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Socio-demographic determinants of out-of-pocket health expenditure in a rural area of Wardha district of Maharashtra, India

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***Background & objectives*: In India, health expenditure accounts for less than 5 per cent of the Gross Domestic Product and the level of out-of-pocket (OOP) spending is 69.5 per cent of total health expenditures. OOP expenditure exacerbates poverty and has a negative impact on equity and can increase the risk of vulnerable groups slipping into poverty. This study was conducted to estimate the OOP expenditure on health and catastrophic health expenditure and their socio-demographic determinants in a rural area of Maharashtra, India.**

***Methods*: This was a prospective observational study involving monthly follow up visits, done in 180 households of three villages under a primary health centre in Wardha district, India.**

***Results*: Of the 180 families, 18.9 per cent had catastrophic health expenditure over a period of one year. The median total out-of-pocket health expenditure was ₹1105.00 with median medical expenditure being ₹863.85 and median non-medical health expenditure being ₹100.00. A total of 151 (83.9%) had enough money, 27 (15%) borrowed money and two (1.1%) of them sold assets. The significant correlates for the ratio of out-of-pocket health expenditure to total annual income of the family were the occupation of head of family, caste category and type of village. The significant correlate for catastrophic health expenditure was type of village.**

***Interpretation & conclusions*: Around one-fifth of the households had catastrophic health expenditure. People with no healthcare facility located in their village had higher odds of having catastrophic health expenditure. Private providers were preferred for the treatment of acute illnesses and medical college hospitals for hospitalization.**

Key words Catastrophic health expenditure - household - out-of-pocket health expenditure - socio-demographic determinants

In India, health expenditure accounts for <5 per cent of the Gross Domestic Product and the level of out-of-pocket (OOP) spending is 69.5 per cent of total health expenditures[1]. In Maharashtra, per capita expenditure was ₹1576, public spending was 22.1 per cent[2]. In some areas where the services of a primary health centre (PHC) are not accessible to a majority of the population due to inconvenient distance, people in these areas are more likely to avail facilities in the private sector which may lead to higher per capita OOP health expenditure. OOP expenditure exacerbate poverty and has a negative impact on equity and can increase the risk of vulnerable groups slipping into poverty[3]. The insurance coverage being poor (<9%)[4], and utilization

of private health services being as high as 82 per cent, most families pay OOP[5]. Insufficient public financing, lack of a comprehensive method for risk pooling and high OOP expenditures because of rising health costs are key factors that affect equity in health financing and financial risk protection[5]. Many studies on healthcare expenditure have been conducted in India[6-10]. However, most of these studies are cross-sectional in nature and provide data at a single point of time. A prospective study will not only account for the seasonal variations in health expenditure but also will be less liable to recall bias in terms of expenditure done on health. Hence, a prospective study was conducted to estimate the annual family health expenditure, the proportion of OOP health expenditure, catastrophic health expenditure, and their socio-demographic determinants in a rural area of Maharashtra, India.

Material & Methods

The present prospective observational study was undertaken in the primary health centre (PHC), Anji of Wardha district in Maharashtra, India, and was carried out from June 2013 to July 2014 by the department of Community Medicine, Mahatma Gandhi Institute of Medical Sciences, Wardha, India. The PHC covered a total of 27 villages with a population of 80,160. Three villages of the PHC were selected for the study: a village with the PHC, other two villages from the same PHC where no subcentre or any other government healthcare facility was located. A monthly follow up visit was done in each of the 180 households of three villages to determine the morbidities, healthcare seeking, health expenditure for those morbidities and the OOP health expenditure.

Study setting: In Wardha, males constitute 52 per cent of the population and females 48 per cent. Its population growth rate over the decade 2001-2011 was 5.18 per cent, and a literacy rate of 86.9 per cent higher than the national average of 64.5 per cent, male literacy is 91.9 per cent and female literacy is 81.8 per cent. It is an agriculture-based population where about 67.4 per cent of the people live in rural areas. About 11.4 per cent of the population is below poverty line (BPL)[11]. Antenatal coverage and routine immunization coverage in the area is good (>90%). The majority (>95%) of deliveries take place in hospitals[12]. Rural areas are dependent on services catered by PHCs and supported by the District hospital and the two medical colleges located in the district.

Sampling technique and sample size: The sample size was calculated using the formula[13]: $n=(z/\text{relative precision})^2$. The sample size was calculated at 80 per cent confidence level and 10 per cent relative precision, and was found to be 165. A total of 15 houses (5 per village) were included for loss or non-response giving total sample size of 180 households to study the incident morbidities, health-seeking behaviour and also the incidence of catastrophic health expenditure. Families were selected by systematic random sampling from each of the village. A household was recruited for the study after obtaining written informed consent from the head of the family. The study was approved by the ethics committee of the institute.

Data collection: On visiting the selected household, the data were collected using a pre-designed and pre-tested questionnaire. A 'health expenditure card' was prepared to note the health expenditure to avoid loss of information. One family member was trained to fill the card. The investigator visited the family once every month for 12 months. On the first visit, information on socio-demographic characteristics of the family was obtained. On every visit, the health expenditure card was retrieved and cross-checked for the completeness and correctness of the information. In case of missing information, head of the family was interviewed to get the complete information. This covered the direct as well as indirect cost. The direct cost included the cost of consultation, drugs, investigation, operative or other procedures and bed charges. The indirect cost included food, lodging and transportation of patients and attendants, loss of wages of patients and attendants.

Definitions: The following definitions were used to measure the OOP health expenditure of the families:

(*i*) Household health expenditure: It was defined as the annual direct OOP health spending by households on medical goods and services and maintenance of good health[14].

(*ii*) Catastrophic health expenditure: It was defined as the household's annual health expenditure when exceeds 10 per cent of the total annual household income[15].

(*iii*) Direct health expenditure: It includes all annual medical expenditure towards treatment which includes doctor's fee, purchase of medicine, diagnostic charges and hospital charges[16].

(*iv*) Indirect health expenditure: It includes the other annual expenses incurred by a household which includes transportation charge, lodging charges and loss of wages for both the patients and the family members[16].

Statistical analysis: The data analysis was done using SPSS version 12.0 (SPSS Inc., Chicago, USA). Annual OOP health expenditure was expressed as mean±standard deviation (SD) and also median [inter quartile range (IQR)]. The data were tested for normal distribution. As the data were not normally distributed, the median was used to describe the results. Multiple classification analysis was done to identify the main covariates of the annual OOP health expenditure. Multiple classification analysis of the ratio of OOP and annual family income was carried out to get better insights. Catastrophic health expenditure was expressed as a binary variable to find out its association with different socio-demographic variables. Multivariate logistic regression analysis was conducted to identify determinants of catastrophic health expenditure. Odds ratio with its 95 per cent confidence interval (CI) was calculated to express the strength of association. Multicollinearity was assessed using tolerance. None of the independent variables had tolerance <0.9, all of these were considered for the multivariate logistic regression.

Results

Of the 180 households studied, 152 (84.4%) had male member as the head of family and 28 (15.6%) households had female member as the head of family; 29 (16.1%) were illiterate, 39 (21.7%) had primary education, 74 (41.1%) had completed secondary education and 38 (21.1%) were educated till higher secondary and above. Eighty four (46.7%) of the household's head were daily labourers, 91 (50.5%) were skilled labourer and five (2.8%) were employed in service or had a business. While 72 households lived in a joint family (40%), 108 lived in a nuclear family (60%). Only 83 (46.1%) had health insurance. Sixty (33.3%) were below poverty line (BPL) (yellow ration card), and 120 (66.7%) were above poverty line (white/orange ration card) (Table I).

Morbidities and health seeking: Of the total 1127 morbidity conditions which were classified according to major categories of International Classification of Diseases-10 (ICD-10)[17], 291 (25.8%) had disorders

Table I. Determinants of total annual out-of-pocket (OOP) health expenditure: Multiple classification analysis

Variable	Category	Total	Predicted mean OOP expenditure			
			Unadjusted mean		Adjusted mean	
			Mean	η	Mean	β
Sex of family	Male	152	4950.81	0.050	4949.01	0.049
	Female	28	3070.15		3079.92	
Education of head of family	Illiterate	29	4053.43	0.075	3378.87	0.082
	Primary	39	6233.11		6718.30	
	Secondary	74	3716.93		4295.09	
	Higher secondary and above	38	5336.69		4227.62	
Occupation of head of family	Daily labourers	84	5074.36	0.038	6178.14	0.104
	Skilled labourers/farmers	91	4182.25		3314.20	
	Services/others	5	6331.39		3586.34	
Type of family	Nuclear	108	3149.33	0.135	3101.25	0.139
	Joint	72	6921.67		6993.78	
Caste category	Scheduled caste/scheduled tribe/nomadic tribes	69	3165.33	0.136	3222.72	0.149
	Other backward caste	106	5185.13		5079.27	
	General	5	14,091.11		15543.42	
Socio-economic status	Above poverty line	120	5290.36	0.065	4902.82	0.025
	Below poverty line	60	3394.07		4169.15	
Health insurance	Yes	83	3520.52	0.090	3564.06	0.086
	No	97	5987.92		5937.04	
Type of village of residence	Primary health centre	60	6326.48	0.086	5576.50	0.047
	Non-primary health centre	120	3824.16		4199.15	

Table II. Distribution of direct and indirect health expenditures (in ₹)

Health expenditure	Mean±SD	Median (IQR)
Direct expenditures		
Consultation	163.84±1793.84	5.00 (2.00-50.00)
Drugs	424.15±396.59	327.45 (190.00-590.00)
Investigations	1320.68±5306.38	230.00 (140.00-600.00)
Hospitalization	1237.84±3178.93	312.50 (295.00-600.00)
Indirect expenditures		
Transportation	253.33±1128.73	100.00 (40.00-200.00)
Loss of wage of attendants	1247.28±1194.00	1000.00 (500.00-1400.00)
Loss of wage of patients	1813.40±1813.40	2000.00 (400.00-2500.00)

IQR, inter quartile range; SD, standard deviation

Table III. Determinants of ratio of annual out-of-pocket (OOP) expenditure to annual household income: Multiple classification analysis

Variable	Category	Total	Predicted mean ratio of OOP expenditure to household annual income			
			Unadjusted mean		Adjusted mean	
			Mean	η	Mean	β
Sex of family	Male	152	0.0717	0.025	0.0724	0.037
	Female	28	0.0625		0.0589	
Education of head of family	Illiterate	29	0.0783	0.039	0.0656	0.023
	Primary	39	0.0756		0.0752	
	Secondary	74	0.0654		0.0706	
	Higher secondary and above	38	0.0683		0.0683	
Occupation of head of family	Daily labourers	84	0.0849	0.137	0.0917	0.171
	Skilled labourers/farmers	91	0.537		0.0482	
	Services/others	5	0.1273		0.1132	
Type of family	Nuclear	108	0.0668	0.032	0.0659	0.040
	Joint	72	0.0756		0.0769	
Caste category	Scheduled caste/scheduled tribe/nomadic tribes	69	0.0642	0.123	0.0558	0.152
	Other backward caste	106	0.0698		0.0747	
	General	5	0.1656		0.1765	
Socio-economic status	Above poverty line	120	0.0658	0.048	0.0618	0.090
	Below poverty line	60	0.0792		0.0872	
Health insurance	Yes	83	0.0595	0.088	0.0556	0.120
	No	97	0.0829		0.0875	
Type of village of residence	Primary health centre	60	0.0906	0.108	0.0849	0.078
	Non-primary health centre	120	0.0602		0.0637	

of respiratory system, 197 (17.5%) had miscellaneous conditions, 187 (16.6%) had disorders of bones and joints, 85 (7.5%) had disorders of gastrointestinal system, 68 (6.0%) had injuries other than fracture, 63 (5.5%) had disorders of skin and subcutaneous tissue, 46 (4.0%) had intestinal infectious diseases while around 190 (17%) morbidities were by miscellaneous causes that included disorders of female genital

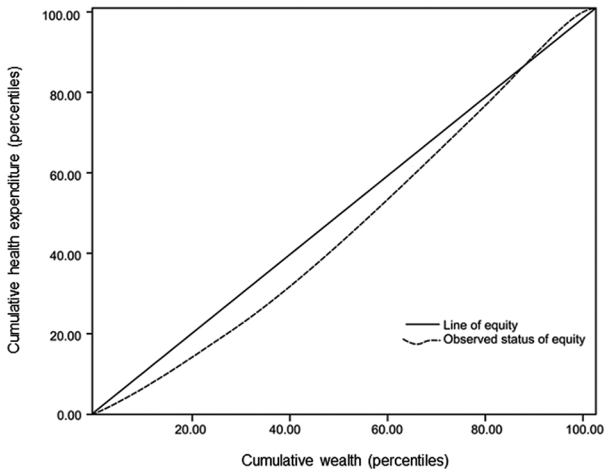

Figure. Inequity in health expenditure - a concentration curve.

organs, teeth, central nervous system, eye and ear, urinary and cardiovascular system and pregnancy including its complications and abortion among others. Considering multiple episodes of a disease there were total 1163 episodes of illness. Of these, any type of illness that included all the episodes in one year, 396 (34.0%) visited private practitioner, 302 (26.0%) visited government practitioner, 266 (22.9%) visited a community owned clinic, 109 (9.4%) visited medical college hospitals, 77 (6.6%) visited another clinic, nine (0.8%) had self-treatment, three (0.2%) visited others which included *Ayurveda*/Siddha/Registered Medical Practitioner (RMP) and one (0.1%) visited health worker. Out of 59 hospitalizations for one year, 36 (61%) were hospitalized in medical college hospital, 15 (25.4%) in a government hospital and eight (13.5%) in private hospital.

Out-of-pocket (OOP) health expenditure: The median direct expenditure was ₹863.85 (IQR: 358.45-2709.50) and median indirect health expenditure was ₹100.00 (IQR: 0-540.00). Table II shows the further distribution of direct and indirect health expenditure.

Determinants of total OOP health expenditure: In the present study, multiple classification analysis of different correlates of OOP health expenditure was done for adjusting the effect of different factors as shown in Table I. The mean of OOP health expenditure when adjusted to the confounding effect of other variables, maximum variation in OOP was explained by caste category (beta=0.149) followed by type of family (beta=0.139) and occupation of head of family (beta=0.104).

We also analyzed the determinants of the ratio of OOP to the income. Maximum variation in mean ratio was explained by the occupation of head of the family (beta=0.171), followed by caste category (beta=0.152) and health insurance (beta=0.120). Rest of the factors contributed <0.1 for the variation (Table III).

Magnitude and correlates of catastrophic health expenditure: Out of 180 households, 34 (18.9%) had catastrophic health expenditure. The only significant independent correlate of catastrophic health expenditure was the type of village they belonged to. The families which belonged to villages other than PHC village had higher odds (odds ratio=2.700; 95% CI: 1.126-6.475) of having catastrophic health expenditure as compared to those which belonged to PHC village (Table IV).

Inequity in health expenditure: Inequality in health expenditure was analysed using concentration curve (Figure). The concentration curve revealed no inequality in health expenditure with slight protection to poor.

Mobilization of money: To meet out the expenses incurred on health expenditure, of the total 180 households, 151 (83.9%) had enough money, 27 (15%) borrowed money, and 2 (1.1%) of them sold assets.

Discussion

According to National Sample Survey Organization (NSSO) 60th round average total expenditure for India was ₹6225 and the average total medical expenditure was ₹5695.00[16]. As per the NSSO 71st round for the State of Maharashtra, share of Public health-care provider for outpatient care was 17.7 per cent, share of Public health-care provider for hospitalized care for the rural area was 19.2 per cent. The average cost of care for rural areas for each episode of hospitalization was ₹16,956 while the average cost for OPD-based care for ailments in the last 15 days was ₹509[18].

The health-care seeking behaviour seen in the present study was in contrast to that seen in the NSSO 71st and NSSO 60th round surveys while the average cost of care both for OPD and hospitalization was markedly less. These differences could be due to improved rural health infrastructure and services under the National Rural Health Mission and availability of two Medical

Table IV. Multiple logistic regression for catastrophic expenditure: Full model

Variable	Category	Total	Number with catastrophic expenditure	OR for catastrophic expenditure (95% CI)
Sex of family	Male	152	28 (18.4)	0.679 (0.221-2.087)
	Female	28	6 (21.4)	1
Education of head of family	Illiterate	29	6 (20.7)	0.766 (0.171-3.435)
	Primary	39	6 (14.4)	0.625 (0.157-2.478)
	Secondary	74	14 (18.9)	0.959 (0.299-3.070)
	Higher secondary and above	38	8 (21.1)	1
Occupation of head of family	Daily labourers	84	18 (21.4)	0.409 (0.038-4.448)
	Skilled labourers/farmers	91	14 (15.4)	0.246 (0.025-2.475)
	Services/others	5	2 (40.0)	1
Type of family	Nuclear	108	22 (20.4)	1
	Joint	72	12 (16.7)	0.241 (0.524-2.942)
Caste category	Scheduled caste/scheduled tribe/nomadic tribes	69	16 (23.2)	0.175 (0.019-1.627)
	Other backward caste	106	15 (14.2)	0.144 (0.016-1.293)
	General	5	3 (60.0)	1
Socio-economic status	Below poverty line	60	15 (25)	2.150 (0.840-5.504)
	Above poverty line	120	19 (15.8)	1
Health insurance	Yes	83	17 (20.5)	1.430 (0.588-3.476)
	No	97	17 (17.5)	1
Type of village of residence	Primary health centre	60	8 (13.3)	1
	Non-primary health centre	120	26 (21.7)	2.700 (1.126-6.475)

OR, odds ratio; CI, confidence interval

colleges who run their own community-based health insurance schemes in the study area. The improved health-care seeking in government sector matches with the other available evidence where the development of the health systems and some strengthening of care in rural areas have been reported over the last decade[19,20].

In the present study, money mobilization was accounted for the households, and it was found that of the total 180 households 83.9 per cent had enough money. In a study on Global Ageing and Adult Health in 2007-2008, the source of healthcare financing in India showed that 25.8 per cent had savings, 7.8 per cent sold items, 25.5 per cent had borrowed from relatives and others, 1.4 per cent had insurance coverage and 9.7 per cent had other sources of health financing[21]. For Maharashtra, it was found that 13.7 per cent had savings, 8.2 per cent sold items, 20.6 per cent borrowed from relatives and others, 1.5 per cent had insurance coverage and 4.5 per cent had other source of financing[22].

Binnendijk *et al*[23] in their study on financial hardship found that about 25 per cent of the households with any healthcare cost had to face financial hardship during the year preceding the survey. Households selling assets or borrowing money with interest to finance their healthcare were defined as households with hardship financing. Another study on distressed financing of household OOP healthcare payments in India has found that around 60 per cent of hospitalization cases from rural areas face financial distress and have to use coping strategies of borrowing (including contributions from friends or relatives) or sale of household assets. Such coping strategies accounted for 58 per cent share in total OOP payments for inpatient care in rural India[24].

The lesser proportion of households who were exposed to financial hardship in our study could be due to the wide health insurance coverage (43% of study households) by the medical college hospitals in the district as compared to the health insurance coverage (13.1%) for rural population as per the NSSO 71st round[18].

Only 18.9 per cent of the households had catastrophic expenditure in the present study. In one study from Orissa, it was 18.6 per cent[24] and in a study

by Ghosh[25] the catastrophic healthcare expenditure among selected 16 States increased from 13.1 per cent in 1993-1994 to about 15.4 per cent in 2004-2005. Also that the percentage of households incurring catastrophic payments for health care in Maharashtra was 19.4 per cent[21]. The findings of the present study were comparable with the findings of these studies. In the present study, the distribution of catastrophic health expenditure among the head of a family with no education was 20.7 per cent, with primary education was 14.4 per cent, with secondary education was 18.9 per cent and with higher secondary education and above was 21.1 per cent. Sekher[26] reported that catastrophic health expenditure among the illiterates was 32 per cent, primary schooling was 23.6 per cent, secondary schooling was 23.6 per cent, high school was 19.3 per cent and college and above was 13 per cent.

Li *et al*[27] in their study on factors affecting catastrophic health expenditure and impoverishment from medical expenses in China found out that age, sex, education, household size, employment status of the head of household and location were the determinants for the risk of catastrophic health expenditure. Furthermore, households headed by a male or by someone with higher education or employment were less likely to suffer catastrophic health expenditure. Pal[28] in his study on catastrophic health expenditure in India found that the incidence of catastrophic payments goes down with increased income and improved education. He also identified economic and social status of households as key determinants of incidence of catastrophic health expenditure. WHO in their strategy for Health Financing in Asian Pacific Region has identified inadequate access to the healthcare facility as a determinant for catastrophic health expenditure. The Report identifies the distance of health facility as a key determinant for access with distance being a greater barrier for women than for men[29].

In the present study, distance or location (villages where PHC is not located) was also identified as the significant determinant of catastrophic health expenditure. Females, nuclear families, BPL families had higher odds for catastrophic health expenditure, however, this was not significant. This may be due to the smaller sample size of the present study which is a limitation. Families with health insurance also had higher odds for catastrophic health expenditure. This could be due to the fact that the community-based health insurance schemes which the households were availing did not offer complete coverage and only a partial waiver is given on outpatient or inpatient department services. Similar findings have been reported by others[30,31]. Li *et al*[30] in their study on the role of cooperative health insurance scheme in reducing catastrophic health expenditure found that the households covered by the insurance schemes had similar levels of catastrophic health expenditure and medical impoverishment as those without health insurance. Shahrawat and Rao[31] have reported that insurance schemes that cover only hospital expenses do not adequately protect the poor against impoverishment due to spending on health because medicines and OOPs for OPD visits were the main share (72%) of total OOP payments. This also matches with the available evidence that increasing insurance coverage neither gets translated into the benefits for poor nor is efficient in financial protection[18-20].

The limitation of the present study included small sample size. Larger study may help to validate the findings of the present study. Second, the morbidities and expenditure were self-reported which might have brought in measurement bias, although through monthly visits and 'health expenditure card' we tried to minimize it. Although median health expenditure was reported in analysis, findings related to average health expenditure need to be interpreted appropriately as the data were skewed with high variability.

In conclusion, our study showed that though the health insurance coverage of households was fairly high (around 43%) around one-fifth of the households had to spend catastrophically on health. Although some reduction in financial burdening or hardship was seen in the study population but it did not protect them against having to spend catastrophically on health. Location or distance from the healthcare facility was identified as a significant factor for catastrophic health expenditure. The significant correlates for out-of-pocket expenditure were the occupation of head of family, caste category and location of village or distance from the healthcare facility. Merely improved health insurance coverage is not translated into better protection against health impoverishment. The efforts should also concentrate on making the services available as close to the households as possible as distance from the health facilities is an important determinant for OOP expenditure and catastrophic health expenditure.

***Conflicts of Interest*:** None.

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