proportion of their resources on health care than households in other states. Although Maharashtra, Himachal Pradesh and Uttar Pradesh present as high an average share of OOP payments for health care as Kerala, they also present a steep gradient. The most dramatic declines in the gradient for OOP payments on health care can be seen in Haryana, Madhya Pradesh, West Bengal and Bihar, while a steep increase in the income gradient has occurred in Karnataka and Punjab.

Table 4:Percentage of households incurring catastrophic payments for health care in India and select states, 1993–94 and 2004–5

		OOP payments as share of total household consumption expenditure							
		1993–94				*2004–05*			
	Threshold	*5%*	*10% (95% CI)*	*15%*	*25%*	*5%*	*10% (95% CI)*	*15%*	*25%*
India	Catastrophic headcount (H_c)	26.66%	12.97% (12.77–13.17)	7.45%	2.77%	29.98%	15.37% (15.17–15.57)	9.24%	4.15%
	Concentration index (C_E)	0.1019	0.1024	0.1047	0.1471	0.1095	0.1186	0.1408	0.1689
	Overshoot (H_g)	2.27%	1.34%	0.85%	0.39%	3.19%	2.12%	1.52%	0.90%
	Concentration index (C_{Eg})	0.1002	0.1025	0.1084	0.1195	0.1327	0.1414	0.1467	0.1424
Assam	Catastrophic headcount (H_c)	7.86%	1.96% (1.53–2.39)	0.77%	0.21%	9.25%	3.21% (2.98–3.45)	1.63%	0.59%
	Concentration index (C_E)	0.1444	0.2035	0.1667	0.4944	0.0723	0.1360	0.1593	0.0614
	Overshoot (H_g)	0.33%	0.13%	0.06%	0.03%	0.63%	0.34%	0.23%	0.13%
	Concentration index (C_{Eg})	0.1462	0.1919	0.2214	0.2006	0.1075	0.1034	0.0791	0.0144
Bihar	Catastrophic headcount (H_c)	21.03%	8.96% (8.37–9.54)	4.81%	1.27%	17.56%	5.76% (5.16–6.36)	2.88%	1.05%
	Concentration index (C_E)	0.1151	0.1535	0.1987	0.2894	0.0784	0.0912	0.1690	0.2856
	Overshoot (H_g)	1.39%	0.71%	0.39%	0.14%	1.08%	0.57%	0.37%	0.19%
	Concentration index (C_{Eg})	0.1661	0.2148	0.2644	0.3910	0.1423	0.1836	0.2161	0.2115
MP	Catastrophic headcount (H_c)	26.38%	12.98% (12.27–13.69)	7.40%	2.93%	30.57%	16.30% (15.35–17.24)	10.44%	4.85%
	Concentration index (C_E)	0.1670	0.1642	0.1822	0.2073	0.0898	0.1042	0.1259	0.1964
	Overshoot (H_g)	2.26%	1.32%	0.83%	0.37%	3.58%	2.46%	1.80%	1.07%
	Concentration index (C_{Eg})	0.1858	0.2039	0.2238	0.2908	0.1179	0.1236	0.1272	0.1039
Orissa	Catastrophic headcount (H_c)	18.74%	7.68% (6.89–8.47)	3.67%	1.16%	24.02%	12.21% (11.30–13.11)	7.36%	3.08%
	Concentration index (C_E)	0.1747	0.2099	0.26343	0.2306	0.1915	0.2122	0.1689	0.2285
	Overshoot (H_g)	1.23%	0.64%	0.36%	0.14%	2.40%	1.56%	1.08%	0.61%
	Concentration index (C_{Eg})	0.2122	0.2382	0.2574	0.3004	0.199043	0.1937	0.19223	0.1942
West Bengal	Catastrophic headcount (H_c)	28.29%	14.25% (13.48–15.03)	7.48%	2.34%	34.99%	17.80% (16.74–18.86)	10.72%	4.85%
	Concentration index (C_E)	0.1584	0.1552	0.1508	0.2426	0.1170	0.1240	0.1802	0.2213
	Overshoot (H_g)	2.24%	1.22%	0.70%	0.28%	3.50%	2.25%	1.55%	0.84%
	Concentration index (C_{Eg})	0.1802	0.1989	0.2398	0.3292	0.1574	0.1770	0.19056	0.1822
Uttar Pradesh	Catastrophic headcount (H_c)	31.76%	16.57% (15.89–17.26)	10.09%	4.09%	39.66%	20.24% (19.50–20.99)	12.41%	5.88%
	Concentration index (C_E)	0.0746	0.0911	0.0883	0.1478	0.0755	0.0919	0.1062	0.1394
	Overshoot (H_g)	3.01%	1.86%	1.22%	0.56%	4.42%	2.99%	2.20%	1.34%
	Concentration index (C_{Eg})	0.1097	0.1275	0.1488	0.2125	0.0932	0.0995	0.0988	0.0854

Table 4:Percentage of households incurring catastrophic payments for health care in India and select states, 1993–94 and 2004–5

		OOP payments as share of total household consumption expenditure							
		1993-94				*2004-05*			
Threshold		*5%*	*10%*	*15%*	*25%*	*5%*	*10% (95% CI)*	*15%*	*25%*
Karnataka	Catastrophic headcount (H_c)	26.60%	11.82% (10.93-12.70)	6.79%	2.60%	22.81%	9.87% (8.78-10.96)	5.15%	2.26%
	Concentration index (C_E)	0.0535	0.0622	0.0449	0.0439	0.1411	0.1485	0.21859	0.3775
	Overshoot (H_g)	2.15%	1.26%	0.81%	0.38%	1.84%	1.10%	0.76%	0.42%
	Concentration index (C_{Eg})	0.0341	0.0238	0.0116	-0.0037	0.2154	0.2600	0.2934	0.2966
Andhra Pradesh	Catastrophic headcount (H_c)	25.26%	11.88% (10.82-12.93)	6.50%	2.77%	32.23%	17.17% (16.37-17.98)	10.36%	4.69%
	Concentration index (C_E)	0.1116	0.0980	0.0743	0.0991	0.1222	0.1551	0.1781	0.2097
	Overshoot (H_g)	2.04%	1.18%	0.76%	0.35%	3.39%	2.22%	1.55%	0.83%
	Concentration index (C_{Eg})	0.0722	0.0504	0.0386	0.0769	0.1555	0.1645	0.1658	0.1437
Gujarat	Catastrophic headcount (H_c)	21.42%	9.97%(8.76-11.17)	5.35%	2.24%	30.88%	16.76%(15.64-17.88)	9.47%	4.06%
	Concentration index (C_E)	0.0741	0.0710	0.1007	0.2273	0.0655	0.0114	0.0456	0.0597
	Overshoot (H_g)	1.63%	0.88%	0.52%	0.18%	3.27%	2.14%	1.52%	0.89%
	Concentration index (C_{Eg})	0.1188	0.1574	0.2194	0.3634	0.0553	0.0589	0.0647	0.0744
Tamil Nadu	Catastrophic headcount (H_c)	24.11%	11.59%(10.89-12.30)	6.74%	2.93%	26.08%	12.86%(12.24-14.31)	7.45%	3.15%
	Concentration index (C_E)	0.1618	0.1391	0.1424	0.1436	0.1769	0.1983	0.2046	0.1646
	Overshoot (H_g)	2.11%	1.28%	0.86%	0.44%	2.59%	1.67%	1.18%	0.70%
	Concentration index (C_{Eg})	0.1065	0.0789	0.0573	0.0094	0.1609	0.1490	0.1303	0.0956
Rajasthan	Catastrophic headcount (H_c)	24.33%	11.86% (10.96-12.77)	6.93%	3.18%	25.05%	13.20% (12.30-14.15)	8.37%	3.68%
	Concentration index (C_E)	0.0949	0.1462	0.1680	0.1375	0.1251	0.1045	0.0944	0.1568
	Overshoot (H_g)	2.28%	1.43%	0.98%	0.52%	2.77%	1.86%	1.32%	0.77%
	Concentration index (C_{Eg})	0.0829	0.0683	0.0323	-0.0849	0.1258	0.1298	0.14437	0.1605
Maharashtra	Catastrophic headcount (H_c)	30.42%	15.29%(14.59-16.0)	8.74%	2.85%	34.98%	19.46%(18.69-20.24)	11.92%	5.31%
	Concentration index (C_E)	0.0640	0.0056	-0.0183	-0.0773	0.0851	0.0608	0.1028	0.0809
	Overshoot (H_g)	2.60%	1.52%	0.94%	0.44%	4.33%	3.03%	2.26%	1.47%
	Concentration index (C_{Eg})	-0.0325	-0.0741	-0.1098	-0.1625	0.0813	0.0848	0.0892	0.0922

Table 4:Percentage of households incurring catastrophic payments for health care in India and select states, 1993–94 and 2004–5

		OOP payments as share of total household consumption expenditure							
		1993-94				*2004-05*			
	Threshold	*5%*	*10%*	*15%*	*25%*	*5%*	*10% (95% CI)*	*15%*	*25%*
Punjab	Catastrophic headcount (H_c)	35.04%	15.12%(14.01-16.23)	7.39%	2.90%	37.79%	17.25%(15.75-18.75)	10.05%	3.86%
	Concentration index (C_E)	0.0399	0.0477	0.0700	0.0801	0.0423	0.1238	0.1424	0.2947
	Overshoot (H_g)	2.44%	1.29%	0.76%	0.30%	3.06%	1.96%	1.38%	0.81%
	Concentration index (C_{Eg})	0.0568	0.0722	0.0848	0.1237	0.1959	0.2593	0.31704	0.4002
Himachal Pradesh	Catastrophic headcount (H_c)	21.74%	10.21%(8.96-11.46)	6.30%	2.64%	33.14%	18.48% (16.97-19.98)	11.62%	5.03%
	Concentration index (C_E)	0.1913	0.1693	0.1861	0.2701	0.1689	0.1349	0.1752	0.1988
	Overshoot (H_g)	1.88%	1.12%	0.73%	0.34%	3.86%	2.60%	1.86%	1.06%
	Concentration index (C_{Eg})	0.1611	0.1559	0.1401	0.0816	0.1251	0.1222	0.1099	0.0384
Haryana	Catastrophic headcount (H_c)	28.95%	16.55%(14.80-18.30)	10.08%	3.60%	34.07%	19.27%(17.60-20.94)	12.30%	5.48%
	Concentration index (C_E)	0.0837	0.0777	0.1090	0.2898	0.0627	0.0113	-0.0193	-0.0496
	Overshoot (H_g)	2.85%	1.77%	1.12%	0.48%	3.30%	2.28%	1.70%	1.05%
	Concentration index (C_{Eg})	0.1422	0.1748	0.2260	0.3363	0.0184	0.0033	0.0013	0.0226
Kerala	Catastrophic headcount (H_c)	34.21%	17.40%(16.27-18.52)	9.72%	2.97%	52.55%	32.42%(31.16-33.69)	20.45%	8.95%
	Concentration index (C_E)	0.0228	0.0116	-0.0183	0.0576	0.0360	0.0156	0.0150	-0.0151
	Overshoot (H_g)	3.00%	1.77%	1.13%	0.59%	7.05%	4.97%	3.68%	2.28%
	Concentration index (C_{Eg})	-0.0056	-0.0192	-0.0201	-0.0394	0.0098	0.0029	0.0003	-0.0084

Catastrophic payments

Catastrophic spending on health occurs when a household must reduce its basic expenses over a certain period of time, sell assets, or accumulate debts in order to cope with the medical bills of one or more of its members. Since there are no universally accepted cut-off values or thresholds for defining the catastrophic nature of health care payments, the catastrophic headcount has been defined as the percentage of households spending more than a 5–25 percent share of their total consumption expenditure on health care. However, it is evident from other empirical studies that 10 percent of total expenditure is widely accepted as the standard, as this represents an approximate threshold at which the household is forced to cut down on subsistence needs, sell productive assets, incur debts or be impoverished (van Doorslaer et al., 2006).

Figure 2: Percentage of households incurring catastrophic expenditure at different thresholds, India and selected states, 1993–94

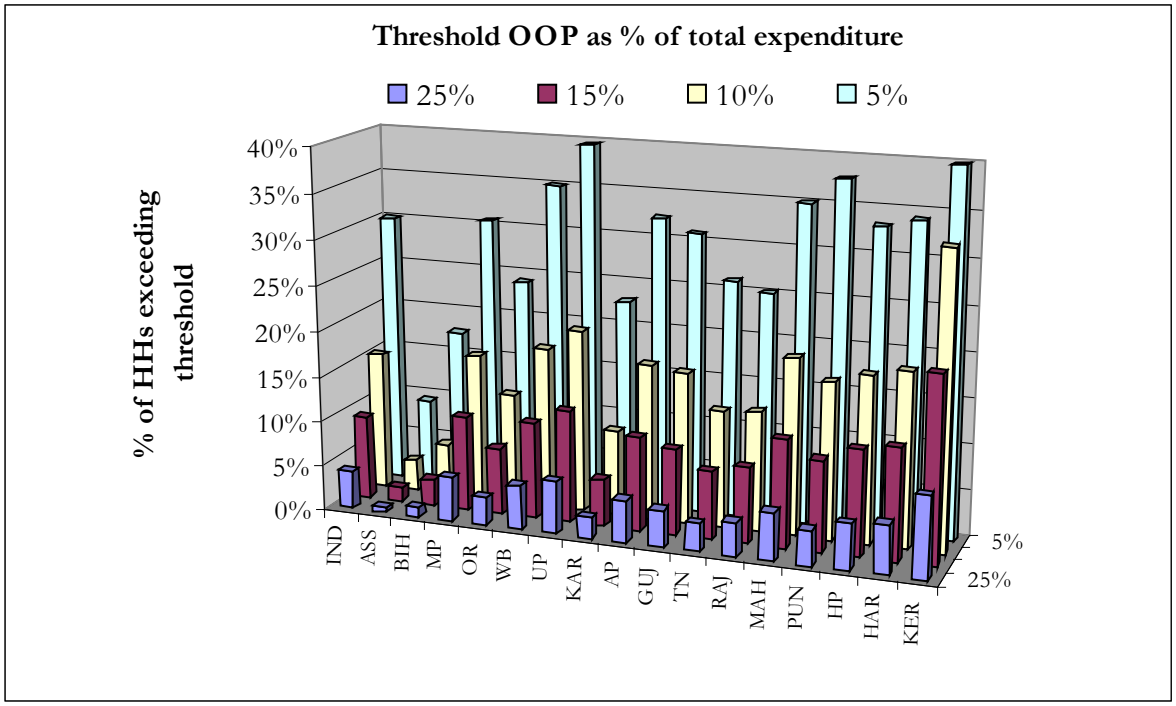
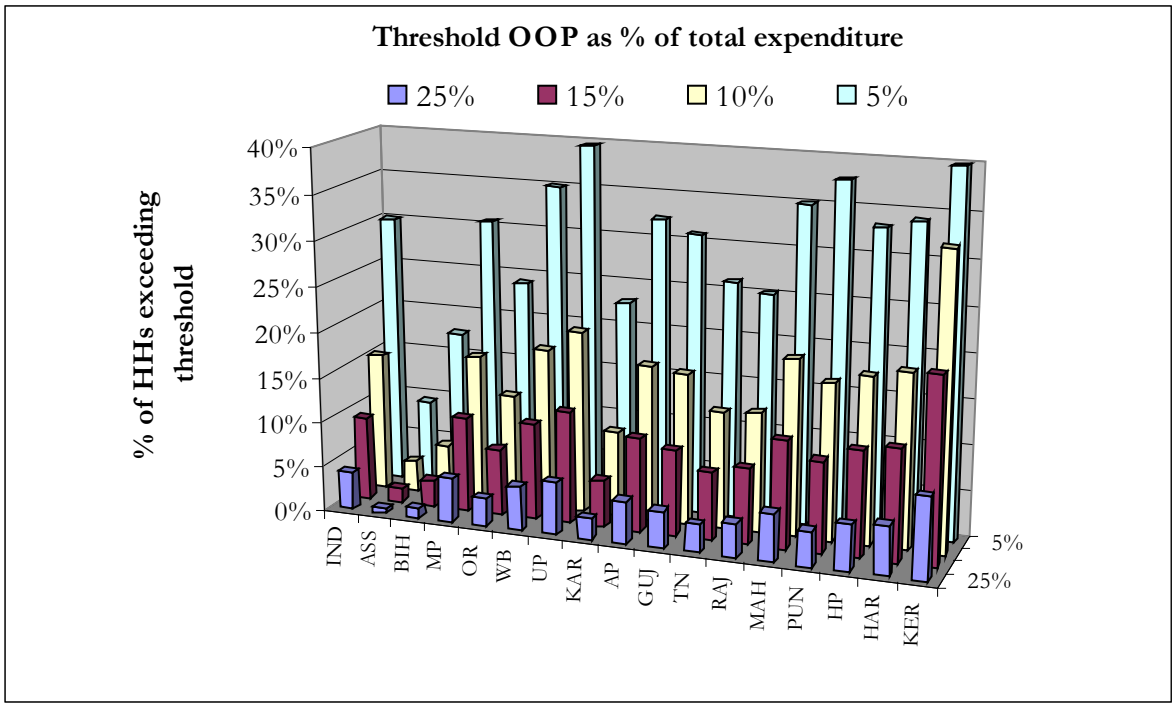


Figure 3: Percentage of households incurring catastrophic expenditure at different thresholds, India and selected states, 2004–05

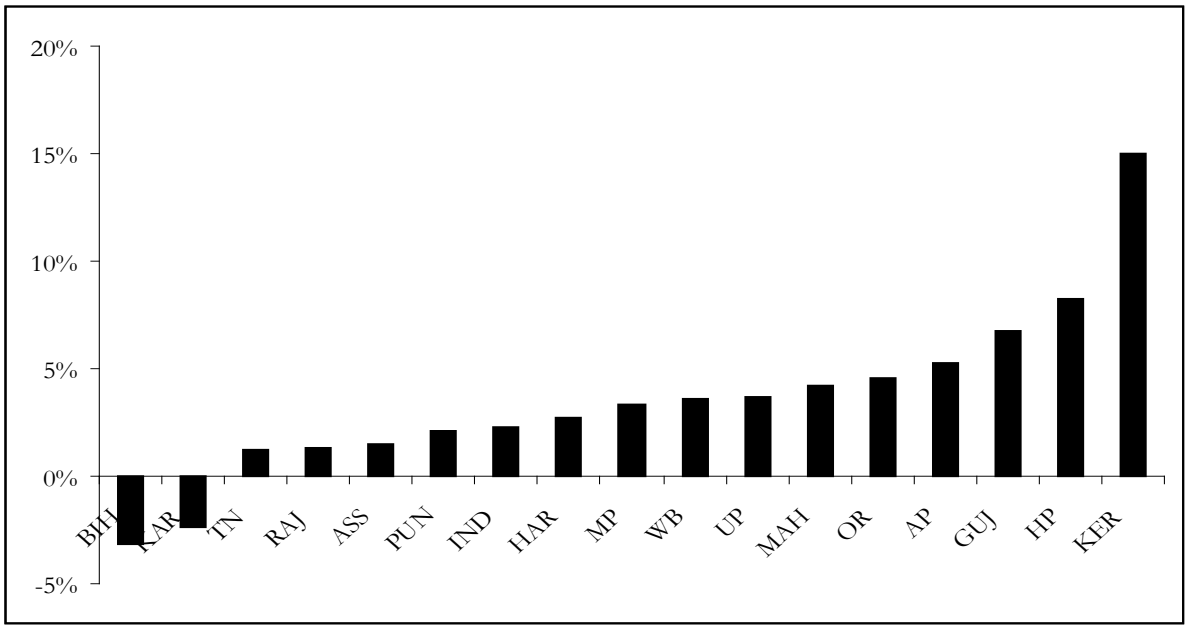


The impact of the increase in the share of OOP expenditure can be seen in the incidence of catastrophic expenditure (Table 4). It is important to note that the catastrophic character of OOP payments increased over the period in question at the 5 percent, 10 percent, 15 percent and 25 percent thresholds. The catastrophic health care expenditure incidence (OOP> 10 percent) increased from 13.1 percent in 1993–94 to about 15.4 percent in 2004–05. The catastrophic headcount was more than 4 percent even at the highest defined threshold level (OOP> 25 percent) in 2004–05, and the percentage of households falling into the 'catastrophic' bracket increased substantially, from a low level of 2.77 percent in 1993–94.

Altering the threshold level for what qualifies as catastrophic health payments marginally affects the ranking of states with the highest or lowest incidence of such payments (Figures 2 and 3). For example, Madhya Pradesh appears to have experienced the fourth-highest incidence of

catastrophic health payments at the 25 percent threshold in 2004–05, but it would rank much lower at the 5 percent level. Meanwhile, the proportion of households facing catastrophic OOP health payments varied widely among states, from 3.46 percent in Assam to 32.42 percent in Kerala (Table 4) in 2004–05. A similar pattern in catastrophic health payments was also observed in 1993–94, when catastrophic headcounts were prevalent mostly in high- and middle-income states (except Uttar Pradesh) at lower threshold levels. However, at the highest threshold level (25 percent of total consumption expenditure), many poorer states such as Madhya Pradesh, Uttar Pradesh and Rajasthan had higher levels of catastrophic headcount than some of the high-income states such as Punjab, Maharashtra, Gujarat and Tamil Nadu. The pattern has not changed much even after a decade or so. In 2004–05, with the exception of two poor states, Madhya Pradesh and Uttar Pradesh, catastrophic headcount at every threshold level continued to be concentrated among the relatively developed states. However, two higher-middle-income states, Tamil Nadu and Karnataka, have a substantially lower catastrophic headcount than other states at every threshold level.

Figure 4: Percentage change in catastrophic expenditure (OOP > 10 percent) in India and selected states, 1993–94 to 2004–05



The incidence of catastrophic payments has increased considerably in Kerala, Himachal Pradesh, Gujarat and Andhra Pradesh (Figure 4). In contrast, in Bihar and Karnataka the proportion of households with a catastrophic headcount was significantly lower in 2004–05 than in 1993–94 at every defined threshold level. The reduction in the prevalence of catastrophic headcount in Karnataka could perhaps be explained by the fact that OOP payments declined during the study period. These findings corroborate available evidence from both developed and middle-income countries: most countries that have advanced social institutions—pre-payment financing mechanisms and welfare policies such as social insurance and high subsidies to the health system to protect households from catastrophic health spending—face a lower incidence of catastrophic health care expenditure.

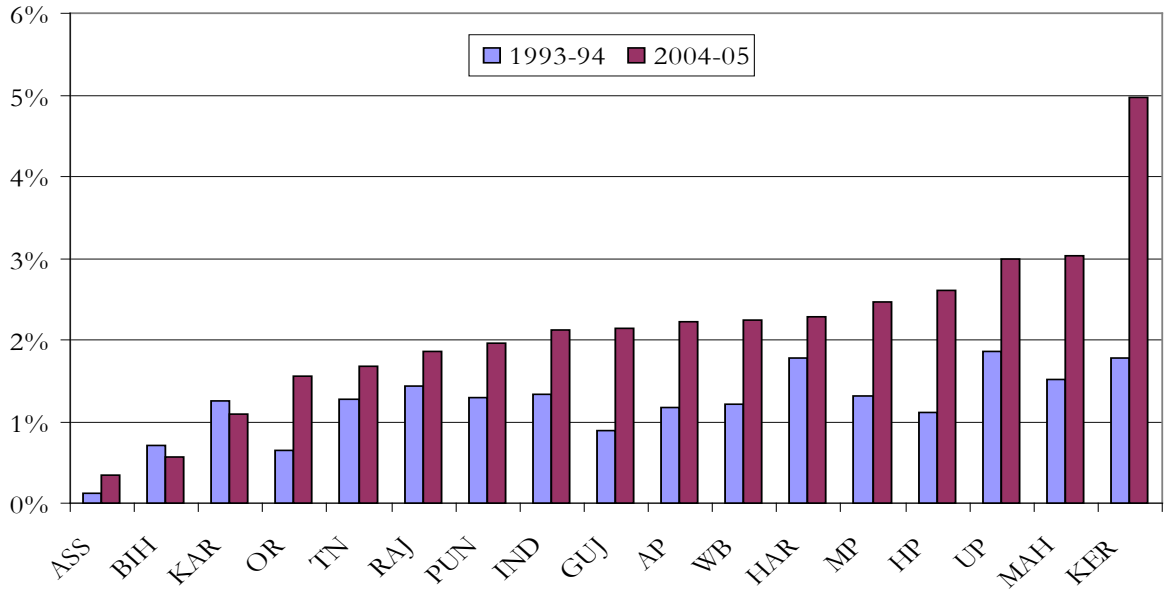
However, it is worrisome that some states, like Kerala, saw the incidence of catastrophic spending double over the study period. In 2004-05, as many as 53 percent of households in Kerala incurred OOP spending in excess of 5 percent of their pre-payment consumption expenditure, and 32 percent of the sample spent more than 10 percent of their total consumption expenditure.

CIs, which reflect how the proportion of households exceeding the threshold vary across the income distribution, are presented in Table 4. Table 4 shows that at each threshold, the incidence of catastrophic health payments was concentrated among the rich households in both 1993–94 and 2004–05 and increased over the periods studied. Even if the threshold is raised from 5 percent to 25 percent of total consumption expenditure, the proportion of rich households with catastrophic expenditure still increases for both years. However, it is important to note that rich

households are more likely than poor ones to spend their savings on health care and thus are less likely to experience real impoverishing impact of such expenditure (Berman et al., 2010).

The intensity of catastrophic payments is measured by the amount by which OOP payments exceed the defined threshold (for example, 10 percent of total expenditure); this margin is referred to as the 'catastrophic overshoot' (Wagstaff and van Doorslaer, 2003). Since wealthier households spend a larger fraction of their income on health care than poor ones do, they are more likely to overshoot the threshold by a larger amount. This holds true whatever the threshold, though for each threshold there was a greater concentration of overshooting among the better-off in 2004–05 than in 1993–94 (Table 4). Defining the catastrophic payment as 10 percent of total consumption expenditure, Kerala has the highest mean overshoot (Figure 5). Also, the mean overshoot pattern across states (presented in Figure 6) is akin to the pattern depicted by the catastrophic headcount. However, a significant amount of variation exists across states in the distribution of catastrophic health care payments across income classes.

Figure 5: Mean catastrophic overshoot (OOP > 10 percent) in India and selected states, 1993–94 to 2004–05



The impoverishing impact of health care spending

In this section, the impact of OOP payments on various measures of poverty over the period in question is examined. Table 5 presents the poverty headcount ratio, both gross and net, of OOP payments on health care for India in 1993–94 and 2004–05. The pre-OOP poverty headcount ratio in India was 36 percent in 1993–94 and 27.6 percent in 2004–05.

Table 5: OOP payments for health care: Poverty headcounts and poverty gaps, India, 1993–94 and 2004–05

Poverty measures	1993–94	2004–05
Poverty headcounts (in %)*		
Pre-payment headcount (pre-Hp)	36.0	27.6
Post-payment headcount (post-Hp)	40.0	32.0
Poverty impact – headcount (post-Hp - pre-Hp)	4.0	4.4
Poverty gaps (in Rs.)		
Pre-payment gap (pre-G)	18.77	23.4
Post-payment gap (post-G)	21.87	30.6
Poverty impact – gap (post-G - pre-G)	3.1	7.2
Normalised poverty gaps (in %)		
Pre-payment normalised gap (pre-NG)	8.4	5.8
Post-payment normalised gap (post-NG)	9.8	7.6
Normalised poverty impact (post-NG - pre-NG)	1.4	1.8
Note: Hp (Poverty headcount), G (Poverty gap), NG (Normalised poverty gap)		

OOP payments increased the poverty ratio by 4 percentage points in 1993–94 and 4.4 percentage points in 2004–05. In other words, 35 million people in 1993–94 and 47 million people in 2004–05 were pushed into poverty by the need to pay for health care services. The poverty gap comparisons across years are most meaningful when normalised poverty gaps are used: i.e., when poverty gaps are divided by the poverty line (Wagstaff and van Doorslaer, 2003). The increase in the normalised gap because of OOP payments was 1.4 percentage points in 1993–94 and 1.8 percentage points in 2004–05.

Table 6: People impoverished due to OOP payments in 1993–94 and 2004–05

States/India	1993–94		2004–05	
	Percent	Number	Percent	Number
Assam	1.88	438,263	1.70	473,926
Andhra Pradesh	4.07	2,796,568	2.76	1,832,173
Karnataka	4.29	2,002,380	3.86	2,120,144
Bihar	3.50	3,114,549	2.71	2,386,664
Punjab	3.71	782,497	3.45	875,748
Tamil Nadu	3.67	2,107,512	3.33	2,134,396
Himachal Pradesh	2.66	145,811	4.54	286,428
Haryana	3.72	642,442	4.36	978,820
Orissa	3.60	1,178,778	4.32	1,645,272
Rajasthan	3.68	1,700,518	4.71	2,825,246
Gujarat	3.33	1,430,416	4.99	2,659,171
Maharashtra	3.95	3,243,734	4.96	5,071,038
West Bengal	4.70	3,318,942	5.01	4,191,346
Madhya Pradesh	4.79	3,248,927	5.47	3,501,128
Kerala	4.33	1,291,691	6.15	2,011,480
Uttar Pradesh	5.33	7,790,750	6.64	11,711,234
India	4.0	35,217,191	4.40	47,376,688

It is clear that both the incidence and intensity of impoverishment were much greater in 2004–05 than in 1993–94, indicating that conditions have deteriorated because of reforms in the health care sector over the period considered. Table 6 shows interstate variation in the incidence of the poverty ratio, net of OOP payments toward health care in India in 1993–94 and 2004–05. In 2004 the subtraction of OOP health payments from total consumption expenditure increased the poverty ratio by more than 5 to 6 percentage points in West Bengal, Madhya Pradesh, Kerala and Uttar Pradesh; by 4 to 5 percentage points in Orissa, Haryana, Himachal Pradesh, Rajasthan, Gujarat and Maharashtra; and by 1.7 to 3.9 percent in the rest of the states. During the period 1993–94 to 2004–05, the highest increase in poverty due to OOP payments was observed in Kerala (1.82 percent), Himachal Pradesh (1.88 percent), Gujarat (1.66 percent) and Uttar Pradesh (1.31 percent). On the contrary, the incidence of poverty due to OOP payments declined in Andhra Pradesh, Bihar, Karnataka, Tamil Nadu, Punjab and Assam.

5. Discussion

OOP payments are the principal means of financing health care in most low-income countries, and India follows this pattern.

This study has provided considerable evidence on trends governing the magnitude, distribution and economic consequences of OOP payments for health care in India during a period of reform. The evidence suggests that the new policies have had a major impact in increasing the incidence of catastrophic expenditure and impoverishment. The analysis shows that the OOP payments for medical care increased over the study period. On average, households spent Rs. 198 or 5.5 percent of total consumption expenditure on health care in 2004–05 compared to 4.4 percent in 1993–94. There are considerable interstate differences in the mean OOP budget. The results suggest a positive relationship between the share of OOP health payments and the level of economic development of states measured by the per capita SDP. Apart from income and the availability of health services, the mechanism of health care financing seemed to play an important role toward deciding state differences in OOP spending on health care. Where public health care investment and insurance coverage were higher, the OOP payment share was lower (Karnataka). However, this does not explain the full amplitude of OOP payment share differences by state. For instance, the OOP payment share reported in Maharashtra was much higher even though public investment and insurance coverage were relatively better in this state. On the other hand, in Uttar Pradesh, the OOP payment share is second highest in the country despite very low public health spending.

Drugs accounted for 61–88 percent of the total OOP payments across states, which is several times higher than in established market economies and which clearly points to the overuse of

drugs in India. One reason for the high reported expenditure on drugs could be the difficulty of obtaining an accurate picture of the breakdown between outpatient care and drugs for institutional care. (For example, rural practitioners and informal health-care providers tend to give drugs as part of their service and charge a single amount). Also, since the poor have very limited access to professional health care services, they often opt for self-medication and end up spending a large amount on medicines. It is argued that the incentives provided by the pharmaceutical companies in India to the physicians have also contributed to the irrational use of medicines. Hospitalisations accounted for only 13 percent of OOP expenditure at the all-India level in 2004–05. The distribution of OOP payments on inpatient care, ambulatory care, medicines and other types of care varied considerably across states. While the households in lower-income states spent a higher fraction of OOP payments on medicine, their counterparts in higher-income states spent a higher fraction on inpatient care. The estimates reveal that although expenditure on ambulatory care has remained almost constant, expenditure on inpatient care increased by 2.5 times during the study period. This reflects a substantial increase in user charges for inpatient care at public and private hospitals during the period. An increase in inpatient care utilisation can also partly explain the rise in inpatient expenditure.

Results indicate that catastrophic health care expenditure incidence (OOP > 10 percent) increased to about 15.4 percent in 2004–05 from 13.1 percent in 1993–94. Meanwhile, 4 percent of households fell into the 'catastrophic bracket' in 2004–05 (by spending more than 25 percent of their total consumption expenditure)—a substantial increase from a low level of 2.8 percent in 1993–94. There are important differences in the incidence of catastrophic health payments across states. Catastrophic health expenditures most often stayed at a low threshold (comprising a smaller share of total household expenditure) in economically better-performing states. However, at the

highest threshold level—i.e., 25 percent of total expenditure—many of the poorest states such as Madhya Pradesh, Uttar Pradesh and Rajasthan had higher levels of catastrophic headcount. The incidence of catastrophic expenditure increased substantially in Kerala (15 percent), Himachal Pradesh (8.3 percent), Gujarat (6.8 percent) and Andhra Pradesh (5.3 percent), where the OOP payments share also increased over the study period. Surprisingly, in Gujarat, the CI value decreased from 0.07 to 0.01 for catastrophic expenditure, indicating that the poorest households were making more catastrophic health payments, which is contrary to the notion that community health insurance has gone far toward containing the impact of health care costs on poor households (Ranson, 2003). The distribution of catastrophic payments also differs across states. Barring a few states, catastrophic expenditure is more evenly distributed in economically better-performing states than in their disadvantaged counterparts. In most of the poorest states, it is the richer households that can afford to spend a larger fraction of their resources on health care, while the poorer ones are not in a position to divert their resources from other needs.

However, contrary to the hypothesis that an increase in OOP payments leads to a reduction (or regression) in the progressivity of the financial burden of health care, the results suggest that at every threshold, the incidence of catastrophic health payments became more concentrated among rich households over the period 1993–94 to 2004–05—both across India and in most of the selected states. This has to do with the limitations of the methodological approach adopted in this study. The main problem with its focus on catastrophic payments and impoverishment is that it misses a huge number of households that do not have the financial capacity to utilise health care services and therefore could not be quantified (Pradhan and Presscott, 2002).

It is noted that despite the greater concentration of catastrophic payments among better-off households in the majority of the states, OOP payments aggravated the prevalence and intensity of poverty in India over the period 1993–94 to 2004–05. The findings indicate that 4.4 percent of the total population in India (up from 4 percent in 1993–94) fell below the poverty line because of OOP payments on health care. The poverty impact of OOP payments is significant in all the selected states, but it was the greatest in Uttar Pradesh (6.6 percent), Kerala (6.1 percent), Madhya Pradesh (5.5 percent) and West Bengal (5.0 percent) in 2004–05. While Andhra Pradesh, Bihar, Tamil Nadu, Karnataka, Punjab and Assam recorded a decline in the incidence of poverty because of OOP payments, this has increased in the other states surveyed.

The results of this paper imply that lower- and middle-income households bear the brunt of the ongoing health care reforms. The evidence points toward higher incidences of impoverishment among these populations. Therefore, a rather broad-based risk pooling and pre-payment measure (balancing between sick and healthy) would seem to be a better financing strategy as it would limit OOP spending, increase financial protection, reduce the risk of impoverishment and ensure the utilisation of health care services by the poorest of the poor. Alternatively, high OOP payments for health care and their consequent effects on household living standards can be prevented by subsidising drugs for low-income households (from lower-middle-class households to those living below the poverty line) and by increasing the contribution of both public- and private-sector spending on health care, which would in turn reduce the household burden.

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[ii] Expenditure on institutional care includes (i) purchase of drugs and medicines; (ii) payments for diagnostic tests; (iii) medical fees; (iv) payments made to hospitals and nursing homes for medical treatment and (v) others. The expenditure for non-institutional care are the same for the first three items. The other types of expenditure recorded under this are (i) family planning appliances including intrauterine devices (IUDs), oral pills, condoms, etc., and (ii) others.