

## Cancer Spending, Economic Burden and its Effect on the Household Welfare

Toms K Thomas, Roma Chettri\*, Ch Satish Kumar, Anita Nath, Navnit Basnet and Tenzing Sherpa

Department of Public Health, SRM University, Tamil Nadu, India

### Abstract

**Background:** As the incidence of cancer rises, so does the prevalence of catastrophic medical expenses, which are increasingly considered to be one of the main causes of poverty.

**Objective:** The objective of this study is to analyse studies of Catastrophic Healthcare Expenditure (CHE) in cancer patients, assess their experience with catastrophic health expenditure, and identify factors associated with the incidence. The review compiled the various aspects of the economic impact of cancer on Indian society from the available and accessible literature.

**Method:** To conduct a thorough search of the literature; Google Scholar and PubMed were employed. The desk review was conducted using key phrases such as economic burden, cost, spending and cancer, cancer in the Northeast, CHE in cancer, and India cancer, cancer in Northeast India. Cancer burden and financing for recent studies were chosen. Several open access journals available were fully reviewed and their findings are noted.

**Results:** Long term cancer treatments involve a variety of medicines and expensive testing these are the main contributors to high cancer care expenses. According to the report the proportion of cancer patients who sought treatment outside NER is reported is seen to be more for Sikkim (95.3%) and Nagaland (58.1%). Due to the geographic dispersion of cancer treatment centres, patients are compelled to pay for travel and housing in order to obtain care at specialist oncology facilities, raising the cost of these charges. The high disease burden and rising cost of cancer treatment place a financial strain on both households and the individuals. Additionally, there is no prepayment or risk-pooling mechanisms in place, so this expense carries a high financial burden.

**Keywords:** Prevalence; Cancer spending; Economic burden; Household welfare; Cancer

### Introduction

Cancer becomes the second leading cause of death in the year 2018 and contributes to 70% of the death in the low and middle-income countries GLOBOCAN predicted that cancer incidences in India would reach 2.08 million by 2040, a 57.5 percent rise from 2020 [1,2]. Lung and breast cancers continue to be the most frequent cancers in both men and women [3]. By 2030, more than 20 million people are estimated to be diagnosed with cancer worldwide [4]. With the increasing burden of cancer the prevalence of catastrophic expenditure due to health-care costs is increasing, and it is increasingly thought to be one of the key drivers to poverty. With only 25% of the Indian population covered by any sort of health insurance, the cost associated with the diagnosis and treatment of this rising tide of cancer in India is huge. The majority of cancer patients in India pay for their treatment out of their own pockets. According to a parliamentary panel assessment, six crore Indian residents are pushed below the poverty level each year as a result of cancer treatment costs in their families. Several studies done on cancer spending expenditures have been linked to high out-of-pocket expenses, medical debt, and even bankruptcy [5]. To deal with increased out of pocket expenditures on health care, households use a number of tactics, including current earnings, savings accounts, disposition of assets, borrowing funds, and decreased spending. The negative implications of borrowing and selling assets to achieve OOPPE are severe in both the short and long run [6]. Many families face financial ruin and fall into poverty as a result of hospitalization bills [7]. Cancer treatment costs present significant ethical challenges regarding the need to make choices that may affect the sustainability of the families' individuals. For example, choosing to

give up a home or take out a loan to pay for care is known as "financial toxicity" because, in addition to the physical toxicity that cancer treatment may cause, some people also find it difficult to cope with the suffering associated with the financial shortfall and psychological stress that may occasionally arise [8].

### Literature Review

#### Significance of the review

The objective of this paper was to analyse studies of Catastrophic Healthcare Expenditure (CHE) in cancer patients, assess their experience with catastrophic health expenditure, and identify factors associated with the incidence. Based on this, a review is conducted to assess the economic burden of cancer on the Indian population. Few research conducted in this area has a variety of goals and outcomes.

**\*Corresponding author:** Roma Chettri, Department of Public Health, SRM University, Tamil Nadu, India; E-mail: romah\_chettri@srmus.edu.in

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This review compiled the various aspects of the economic impact of cancer on Indian society from the available and accessible literature.

**Ethical clearance:** Was not obtained as this is a review article.

**Methodology:** This research is a systematic review. To conduct a thorough search of the literature; Google Scholar and PubMed were employed. The desk review was conducted using key phrases such as economic burden, cost, spending and cancer, cancer in the Northeast, CHE in cancer, and India cancer, cancer in Northeast India. Cancer burden and financing for recent studies were chosen. Several open access journals available were fully reviewed and their findings are noted.

**Cancer burden in India:** The National Cancer Registry Programme (NCRP) of India, Population Based Cancer Registries (PBCR), contains 36 PBCRs and 236 hospital based cancer registries. India has released its most recent report, which includes data from 2012 to 2016. The population-based cancer registry programme in India reveals a rising burden of female cancers.

Breast cancer is expected to be the most prevalent kind of cancer in 2025, followed by cancer of the lungs and oral cancer. In 2020, the anticipated number of cancer patients in India was 13,92,179 with women (7,12,758) with a higher reported incidence than men (6,79,421). Accordance to the PBCR pooled data report 2020, Delhi (60,097) Mumbai (53,714) Chennai (31,271) Bangalore (29,049) and Thiruvananthapuram district (27,833) PBCRs had the most number of cases.

According to several past hospital based researches, a household pays approximately Rs. 36,812 for the complete cancer therapy, excluding non-medical [9]. It should also be highlighted that Out-of-Pocket (OOP) expenditure on cancer hospitalisation is around 2.5 times the general average hospitalisation expenditure [10] in India, the incidence of cancer is on the rise, and reducing the incidence of cancer that is preventable may be the greatest long-term solution. Up to 60%–70% of India's total cancer burden may be attributable to preventable malignancies [11]. In India, various publicly financed health insurance schemes have been implemented by the centre and state governments for financial protection covering cervical cancer treatment [12]. It has been noted that family caring for patients get disturbed and unhappy as a result of financial, personal, and social problems. More than one-third of families fell victim to catastrophic health financing and hardship financing. The study also highlights that poorest were hardest hit by the OOP payments, both in terms of catastrophic health expenditure and distress financing, the study also showed that cancer affected households had to incur a significantly high OOP on treatment in public sector hospital in India [13].

**Out of pocket expenditures:** Evidence in impact of publicly financed health insurance schemes suggests that there has been no decline in the OOPE payments [12] in India, only 12% and 13% of the urban and rural population have health insurance coverage respectively, and around 60% of the health care expenditure is paid out-of-pocket by households. Therefore, diagnosis of cancer becomes devastating news for the household due to financial and psychological hardships (National Health Systems Resource Centre; National

Sample Survey Organization. A similar study from Nepal reported, 86.1% of families with cancer patients suffering from CHE. ("Frontiers Estimating the Direct Cost of Cancer in Nepal) 84% of the breast cancer patients experienced catastrophic health expenditure (out of pocket expenditure  $\geq$  40% of the total non-food expenditure of the household). Patients with low income admitted with second stage or above of breast cancer and patients from rural households were more prone to distress financing (taking loans from banks/money lenders or selling economic productive assets to meet the expenses of treatment) in Punjab [13].

**Health seeking behavior:** Cancer related health seeking behaviour is uncommon. Individual's lack of understanding, never receiving information, and not actively seeking cancer information are all strongly linked with not seeking health care for cancer prevention and control. Approximately 45% of patients went to private hospitals as their first point of contact, whereas 42% went to tertiary or government-run institutions. Referrals to cancer centres were similarly largely from private practitioners, with the exception of Aizawl, where basic health care providers recommended 57% of patients [14]. The study found that 34.5% of the individuals seek medical attention as soon as symptoms arise [15]. Findings of study conducted in Tamil Nadu, where the most common reason for visiting a particular health facility was easy accessibility (31.12%) [16]. According to the study done among rural cohort of North India, When compared to private healthcare facilities (63.2%), it was found that the use of public healthcare facilities was low (36.8%).

Traditional healers were contacted by the greatest percentage of those seeking unofficial treatment among them (20.8%), followed by self-medication in 0.7% of cases [14].

## Assessing the review studies

**Cancer in Northeast India:** According to the PBCR pooled report 2020, Delhi (60097), Mumbai (53714), Chennai (31271), Bangalore (29049), and Thiruvananthapuram district (27833) PBCRs had the highest number of cases. Tripura state (11473) and Kamrup urban (11013) PBCRs had the highest number of cases registered. Most of the registries in this part of the country registered higher proportion of cancers in males, except at Manipur, Imphal West district, and Papumpare district in Arunachal Pradesh. Increased cancer incidence was linked to greater tobacco smoking in the North-Eastern states of India. Men were more likely to develop cancer in their lungs, mouth, oesophagus, and stomach. Breast cancer is most common in women, followed by cervix, uterus, and ovaries. The Northeast (NE) states were found to have the highest AAR and AAMR for all cancer sites per 100,000 inhabitants of the Indian area. Aizawl district (270.7/100,000), Papumpare district (230.4/100,000), East Khasi Hills (218.3/100,000), Mizoram state (211.5/100,000), Kamrup Urban districts, and Meghalaya (206.0/100,000) were mentioned for having higher AAR (NCRP), and Papumpare district (249.0/100,000) was mentioned for having higher AAR in females (Table 1).

S. no	Registry	Males		Females		Total
		n	%	n	%	n

1	Manipur state (2012-2016)	3702	45.1	4500	54.9	8202
2	Imphal West (2012-2016)	1137	43.1	1500	56.9	2637
3	Mizoram state (2012-2016)	4323	53.6	3736	46.4	8059
4	Aizawl district (2012-2016)	2180	53.4	1900	46.6	4080
5	Sikkim state (2012-2016)	1172	50.9	1131	49.1	2303
6	Tripura state (2012-2016)	6559	57.2	4914	42.8	11473
7	West Arunachal (2012-2016)	1222	51.1	1171	48.9	2393
8	Papumpare \$district ( 2012-2016)	472	47.2	528	52.8	1000
9	Meghalaya ( 2012-2016)	4688	62.3	2832	37.7	7520
10	East Khasi hills district (2012-2016)	2884	62.5	1729	37.5	4613
11	Nagaland (2012-2016)	1403	58.6	992	41.4	2395
12	Pasighat (2012-2016)	321	51.4	303	48.6	624
13	Cachar district (2012-2016)	4663	54.2	3943	45.8	8606
14	Dibrugarh district (2012-2016)	2535	53.1	2238	46.9	4773
15	Kamrup urban (2012-2016)	6223	56.5	4790	43.5	11013

**Table 1:** Total number of cancer cases registered in PBCRs under North-East India 2020.

### Cancer related health facilities in Northeast India

Table 2 show that there is not enough number of hospitals that are treating cancer in the NE. The patients are not getting enough facilities and are compelled to seek the treatment outside their home state which puts them at the risk of high out of pocket expenditure. According to the PBCR recent published report the proportion of cancer patients who sought treatment outside NER is reported by the registry is seen to be more for Sikkim (95.3%) and Nagaland (58.1%), whereas the proportion for the same is less for Assam (5.1%), Mizoram (6.5%) and

Tripura (6.9%). Diagnostic and medical care could be enhanced in these states. Oncology institutions, diagnostics, adequate personnel resources, and palliative care centres are all needed. Patients shouldn't have to travel to various regions for detection and medical care if companies or a charitable organization partners provide cost-effective services. Diagnostic and medical care could be enhanced in these states.

State	Population	Cancer treating facilities	Radio therapy facilities	Cancer welfare scheme	Palliative care centres
Arunachal Pradesh	13,83,727	1	1	0	0
Assam	3,12,05,576	6	6	9	8
Manipur	28,55,794	1	1	0	1
Meghalaya	29,66,889	7	7	0	1
Mizoram	10,97,206	5	5	3	2
Nagaland	1978502	6	6	0	1

**Table 2:** Cancer care facilities in the Northeast India.

Sikkim	6,10,577	1	1	0	1
Tripura	3673917	1	1	0	1

## Extend of cancer

Cancer elicits shock and terror in India for two reasons: First, highly costly treatment costs, and second, poor prospects of life [15]. The financial burden of cancer treatment can lead to acute anguish and even insolvency for patients and their families [16]. We also discovered that cancer treatment generates significant financial shocks and has an impact on household living standards. Clearly, one out of every three cancer patients' homes spends approximately half of their annual household expenditure on cancer hospitalisation.

## Out of pocket health expenditures

In India, only 12% and 13% of the urban and rural population have health insurance coverage respectively, and around 60% of the health care expenditure is paid out-of-pocket by households [13]. Patients with low income admitted with second stage or above of breast cancer and patients from rural households were more prone to distress financing (taking loans from banks/money lenders or selling economic productive assets to meet the expenses of treatment) in Punjab. Out-of-pocket health expenditures are significantly higher in cancer households compared to controls, ranging from INR 3,576 for inpatient expenses in the year prior to the survey, to INR 4,438 per member, and for outpatient visits in the 15 days prior to the survey, from INR 66 to INR 85 per member. The high disease burden and rising cost of cancer treatment place a significant financial strain on both health-care systems and individuals. In India, just 12% and 13% of the urban and rural populations have health insurance coverage, respectively, and households pay around 60% of health-care costs out of pocket. More than one-third of cancer patient's excessive OOP expenditure is attributable to asset borrowing/sale [14]. Cancer treatment is prohibitively expensive due to the high cost of medications, complex equipment, and cutting-edge technology. Providing free cancer care at all public health institutions would place a significant financial strain on the health system, but focusing on the lowest quintile appears possible and equitable. Some state-level programmes, like as Karnataka's Yashaswini health insurance programme and comparable schemes in Andhra Pradesh and Tamil Nadu, provide cancer treatment to people living in poverty.

## Health seeking behaviour

Among several determinants of late diagnosis, the most important is the healthcare-seeking behaviour of the cancer patients. Health care

seeking behaviour refers to an individual's decision or action to maintain, obtain, or restore excellent health and to prevent sickness. This includes all accessible health care options like visiting a public or private, modern or traditional health facility, self-medication and use of home remedies, or avoiding using available health services, and so on. Individual healthcare-seeking behaviours can be affected by the complex interrelationships between socioeconomic and physical environments, as well as individual features and behaviours. Cancer screening is an essential preventive work. Even though India's national program includes screening, it has yet to take root in the vast majority of the country. At present, a great deal of screening tests is only offered at more advanced institutions. In order to move forward toward attaining sustainable development goals, health care utilization is as essential as health service availability [17]. Nearly 80% of public and commercial health facilities are situated in urban regions and are widely used by urban people [18]. Further, secondary expenditures such as those related with travel to health care facilities serve as deterrents for the rural population which puts a financial burden on those residing in rural settings.

## Cost of investigations and treatment

In Punjab, the cost of medications accounted for 36.23% of the overall cost of illness among breast cancer patients, while the cost of hospitalisation, including surgery, accounted for 36.23% to 27.05% of the total expenditure. The cost of medications (45.7%) was the most significant contributor to direct cost, and productivity loss (64.9%) was the most significant contributor to indirect cost [13]. The study conducted in the tertiary care in North India, The cost of various cervical cancer treatment techniques (Table 3), such as radiotherapy, brachytherapy, chemotherapy, and surgery, varies between INR 19,494 and 41,388. In addition, patients spent INR 4,042 to 23,453 on OOPE. Approximately 62% of patients had CHE, and 30% had distress finance as well as distress funding for brachytherapy and radiation, the HBP cost ranges from (INR 45,364 to 64,422) [19].

Treatment stages	Direct-medical expenditure	Direct-non-medical expenditure	Total expenditure in INR
Before coming to study hospital	10786	1830	12616
Pre-radiotherapy	5830	5124	10949
Radiotherapy	3547	9275	12822
Brachytherapy	3755	1828	5583
Chemotherapy	3210	832	4042

Surgery	21850	1603	23453
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**Table 3:** Treatment specific direct and non-direct medical out of pocket expenditure for cervical cancer treatment.

Cost study done in a tertiary care hospital in Srinagar, the average unit cost per patient each bed day for in-patient chemotherapy was 5,725.12. Out of this total of 5,725.12, 2347.30 (41.21%) was spent personal. According to a study conducted among cancer-affected households in Punjab to determine the economic burden of breast

cancer (Table 4). The cost of medications (36.23%) and the total cost of hospitalisation (27.05), which includes the cost of surgery, were the two factors that contributed most to the overall cost of illness. Total medical cost (75.87%) was the largest contributor to total direct cost, which was impacted by drug cost (36.23%).

Components (n=221)	Cost (in INR)	Percentage of total cost of illness*
Total screening cost	41,47,700.00	3.98
Total hospitalization cost	2,82,00,041.00	27.05
Total radiotherapy cost	69,63,220.00	6.68
Total drug cost	3,77,66,768.00	36.23
Total consultation cost	20,02,940.00	1.92
Total medical cost	7,90,80,682.00	75.87
Total non-medical cost*	35,58,980.00	3.41
Total direct cost	8,26,39,662.00	79.28
<b>Indirect cost</b>		
Total wage loss of the patients	20,68,475.73	1.98
Total wage loss of the care taker	48,04,447.84	4.61
Expenditure on hired help	7,07,000.00	0.68
Productivity loss	1,40,14,584.40	13.44
Total indirect cost	2,15,94,507.97	20.72
<b>Total cost of illness</b>		
Direct cost+indirect cost	10,42,34,170	100
<b>Note:</b> *Transportation, food and lodging, *Direct cost+Indirect cost.		

**Table 4:** Components of cost of illness in breast cancer.

According to a cost analysis by the average monthly OOPE per episode for inpatient care was 6549, and the average for outpatient care was 8811. For inpatient and outpatient care, people over 60 had the highest OOPE. Males had greater OOPE for both inpatient and outpatient treatment (₹6069-₹9293) than females (₹5030-₹7947). Cancer was responsible for 119% of outpatient visits for the second lowest quintile among the study population. HCB was found higher in rural locations (41.9% inpatient, 55.4% outpatient) than in urban areas and in private hospitals (57.8% inpatient, 62.7% outpatient) than in state hospitals. Outpatient visits for cancer showed the greatest health-care burden in India's Southern and North-Eastern regions. The total economic burden of cancer therapy amounts to the mean cost of 36,812 Indian National Rupee (INR) of a patient in India. Out of this total expenditure, 40% comprises expenditure incurred before coming

to the hospital. 17.3 percent annual hospital admission per 100 members in households with cancer patients. In addition, they made 5.6 to 7.6 outpatient visits per 100 members in the 15 days preceding the survey [1]. Treatment specific cost study done among the lung cancer patients in a tertiary care centre in Himachal Pradesh (Table 5), the total direct nonmedical costs incurred were 10,574.73 INR. Expenses incurred on nonmedical resources such as travel, and lodging was significantly higher than the overall medical costs. In medical expenditures, the total costs of investigative procedures and tests were 5370.73 INR and expense incurred for taking medication in any form amounted to 3019.78 INR from out-of-pocket.

Category of costs incurred	Mean cost (INR)
Direct medical costs (total)	8974.73



Direct non-medical costs (total)	10,574.73
Costs incurred on medication	3019.78
Costs incurred on diagnostics	5370.73
Costs incurred on travel	5613.19
Costs incurred on lodging	2985.71.

**Table 5:** Treatment specific costs incurred by lung cancer patient registered at a tertiary care cancer centre in Himachal Pradesh.

## Coping with financial distress

According to a cost-specific study conducted the coping mechanism utilised by households with insurance (9% of total households) was savings (85%), low-interest borrowing (55.0%), social nets (55.0%), selling financial assets (30%), and financial aids (5.0%) [13]. None of the households with insurance had received distress finance. Borrowing at low interest rates (88%), social nets (77%), savings (73%), and sold financial assets (55.7%) were the most common financial coping mechanisms for households who financed the treatment entirely through OOP (91% of households), followed by delaying payment of pre-existing loans (54%). Many families employed more than one coping strategy to address financial issues, the most popular of which were borrowing and social networks. Savings, selling financial assets, and postponement. To pay for OOP, households adopted the following financial coping strategies: Their own income/savings; borrowings; the sale of physical assets; contributions from friends and relatives; and any other source.

## Discussion

Cancer diagnosis is devastating news for the home owing to financial and psychological challenges. The high disease burden and rising cost of cancer treatment place a significant financial strain on both health-care systems and individuals. Private sector health care facilities are more accessible in India for cancer treatment, with richer households relying more on private hospitals for cancer inpatient care, whereas poor households rely mostly on public healthcare facilities. In India, various publicly financed health insurance schemes have been implemented by the centre and state governments for financial protection covering cancer treatment. Evidence on the impact of publicly financed health insurance plans suggests that OOP payments have not decreased. Cancer is on the rise in Northeast India, with Delhi, Mumbai, Chennai, Bangalore, and Thiruvananthapuram districts having the highest cases.

The main causes of high cancer care costs are lengthy treatment procedures that include a variety of therapies like radiotherapy and chemotherapy, as well as pricey tests. These expenses are made more expensive by the geographic dispersion of cancer treatment facilities, which forces patients to pay for travel and lodging in order to access care at specialized oncology facilities. Additionally, there is no prepayment or risk-pooling mechanisms in place, so this expense carries a high financial burden. To enable treatment at the district level, India's cancer program spending must also be rationalized. Dispersed cancer care is feasible for a significant number of patients if diagnostic services are sufficiently dispersed and public and private sector resources are successfully integrated.

## Conclusion

The results of this investigation can help policymakers create more equitable and long-lasting health financing structures that address the factors that influence CHE in cancer patient.

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