



Original article

Financial burden and coping strategies for cancer care in India

Roopali Goyanka^a, Jeetendra Yadav^{b,*}, Palak Sharma^c^a Department of Economics, Indraprastha College for Women, University of Delhi, Delhi, 110054, India^b ICMR-National Institute of Medical Statistics, Ansari Nagar, New Delhi, 110029, India^c International Institute for Population Sciences (IIPS), Govandi Station Road, Deonar, Opposite Sanjona Chamber, Mumbai, Maharashtra, 400088, India

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A B S T R A C T

Problem: Globally 9.3 million deaths occurred due to cancer in 2018. Currently, India has 13.9 lakh cancer cases, which are estimated to increase by 12% by the year 2025. Treatment of cancer inflicts a heavy cost of care and may even impoverish households.

Methods: Using the national health survey data for 2017–18, this study estimates the burden of healthcare expenditure due to cancer and coping strategies to pay for treatment. Factors affecting the health care expenditure on cancer are examined using a two-part model.

Finding: The monthly values (in 2022 prices) of inpatient and outpatient OOPE on cancer for 2017-18, were found to be ₹6549 and ₹8811 implying that, 37% and 49% of household's monthly consumption expenditure was spent on inpatient and outpatient cancer care, respectively. Households relied on their own income/savings to pay for care and hardship financing was faced even by the higher income quintile patients both for inpatient and outpatient care. The second richest quintile had the greatest odds of borrowing money (0.94[0.54–1.63]). The two-part model shows that the likelihood of incurring expenditure on cancer care is greater at higher age-groups and income quintiles and is lower for females and people seeking care at private facilities. However, the mean expenditure is higher for those using private facilities or belonging to richer quintiles and is lower in urban areas.

Conclusion: There is a need for policies to impart financial protection and expand the screening and curative services for cancer, with an assured quality in the public sector to ameliorate the financial burden of cancer care among households in India.

What we already know

- Incidence of cancer is on the rise in India
- Cancer is associated with a high cost of care
- In India, cancer care is associated with high out-of-pocket expenditure (OOPE)

What this paper adds

- Mean monthly OOPE per episode is estimated at ₹6549 for inpatient care and ₹8811 for outpatient care
- While OOPE is greater for richer quintiles, the health care burden is greater for poorer quintiles
- Using two-part model for inpatient care, it is found that the likelihood of having cancer related inpatient expenditure is lower for those seeking care at private facilities but the mean expenditure is greater at these facilities.

- In the absence of any pre-payment support, 92% expenditure on outpatient care is incurred by patients out of their own income at the point of service.

1. Introduction

Cancer causes 9.3 million deaths every year and was the second leading cause of all NCD (non-communicable diseases) related deaths in the world according to World Health Organization in 2018.¹ Global cancer rates are expected to rise by 60% over the next 20 years, especially in low-middle income countries.² Around half of all the new cases and around 55% of deaths due to cancer in the world occur in Asia alone.³

The high disease burden of cancer is also accompanied by a high economic burden. The annual economic cost of cancer was estimated at US\$ 1.16 trillion in 2010, globally,⁴ and €199 billion in 2018 in Europe.² The average health care expenditure per person with cancer is four times

* Corresponding author.

E-mail addresses: rgoyanka@ip.du.ac.in (R. Goyanka), jeetu.nims@gmail.com (J. Yadav), pal3193@gmail.com (P. Sharma).<https://doi.org/10.1016/j.cegh.2023.101259>

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(\$16346) higher than those without cancer in USA.⁵ Cancer-affected households have much higher out-of-pocket expenditure (OOPE) and economic burden compared to non-affected households,^{6–9} leading to impoverishment and catastrophic expenditure^{10–12} and treatment non-adherence.¹³ With increasing life expectancy and reduction in the age of onset of cancer, the lifetime spent with cancer-related disability has also increased over the years.

Incidence of cancer is on the rise in India. Currently there are 13.9 lakh cases that are expected to grow by 12% by the year 2025.¹⁴ Females have a greater burden of cervical, breast and colorectal cancers while the burden of oral, stomach and oesophagus cancers is higher among males.¹⁴ These types of cancers are associated with lower levels of physical activity and socio-economic and nutritional status.^{15,16,17}

Non-medical costs on food, transportation and lodging by the patients (since cancer treatment facilities have a poor geographical dispersion), and time spent by caregivers, and productivity and earning loss due to cancer-related disability exacerbate the cost of care in India.^{18,19} Depending on the period of study, type of cancer, and components of cost, estimates of cost of care, range from an OOPE of ₹36,812 in 2006–2007 for all cancer types to ₹ 37,485 in 2014–2015,²⁰ for head-and-neck cancer,⁸ and US\$357 per episode of hospitalization in 2014.²¹ In 2017–18, the mean OOPE for cancer exceeded by ₹2895 and ₹52393 for outpatient and inpatient care respectively, compared to other chronic diseases. and average expenditure in private facilities was

$$\text{OOPE in December 2022} = \frac{\text{Consumer price index for December 2022}}{\text{av. consumer price index of December, 2017 and January, 2018}} * \text{OOPE in 2017 – 18}$$

two times that in public facilities.¹³ Most of this expenditure is incurred out-of-pocket and may cause impoverishment.^{14,15}

With the growing incidence of cancer and use of more sophisticated and high-cost treatment methods, there is an urgent need for policy makers to design suitable strategies to reduce OOPE on the disease. Using the recent national data, this study estimates the mean OOPE and

$$\text{Health Care Expenditure Burden} = \frac{\text{Monthly Health Care Expenditure on Cancer patients}}{\text{Household Monthly Consumption Expenditure}} * 100$$

financial burden due to hospitalized and outpatient care for cancer. Coping strategies used by households to pay for this expenditure have also been analysed. Two-part model has been used to study the mean OOPE on cancer. Two-part model (2PM) is a suitable methodology since the data come from cross-section household survey and have a large number of respondents with zero OOPE on cancer. . The methodology enables to separately estimate the probability of non-zero expenditure and mean value of expenditure conditional on expenditure being positive.

2. Methods

2.1. Data

The data is from National Sample Survey (NSS) 75th round - 'Social Consumption: Health', July 2017–June 2018, that surveyed 5,55,115 individuals. The data is nationally representative and collects information on socio-demographic characteristics, morbidity and health care utilization and expenditure of the respondents. The reference period for inpatient expenditure is last 365 days and for outpatient expenditure is

last 15 days. Detailed survey methodology is contained in the NSS Report.²² The number of persons reporting inpatient and outpatient care for cancer in the data is 1153 and 399 respectively with 1606 and 400 episodes respectively; while the total number of episodes for inpatient expenditure and utilization are 93925 while that for outpatient are 43240.²²

2.2. Outcome variables

2.2.1. Out-of-pocket expenditure (OOPE)

OOPE included the reported medical and non-medical costs of care after deducting any reimbursements. To account for the different reference periods for inpatient and outpatient care, all expenditures were converted to monthly values,²⁴ and the total monthly OOPE on cancer was estimated as the sum of monthly inpatient and outpatient OOPE. The NSS 75th round survey collects outpatients for the last 15 days and inpatients spending for last 365 days preceding the survey time. This was transformed to monthly OOPE by multiplying outpatient OOPE by a factor of 2 and division of inpatient OOPE by 12.²⁴

Since the data pertain to the year 2017–18, they were indexed to current (for the year 2022) prices using the Consumer Price Index^{25, 26} in the following manner:

2.2.2. Health care expenditure burden due to treatment on cancer

The burden of healthcare expenditure on cancer was estimated as the share of total monthly OOPE in the total monthly consumption expenditure of households (MPCE).^{24,27,28,29}

2.2.3. Financial coping strategies and hardship financing

To incur OOPE, financial coping strategies used by households to pay for OOPE were: their own income/savings; borrowings; sale of physical assets; contributions from friends and relatives; and any other source. A household was considered to be incurring hardship financing if it had to borrow money or sell assets to undertake OOPE.³⁰⁻³¹

2.3. Predictor variables

Socioeconomic variables at individual, household, and community-level were used as predictors of OOPE.^{32,33,34,22,9} The description of predictor variables is contained in supplementary [Table S1](#).

2.4. Statistical modelling

Descriptive analysis was used to assess the overall burden due to cancer. Differences in HCB across population sub-groups were analysed using bivariate analysis. Association between socio-economic factors and OOPE on cancer was uncovered using Two-part regression model. Given the data with a large fraction of respondents reporting zero health

expenditures on cancer, two-part model is an appropriate estimation method. This method considers that mean OOPE is based upon a mixture of two factors: factors that determine the occurrence of a positive OOPE and factors that determine the value and density of positive OOPE^{23,45} The first part of the model enables to estimate the probability of a person incurring OOPE on cancer in the entire sample the second part of allows to estimate the conditional mean value of OOPE. The first part was estimated using a logit regression model. and log-linear regression model was used for the second part.³⁵ The model therefore allows for separate investigation of the effect of factors on the likelihood of incurring OOPE on cancer and the effect of the factors associated with the mean value of OOPE on cancer, as below:

$$\text{Part 1: Prob } (Y_i > 0) * \exp(\beta X) / (1 + \exp(\beta X))$$

$$\text{Part 2: } E(Y_i | X) = \text{Prob}(Y_i > 0) E(Y_i | X; Y_i > 0) \quad (0)$$

To account for the survey design SVY command was used³⁶ in STATA 13.1.³⁷ The likelihood of experiencing financial hardship was analysed using logit regression.

Table 1

Per episode monthly OOPE and Health Care expenditure Burden due to cancer by socioeconomic characteristics and types of healthcare facilities.

Socioeconomic characteristics	Inpatient			Outpatient		
	OOPE (in ₹)	MCE (in ₹)	HCB (%)	OOPE (in ₹)	MCE (in ₹)	HCB (%)
Age (in years)						
0–14	5617	15637	35.9	6902	13509	51.1
15–35	5291	16630	31.8	7682	16542	46.4
36–59	6311	14486	43.6	7978	15497	51.5
60 and above	7219	22058	32.7	10156	21875	46.4
Education						
Illiterate	4364	13030	33.5	7170	13875	51.7
Up to Primary	3927	19013	20.7	9848	15778	62.4
Middle	9268	14485	64.0	8073	19859	40.6
Secondary and above	6944	20820	33.4	9378	22725	41.3
Gender						
Male	6069	19443	31.2	9293	18737	49.6
Female	5030	15550	32.3	7947	17324	45.9
Religion						
Hindu	5445	17613	30.9	9455	17440	54.2
Muslim	5140	15579	33.0	3848	19352	19.9
Others	7796	19895	39.2	12900	21134	61.0
Caste						
ST	2636	11326	23.3	1690	10514	16.1
SC	4226	19435	21.7	7158	17172	41.7
OBC	4825	15124	31.9	10470	16356	64.0
Others	7976	19486	40.9	8956	20463	43.8
MPCE quintile						
Poorest	3774	7307	51.6	2312	8608	26.9
Poorer	4442	9762	45.5	11659	9776	119.3
Middle	4416	12759	34.6	5383	11620	46.3
Richer	4826	15373	31.4	9777	14194	68.9
Richest	7571	27878	27.2	10395	27530	37.8
Place of residence						
Rural	6559	15657	41.9	9091	16405	55.4
Urban	6532	20513	31.8	8392	20661	40.6
Type of healthcare facility visited						
Public	2607	17644	14.8	11346	18104	62.7
Private	9926	17186	57.8	6390	18198	35.1
Region						
North	5454	26163	20.8	11697	24023	48.7
Central	6372	19198	33.2	8247	17554	47.0
East	7054	11713	60.2	5232	18583	28.2
Northeast	11105	21174	52.4	14828	20237	73.3
West	2785	12575	22.1	6776	12500	54.2
South	9834	16431	59.8	17144	18470	92.8
Total	6549	17495	37.4	8811	18103	48.7

OOPE= Out of pocket expenditure; MCE = Monthly Consumption Expenditure.

Health Care Burden = [Average monthly out of pocket expenditure (in ₹)/Average Monthly Consumption Expenditure (in ₹)] *100.

Source: Authors' estimates

3. Results

3.1. Socio-economic characteristics of cancer patients

Most individuals suffering from cancer belong to the age group of 36–59 years (Supplementary Table S2). More than half of the inpatients and outpatients were females (54%, 53%) or rural residents (55%, 52%) and highest proportion of patients belonged to upper quintiles of living standard. Greater proportion of patients sought care at private facilities for both hospitalized and non-hospitalized services.

3.2. Monthly out of pocket expenditure (OOPE) and health care expenditure burden due to cancer

The mean value of monthly OOPE per episode is ₹6549 for inpatient care and ₹8811 for outpatient care (Table 1). Persons aged 60 years and above have the highest OOPE for both inpatient and outpatient care. OOPE for inpatients and outpatient care was also higher among males (₹6069 - ₹9293) compared to females (₹5030- ₹7947). While OOPE on hospitalization was higher for richer MPCE quintiles, the monthly HCB burden was lower for these quintiles. Outpatient visits for second lowest quintile had a burden of 119% due to cancer. HCB is higher among people in rural areas (inpatient 41.9%, outpatient: 55.4%) compared to urban areas; and for those who visit private hospitals (inpatient: 57.8, outpatient: 62.7%) compared to public hospitals. Southern and north-eastern regions of India had the highest health care burden due to outpatient visits for cancer.

3.3. Factors affecting inpatient OOPE using two-part model

3.3.1. Inpatient

The logit regression (first part) shows that the likelihood of having non-zero healthcare expenditure on cancer increases with age and falls with higher education (Table 2). It is greater for females and richer quintiles, and lower for those living in urban regions and seeking care at private facilities.

The results of the second part show higher mean expenditure at private facilities, richer quintiles, western and southern states and lower mean expenditure in urban areas, for inpatient care. The margin effects show (Table 2) greatest increase in expenditure for the highest age group, lower education level (those up-to primary schooling), and among the richest quintile. There is a decrease in expenditure for females compared to males and in urban regions compared to rural regions. The expenditure in private facilities is greater than in public facilities.

3.3.2. Outpatient

The first part shows that the likelihood of having healthcare expenditure on cancer increases with age and higher income quintiles is lower for females, urban regions and people seeking care at private facilities (Table 2).

Estimates of the Log linear model (second part) show higher mean expenditure at private facilities, richer quintiles, and lower mean expenditure in urban areas. The margin effects (Table 2) show greatest increase in expenditure for the highest age group, richest quintile and highest education level. A reduction in expenditure on females compared to males, in urban areas compared to rural areas and private facilities compared to public facilities.

3.4. Financial coping strategies and hardship financing

Table 3 shows 92% OOPE on outpatient care is incurred by patients out of their own income. For inpatient care, 71.7% individuals reported using their income and 17% individuals had to borrow money to pay for OOPE. 21% individuals among illiterate category; 19.5% of the rural residents and 12.9% of the urban residents borrowed money for

Table 2
Two-part model estimates of factors affecting the health care expenditure on cancer for hospitalized care and outpatient care.

Socioeconomic characteristics and type of health facility visited	hospitalized care						outpatient care						
	Logit regression model (Part-1)		Log-linear regression model (Part-2)		Delta-method		Logit regression model (Part-1)		Log-linear regression model (Part-1)		Delta-method		
	β		β		dy/dx		β		β	95% CI	dy/dx		
Age (in years)													
0-14 ®													
15-35	1.04	[0.46-1.63]	-0.20	[-0.99-0.59]	27.84	[-0.15-55.83]	1.49	[0.42-2.57]	0.01	[-1.21-1.23]	11.89	[-6.75-30.53]	
36-59	2.41	[1.85-2.97]	-0.06	[-0.80-0.67]	194.39	[143.75-245.02]	2.73	[1.79-3.66]	0.35	[-0.4-1.11]	70.12	[30.55-109.7]	
60 and above	2.76	[2.19-3.33]	-0.11	[-0.86-0.63]	265.84	[178.56-353.12]	2.93	[1.89-3.96]	0.84	[0.05-1.64]	142.67	[36.94-248.4]	
Education													
Illiterate ®													
Up to Primary	0.77	[0.43-1.11]	0.02	[-0.31-0.34]	107.81	[32.09-183.53]	0.19	[-0.60-0.98]	-0.08	[-0.77-0.61]	6.23	[-55.34-67.79]	
Middle	0.42	[0.10-0.74]	-0.15	[-0.56-0.27]	28.79	[-30.49-88.07]	0.7	[-0.45-1.86]	-0.36	[-0.94-0.22]	21.82	[-69.25-112.89]	
Secondary and above	0.61	[0.33-0.89]	0.09	[-0.28-0.45]	91.11	[26.78-155.44]	0.4	[-0.35-1.16]	0	[-0.56-0.56]	27.21	[-37.67-92.10]	
Gender													
Male ®													
Female	0.12	[-0.09-0.32]	-0.3	[-0.540.05]	-28.37	[-77.36-20.62]	-0.29	[-0.79-0.20]	-0.35	[-0.81-0.1]	-43.24	[-92.34-5.86]	
Religion													
Hindu ®													
Muslim	0.21	[-0.09-0.51]	-0.18	[-0.57-0.20]	2.88	[-74.54-80.29]	0.43	[-0.54-1.41]	-0.77	[-1.33-0.22]	-22.47	[-85.70-40.76]	
Others	-0.28	[-0.64-0.08]	0.1	[-0.41-0.61]	-24.36	[-108.83-60.12]	-0.19	[-0.80-0.42]	-0.18	[-0.74-0.37]	-23.65	[-74.09-26.79]	
Caste													
ST ®													
SC	0.11	[-0.82-1.04]	0.62	[0.13-1.12]	159.32	[-28.15-346.8]	-0.07	[-1.90-1.77]	1.4	[0.03-2.77]	41.4	[-18.69-101.48]	
OBC	-0.63	[-1.57-0.30]	0.53	[0.07-0.99]	-10.94	[-159.24-137.35]	-0.82	[-2.68-1.05]	2.23	[0.99-3.48]	47.24	[-08.02-102.5]	
Others	-0.62	[-1.50-0.26]	0.44	[-0.07-0.96]	-20.77	[-166.18-124.64]	-0.26	[-1.99-1.47]	2.05	[0.73-3.37]	74.92	[13.94-135.89]	
MPCE quintile													
Poorest ®													
2nd Poorest	0.48	[0.14-0.81]	-0.15	[-0.65-0.34]	20.01	[-18.62-58.65]	0.3	[-0.41-1.02]	0.69	[-0.43-1.81]	14.01	[-4.64-32.66]	
Middle	0.08	[-0.27-0.44]	0.28	[-0.18-0.74]	23.95	[-13.69-61.59]	1.24	[0.39-2.10]	0.74	[-0.33-1.81]	50.77	[10.43-91.11]	
2nd Richest	0.56	[0.16-0.95]	0.61	[0.19-1.03]	118.19	[57.64-178.74]	1.24	[0.42-2.06]	0.51	[-0.64-1.66]	38.43	[1.32-75.53]	
Richest	0.81	[0.35-1.26]	0.88	[0.45-1.31]	234.47	[127.96-340.98]	1.95	[1.20-0.91]	0.86	[-0.23-1.95]	126.22	[29.6-222.85]	
Place of residence													
Rural ®													
Urban	-0.21	[-0.55-0.13]	-0.3	[-0.54-.06]	-81.34	[-154.767.91]	-0.42	[-1.18-0.34]	-0.38	[-0.81-0.05]	-60.54	[-146.59-25.51]	
Type of health facility visited													
Public ®													
Private	-0.3	[-0.530.06]	1.48	[1.25-1.71]	156.52	[109.7-203.34]	-0.77	[-1.35-0.20]	0.46	[0.11-0.81]	-21.65	[-73.7-30.4]	
Region													
North ®													
Central	-0.54	[-0.90-0.18]	-0.08	[-0.40-0.24]	-114.52	[-219-839.21]	-0.45	[-1.16-0.25]	-0.04	[-0.74-0.66]	-34.48	[-118.06-49.1]	
East	-0.27	[-0.63-0.09]	-0.07	[-0.47-0.33]	-70.47	[-189.33-48.38]	0.05	[-0.94-1.04]	-0.37	[-1.15-0.42]	-24.08	[-123.52-75.35]	
Northeast	-1.52	[-2.06-0.98]	0.88	[0.42-1.34]	-115.03	[-240.92-10.86]	0.85	[-0.53-2.22]	0.81	[-0.56-2.18]	369.17	[-425.59-1163.93]	
West	-0.62	[-1.08-0.15]	-1.14	[-1.520.75]	-210.13	[-309.82110.43]	-0.16	[-1.00-0.69]	-1.08	[-1.950.22]	-63.14	[-146.95-20.67]	
South	-0.49	[-0.84-0.14]	0.29	[-0.09-0.67]	-42.64	[-162.25-76.98]	-0.48	[-1.21-0.25]	0.01	[-0.83-0.83]	-34.07	[-121.5-53.35]	

*figures in brackets indicate 95% confidence interval; ® = reference category.

Source: Authors' estimates

Table 3
Source and hardship financing on cancer by patient characteristics.

Socioeconomic characteristics and type of health facility visited	Inpatient						Outpatient					
	household income/savings	Borrowings	Sale of physical assets	Contributions from friends and relatives	Other sources	Odds ratio for hardship financing ^a	household income/savings	Borrowings	Sale of physical assets	Contributions from friends and relatives	Others sources	Odds ratio for hardship financing ^a
Age (in years)												
0–14	71.1	7.1	0.0	21.8	0.0	®	91.5	8.6	0.0	0.0	0.0	®
15–35	79.7	13.3	3.3	0.6	3.1	3.09[0.97–9.83]	93.6	4.1	0.0	0.9	1.5	0.75 [0.05–11.99]
36–59	65.4	23.0	2.2	8.0	1.4	3.23[1.13–9.3]	88.8	8.6	0.4	1.9	0.3	0.86[0.08–9.01]
60 and above	77.7	10.4	3.4	3.9	4.7	1.65[0.56–4.8]	95.1	0.8	0.0	2.4	1.6	0.16[0.01–2.29]
Education												
Illiterate	66.9	20.9	2.2	6.4	3.5	®	90.1	6.8	0.5	1.2	1.4	®
Up to Primary	84.5	8.5	1.1	4.2	1.7	0.59[0.37–0.93]	93.4	3.9	0.0	2.7	0.0	0.94[0.27–3.32]
Middle	63.0	13.4	0.0	20.8	2.8	0.52[0.29–0.91]	92.2	3.5	0.0	3.1	1.3	1.12[0.29–4.4]
Secondary and above	79.5	10.9	2.9	1.9	4.8	0.51[0.32–0.83]	93.3	3.9	0.2	1.6	1.1	1.28[0.35–4.64]
Gender												
Male	75.4	13.3	1.2	6.0	4.1	®	91.1	5.0	0.0	2.8	1.2	®
Female	76.8	12.5	2.3	6.2	2.2	0.85[0.61–1.2]	93.7	4.1	0.5	1.0	0.7	0.9[0.38–2.11]
Religion												
Hindu	77.2	11.7	2.0	5.9	3.2	®	91.0	5.6	0.1	2.6	0.8	®
Muslim	78.7	11.6	0.7	7.2	1.9	0.96[0.58–1.58]	96.8	0.2	0.7	0.7	1.7	0.48[0.09–2.57]
Others	55.7	31.3	0.3	6.9	5.8	2.27[1.29–4]	93.1	6.1	0.0	0.0	0.8	0.92[0.18–4.83]
Caste												
ST	87.9	8.5	0.2	3.3	0.1	®	92.7	5.9	0.0	1.2	0.2	®
SC	73.9	13.4	2.9	7.0	2.9	1.12[0.53–2.35]	89.8	8.9	0.0	1.4	0.0	0.55[0.08–3.96]
OBC	73.5	15.3	0.4	6.4	4.4	0.79[0.39–1.6]	89.4	4.9	0.5	3.7	1.6	0.33[0.04–2.51]
Others	78.3	10.8	2.5	5.6	2.8	0.87[0.42–1.8]	94.7	2.6	0.1	1.5	1.1	0.18[0.02–1.55]
MPCE quintile												
Poorest	67.9	19.5	0.7	0.4	11.6	®	74.9	16.9	0.0	6.9	1.4	®
2nd Poorest	76.3	10.9	4.4	7.0	1.5	0.74[0.42–1.32]	71.7	15.8	0.0	10.9	1.6	0.61[0.13–2.91]
Middle	74.5	16.6	0.1	7.0	1.8	0.71[0.39–1.28]	97.1	1.0	0.6	0.0	1.3	0.4[0.08–2.16]
2nd Richest	68.9	17.0	1.8	9.4	3.0	0.94[0.54–1.63]	92.8	4.5	0.3	0.7	1.7	1.11[0.23–5.33]
Richest	83.7	7.9	1.3	4.9	2.2	0.44[0.24–0.81]	96.0	2.7	0.0	1.2	0.2	0.39[0.07–2.14]
Place of residence												
Rural	69.0	19.3	1.9	7.2	2.7	®	91.9	4.9	0.2	2.3	0.7	®
Urban	76.1	12.9	4.1	3.9	3.0	0.96[0.66–1.4]	92.0	5.0	0.2	1.6	1.2	0.51[0.19–1.4]
Type of health facility visited												
Public	81.2	11.7	1.1	4.4	1.6	®	92.4	5.0	0.4	0.9	1.4	®
Private	63.2	21.5	4.3	7.4	3.7	1.22[0.87–1.71]	91.5	4.9	0.0	3.0	0.6	0.52[0.21–1.28]
Region												
North	79.4	16.0	1.9	1.3	1.4	®	93.7	4.6	0.4	0.5	0.8	®
Central	77.6	10.6	1.0	9.4	1.4	0.66[0.4–1.1]	91.6	4.6	0.0	3.8	0.0	0.82[0.22–3.1]
East	73.5	14.4	1.7	7.4	3.0	0.57[0.35–0.94]	94.0	4.7	0.5	0.5	0.4	2.27[0.61–8.44]
Northeast	81.5	6.9	7.3	3.9	0.3	0.42[0.18–0.98]	99.9	0.0	0.0	0.0	0.1	1[0.00]
West	72.5	13.0	2.2	3.6	8.7	0.82[0.48–1.42]	91.2	4.2	0.0	1.5	3.1	0.49[0.1–2.35]
South	53.6	31.1	6.8	7.0	1.5	0.58[0.33–1.01]	83.2	9.6	0.0	6.1	1.1	0.71[0.17–2.89]
Total	71.7	16.9	2.7	5.9	2.8		92.0	4.9	0.2	2.0	0.9	

^a Figures in brackets indicate 95% confidence interval, ® = reference category.

Source: Authors' estimates

expenditure on hospitalization due to cancer. By types of facilities, 81% individuals visiting public hospitals used their savings to pay for care and 21.5% of those visiting private hospitals had to resort to borrowings. 4% persons reported sale of physical assets to meet the need for hospitalized care in a private hospital. Individuals belonging to second poorest (16.9%) and poorest (15.8%) consumption expenditure quintile reported reliance on borrowings for seeking outpatient care.

3.5. Factors associated with hardship financing

The logit regression shows that the odds of facing hardship financing for hospitalized treatment are three times for patients in the age group 36–59 years (OR - 3.23, CI: 1.13–9.30) compared to the reference category (Table 3). Education level of patient has a negative association with hardship financing for both inpatient and outpatient care. Females are 15% and 10% less likely to face hardship financing in inpatient and outpatient care, respectively, compared to males. Cancer patients in the middle consumption quintile are 11% more likely to experience hardship financing for outpatient care compared to the poorest quintile. Inpatient care at private hospitals has a 22% higher likelihood of financing hardship. Compared to rural patients, urban patients are 4% less likely to face financing hardship for hospitalized services and 50% less likely for outpatient care.

4. Discussion

The prevalence of cancer is rising and it is disturbing that 50% of the total cancer cases were reported in the young age group of 36–59 years. Highest percentages of inpatient and outpatient care for cancer were reported in the richest consumption expenditure quintile and among persons with higher education category. This could indicate poor awareness and low utilization of health care for the disease among poorer and less educated sections of the population. There is a need to focus on IEC (information, education and communication) activities for cancer care and self-examination by patients for early symptoms of cancer.³⁸

The financial burden of cancer as gauged by OOPE and HCB is acute. The mean monthly OOPE per cancer patient in the household was estimated at ₹6549 for inpatient care and ₹8811 for outpatient care. Geriatric population was found to be the most vulnerable to financial burden as it had the highest OOPE for both inpatient and outpatient care (₹7219, ₹10156). OOPE for inpatients and outpatient care was higher among males (₹6069, ₹9293) compared to females (₹5030, ₹7947). HCB for cancer households ranged from 37% to 49% for inpatient and outpatient care, implying that a cancer household spent about half of its income on cancer treatment. This burden was even greater for poorer quintiles, which faced double distress in terms of lower healthcare utilization and greater healthcare burden as indicated by lower OOPE and higher HCB. HCB for the second poorest quintile was estimated to be the highest at 119%. Our results are comparable with other studies^{9,13} and show that the OOPE on cancer has increased from 2014 to 2017–18.

For both inpatient and outpatient care, HCB was higher among rural population (41.9%–55.4%), in contrast to urban population; and for those visiting private hospitals (57.8%–62.7%) in comparison to public hospitals. Southern and north-eastern regions of India had the highest HCB for outpatient visits. The huge financial burden imposed by cancer is validated by other studies in India as well, that found high OOPE and income loss for cancer patients.

Results from the Two-part regression model for hospitalized care, show that the likelihood of having any healthcare expenditure on cancer (first-part) increases with age, education, living standards and private health care facilities. The second part shows higher expected value of expenditure among people with only primary education, those visiting private facilities and those belonging to the richest quintile. In case of outpatient care, both, the likelihood of having any healthcare expenditure on cancer (first part) and the expected expenditure (second part)

increase with age, education and living standards. For those living in urban areas and visiting private health facilities, the likelihood of expenditure and mean expenditure is lower.

Long treatment protocols including a variety of therapies such as radiotherapy and chemotherapy and sophisticated diagnostics are the primary reasons for expensive cancer care. These expenses are accentuated by poor geographical dispersion of cancer treatment facilities, forcing patients to incur expenses on travel and boarding to seek care at specialist oncology facilities,^{40,41} and the financial burden of this expenditure is high due to the absence of any prepayment and risk-pooling mechanisms.

Financial hardship is also reflected in the strategies used to pay for treatment. This study found that for inpatient and outpatient care, 72%–92% patients, had to rely on their own income/savings for incurring payments at the point of service in the absence of any prepayment support. It was also found that 22% patients had to borrow money or sell their assets for inpatient care. The largest proportion of individuals borrowing money belonged to the poorest quintile. In comparison to urban residents, the rural population had a greater need for borrowing money or selling assets for both inpatient and outpatient care. Illiterate persons had the greatest need to borrow money in contrast to the more educated ones. Financial hardship due to treatment of cancer at private facilities have been reported by other studies also.^{42,29} At the time of the survey, the impact of Pradhan Mantri Jan Arogya Yojana (PM-JAY)⁴³ was still not felt, but it is hoped that the next round of data should show a lower financial burden for hospitalized care. However, insurance under PM-JAY is available only for hospitalized care with a limit of ₹ 500,000/-. A study⁸ estimated the unit cost of radiotherapy to be ₹ 1,63, 728 and a patient normally needs more than 15–20 such cycles. As a result, people seeking outpatient care and inpatient expenditures in excess of the insurance limit are still exposed to financial hardship. Targetted expenditure support schemes are needed for people suffering from cancer.

It has been reported that almost 75% patients have advanced stages of the disease at the time of diagnosis.³⁸ Around 30%–50% of cancers are preventable by avoiding risk factors, early detection and timely quality treatment.⁴⁴ Focus on prevention and early screening for the disease is needed for timely detection and treatment, to attain better outcomes and reduce the cost of care. The recent transition from selective to comprehensive primary health care in the public sector should be used as an opportunity to introduce screening protocols at primary health centres for common cancers to facilitate early detection.

High OOPE and HCB, greater utilization of private facilities, delayed diagnosis, expensive treatment protocols and inequities in access to cancer care point to an urgent need for greater public investment in cancer care and policies to provide for financial protection for the disease treatment.

5. Strength of the study

The strength of the present study is the use of large-scale cross-sectional data from NSS 75th round which follows a uniform study design and offers generalizability to the study results. Many researchers and policy makers use this data for research and planning in India. The strength of the study also lies in the use of the Two-part model to explore the likelihood of incurring expenditure and the marginal expenditures across patients belonging to different socio-economic groups.³³

6. Limitation of the study

There are some limitations to the study. Data are based on household survey and may suffer from recall bias. Data do not contain information about the types of cancers and the expenditure during the entire course of treatment. Hence analyses could not be done according to types of cancer and severity of ailment.

7. Conclusion

The estimates of OOPE presented in the study are nationally representative and may be used as a guidance for designing reimbursement packages. Population based cancer registries are the key elements of a cancer control program through data collection and health policy implementation. Given that there are currently only there are only 38 such registries in the country and there is greater utilization of private facilities in comparison to public facilities, indicates low public expenditure on cancer care. There is a need to augment public expenditure for providing quality care at affordable costs.

Consent to participate

This study utilised secondary data from recent NSS 75th round survey which was based on the theme of 'Social consumption: Health. The NSS obtained the ethical consensus from the review committee of the project while consent was taken from the respondents with dully undersigned, once he/she are agreed to participate in the study.

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Declaration of competing interest

None declared.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cegh.2023.101259>.

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