Economics of cancer care: A community-based cross-sectional study in Kerala, India

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Abstract

Background: The estimated incidence of cancer cases in Kerala for 2014 was 31,400 and the mortality associated with it was 13,816. Although the treatment of cancer has shown remarkable advances, it has come with increasing costs. **Objective:** The objective of this study is to estimate the economic burden of cancer in Vypin Block Panchayat at Ernakulam by analyzing the average total direct and indirect cost of cancer care, socioeconomic status, and cost of cancer care between government and private hospitals. **Materials and Methods:** A cross-sectional study was conducted for 2 months from March to April 2018. The study was conducted by utilizing an annotated cost questionnaire for completion by patients. Total direct and indirect cost was estimated. Appropriate statistical tests were used. **Results:** Direct cost for cancer care contributed 75% toward the cost of illness and the remaining was found to be indirect cost. Loss of income (44%) contributed to the largest chunk of indirect cost. The average direct cost for cancer care was found to be Rs. 25,606 and the average indirect cost was Rs. 8772. The average total cost of cancer care was calculated to be Rs. 34,378. Significant statistical variation was found between the cost of cancer care in private and government hospitals. The economic burden of cancer in this Vypin Block Panchayat was found to be Rs. 218,256,977/- **Conclusion:** The ratio of average income to average cost in this study is skewed which indicates the lack of affordability for cancer care in this population. A very large gap, therefore, exits between income levels and cost of cancer care clearly indicating a vast gap between affordability and cost of treatment, which clearly necessitates the need for a definite policy and state intervention for a mass cancer care program.

Key words: Burden of disease, cancer care, cost of care

Introduction

Kerala, better known as "God's Own Country," with a population of 33,406,061 has roughly 35,000 new cases of cancer every year. There are 913 male and 974 female cancer patients per million in Kerala. With a prevalence of 1.1%, there are more than 100,000 cancer patients in the prevalence annually in the state.[1]

The estimated incidence of cancer cases in Kerala for 2014 was 31,400 and the mortality associated with it was 13,816.[2,3] Although the treatment of cancer has shown remarkable advances, it has come with increasing costs.[4] The cost of cancer treatment is associated with expenditures on cancer prevention, screening and treatment services, time and effort spent by patients and their families, lost productivity due to cancer-related disability; and premature death due to cancer. Expenses for cancer care are extremely high.[5] The extent of the resulting economic burden is determined by different factors, including family income, socioeconomic status, insurance status, and stage of disease. Treatment-related costs include costs of consultation, stay, investigations, and medications that include procedure cost also where applicable. Nonmedical costs include food cost, loss of income, and travel to treatment centers. Child care, domestic help, medical equipment, special foods, and nutritional supplements are the other less apparent causes of financial burden.

In future, the cost of cancer care will increase as new sophisticated expensive treatment modalities are adopted to raise the standard of care.[6]

Vypin Block Panchayat in Ernakulam district of Kerala has over 500 registered cancer patients as per the cancer registry survey. At present, there is no systematic cost-of-cancer care study that assessed the economic impact of cancer patients in Vypin. This is important as the national health policies aim to achieve universal access to health care at affordable prices. By providing the socioeconomic dimensions of cancer, it will highlight the ways of health, financing, and mechanisms and thereby aid in better policymaking. The present study aims to estimate the economic burden of cancer in Vypin Block Panchayat at Ernakulam. It also estimates the average direct and the indirect costs of cancer care.

Materials and Methods

A cross-sectional study was conducted for 2 months from March to April 2018. The total population of Vypin as per the Indian Census 2011 is 198,400. According to the Kerala Cancer Registry, Vypin had 500 cancer cases during this period. This was taken as the study population.

The sampling technique adopted for this study is a convenient sampling technique, and according to Slovin's formula ($n = N/(1 + Ne^2)$) where $N = 500$, the sample size (n) estimated was 223.[7] We included 235 patients in our study. At 90% confidence interval and accuracy of 94.5% with 0.055% error, the sample size was calculated at 223. Our actual sample size was 235. Based on statistical sample size template, a sample size of 223 is justified for a population of 198,400.

Prior permission was obtained from the local authority, health supervisor, and health inspector of concerned primary health centers (PHCs). The study was conducted by utilizing an annotated cost questionnaire for completion by patients, which is a modified standardized questionnaire developed by Sally Thompson *et al.*[8]

The primary and sociodemographic details of all the cancer patients in Vypin Block Panchayat were collected from

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Malappuram community health center, Puthuvaippu PHC, Njarakkal PHC, Nayarambalam PHC, Munambam PHC, Edavanakkad PHC, Ayyampilly PHC, Mulavukad PHC, and Vallarpadam PHC.

Cost centers consisted of direct and indirect costs. Direct cost estimated in the study included average consultation cost, average investigation cost, average medication cost (including procedure cost, where applicable), and average cost of stay. Indirect cost included average travel cost, average food cost, average patient income loss, average companion income loss, and average caregiver income loss.

Inclusion criteria included cancer patients from all age groups and those who were willing to participate in the study at the time of the survey. Those patients who discontinued treatment and not registered under the cancer registry were excluded.

Results

The study included a total of 235 cancer patients. Of them, 70 (29.8%) were male patients and 165 (70.2%) were female patients. Ninety-four percent of the patients were married. Majority of the patients were in the age group of 61–70 years (36%) followed by 51–60 years (29.4%). Cancer was not seen among females in the age group of 11–30 years. Majority of the female cancer patients (36%) were in the age group of 51–60 years, whereas cancer in males was most commonly (40%) seen in 61–70 years. Fifty-seven percent of the patients were educated, of which 80% were female. In other words, 65% of female patients suffering from cancer in the study are educated, whereas 39% of the male patients suffering from cancer are educated. Thirty-two percent were employed at the time of the survey. Seventy-four percent of these patients had a monthly income between Rs. 5000 and Rs. 10,000, 18% had income below Rs. 5000/month, and only 8% had more than Rs. 10,000 monthly income. Overall, 77% of the cancer patients were nonsmoker and nonalcoholic. None of the female patients had any such bad habit. However, 70% of male cancer patients were found to be smokers as well as alcoholic. Thirty-eight percent of the cancer patients of Vypin receive treatment from Ernakulam General Hospital and 46% of them from private hospitals. The Regional Cancer Centre provides care for 12% of the cancer cases. Monthly follow-up is seen in 21% of the patients, whereas 14%, 18%, 23%, and 19% of them visit hospital bimonthly, quarterly, half yearly, and yearly, respectively. However, 4% of the patients do not go for follow-up [Table 1].

Most common cancer in this population was found to be breast cancer (49%) followed by intestinal cancer (11%), leukemia (7%), lung and uterine (5%), and laryngeal cancer (4.3%). The remaining 16.5% had cancers of other sites such as brain, pancreas, stomach, eye, and skin. Intestinal cancer was the most common cancer in males (21.43%) followed by lung and laryngeal cancer (14.3%). Sixty-nine percent of females were affected by carcinoma breast followed by cancer of uterus seen in 7.3% [Table 2].

Direct and indirect costs were found to be Rs. 25,606 and Rs. 8772, respectively. Overall medication cost (60%) was the most expensive cost bore by the patients followed by investigation cost (12.5%). Medication cost contributed to 81% of the average direct cost followed by investigation costs (16%). In the indirect costs, patient income loss (44%) was maximum followed by caregiver income loss (37%) [Table 3].

Statistical variations were found between direct and indirect costs incurred for cancer care between private hospitals and government hospitals. It is noted that there is a significant difference in the direct cost of care for cancer in private hospitals, whereas the indirect cost of care for cancer is significantly higher in government hospitals [Table 4].

Statistical analysis was also done to find out variation in income levels existing between populations dependent on government and private hospitals using the *F*-test and *Z*-test for two samples for variance. A significant difference was found between the income level of populations dependent on private and government institutions for cancer care. It clearly reveals that dependency on private versus government care depends on income levels, which is a pointer to issue of affordability of cancer care. A high proportion of the population (27%) reported to have sold their assets to meet the expenditure for cancer treatment.

Discussion

The study included 235 cancer patients residing in Vypin Panchayat of Ernakulam. 70.21% of them were female and 29.79% were male. Ninety-four percent of them were married. Adult males formed 26.36% and adult females formed 70.72% of all cancer cases. The rest 2.27% of all cases were formed by children. Fifth and sixth decades were the most commonly affected age groups. None of the females below 30 years of age had cancer in the study. Fifty-seven percent of the patients were educated; however, 68% of them were unemployed at the time of the survey. This was mainly because 88% of the women were homemakers. Seventy-three percent of the patients fitted to lower-middle-class family, and 19% of the cancer patients in Vypin came under poor socioeconomic status.

Seventy-seven percent of the study population was neither smokers neither alcoholic. Therefore, these habits are not the direct cause of cancer in these patients. However, such habits were found in 77% of the male population.

We found that 23% of the cases came for follow-up after 6 months. Yearly follow-up is done by 19% of all cases and 18% of them visit hospital within a gap of 3 months. The study indicated that 21% of the cases do monthly follow-up. However, 4% of these patients stop follow-up treatment because of various reasons. The main reason for this was due to the inability to manage the expense of treatment and poor socioeconomic status of people in Vypin Block Panchayat. It was also observed that some patients did not turn up for regular follow-up once the disease was completely cured and manageable. Many poor patients coming from remote areas of Vypin abandoned follow-up within a few months of completion of treatment, as it was not possible for them to attend hospital frequently due to poor socioeconomic status. They depend more on government hospitals (54%) than on private hospitals (46%); however, the difference is notably quite less. Nair *et al*. also reported that almost half of the patients opted for private health-care facilities as the first choice for cancer treatment.[9]

Table 1: Demographic characteristics of the sample population under study

Characteristics	Number of cancer patients (*n*=235)	Percentage of cancer patients	
Gender			
Male	70	29.79	
Female	165	70.21	
Marital status			
Married	220	94	
Unmarried	15	6	
		Cumulative (%)	
		Male	Female
Age gruop (years)			
11-20	3 (male 3, female 0)	4.35	0
21-30	3 (male 3, female 0)	8.70	0
31-40	3 (male 1, female 2)	10.14	1.21
41-50	24 (male 4, female 20)	15.94	13.33
51-60	69 (male 10, female 59)	30.43	49.09
61-70	84 (male 28, female 56)	69.57	83.03
71-80	39 (male 19, female 20)	97.10	95.15
81-90	10 (male 2, female 8)	100	100
Education			
Educated	135 (male 27, female 108)	57 (male 39, female 65)	
Uneducated	100 (male 43, female 57)	43 (male 61, female 35)	
Employment status			
Employed	75 (male 53, female 22)	32 (male 75, female 13)	
Unemployed	160 (male 17, female 143)	68 (male 25, female 87)	
Monthly income			
<5000	43	18	
5000-10,000	174	74	
>10,000	18	8	
Bad habits			
Smoker and alcoholic	49 (male 49, female 0)	21 (male 70, female 0)	
Alcoholic	5 (male 5, female 0)	2 (male 7, female 0)	
No bad habit	181 (male 16, female 165)	77 (male 23, female 100)	
Type of hospital visit			
Private hospital	109	46	
Ernakulam government hospital	90	38	
Regional Cancer Centre	28	12	
Other government hospitals	8	3.5	
Frequency of visit			
Monthly	50	21	
Bimonthly	33	14	
Quarterly	42	18	
Half yearly	55	23	
Yearly	45	19	
No follow-up	10	4	

Table 2: Cancer distribution among the sample population under study

Cancer type	Total number of patients (*n*=235), *n* (%)	Males (*n*=70), *n* (%)	Females (*n*=165), *n* (%)
Breast cancer	115 (49)	1 (1.43)	114 (69)
Intestinal cancer	26 (11)	15 (21.43)	11 (6.7)
Blood cancer (leukemia)	16 (7)	8 (11.43)	8 (4.85)
Uterine cancer	12 (5)	0	12 (7.3)
Lung cancer	12 (5)	10 (14.3)	2 (1.2)
Laryngeal cancer	10 (4.3)	10 (14.3)	0
Thyroid cancer	5 (2)	2 (2.9)	3 (1.8)
Others	39 (16.5)	24 (34.28)	15 (9)

Breast cancer was found to be the most common cancer (49%) in this study. Sixty-nine percent of the females in the study group had breast cancer. This was in concordance with the literature.[10] The age-standardized incidence rate of breast cancer in Kerala has been stated as 30.5 in urban areas and 19.8 in rural areas per 100,000 female population.[11] The important risk factors include nulliparity, advancing age, and family history of breast cancer.[12] In our study, we found that all the breast cancer patients were above 30 years of age, and the prevalence increased in the fifth and sixth decades. In the study, 95% of the women were unaware of performing breast self-examination. This can also lead to late presentation

Table 3: Analysis of cost of cancer care

Costs of cancer treatment	Average amount (INR)	SD (INR)
Direct cost		
Average consultation cost	168	120
Average investigation cost	4026	7887
Average medication cost (including procedure cost, where applicable)	20,709	61,645
Average cost of stay	703	4200
Average total direct cost	25,606	
Indirect cost		
Average travel cost	676	518
Average food cost	334	501
Average patient income loss	3880	15,830
Average companion income loss	600	1094
Average caregiver income loss	3282	8443
Average total indirect cost	8772	

SD=Standard deviation, INR=International normalized ratio

Table 4: Statistical analysis of direct costs and indirect costs incurred in Government hospital and Private hospital for cancer care

	Direct cost		Indirect cost	
	Government hospital	Private hospital	Government hospital	Private hospital
Mean	21,232.61905	27,425.50459	10,341.66667	6565.137615
Variance	1,220,983,021	7,478,533,543	521,371,590	46,301,180.77
Observations	126	109	126	109
Df	125	108	125	108
F	0.163265032		11.26043832	
P ($F \leq f$) one-tail	0		4.48809E-31	
F critical one-tail	0.737216745		1.361861394	

of such cases. The next common malignancy seen was intestinal cancer (11%), which was the most common cancer in males (21.43%). The main reason behind the high rate of intestinal and colorectal cancer is the consumption of meat by the residents.[10] 14.3% of the males had lung and laryngeal cancers which have been strongly associated with smoking and tobacco use.[10] As per the overall trend in thyroid cancer cases in Kerala, this area also showed increasing trend in thyroid cases (2%), with males (3%) being more commonly affected than females (2%).[13] Another cancer seen in this study worth mentioning is prostate cancer in 2% of males. It is the leading cause of cancer in males worldwide, and slowly, it is increasing in India too.[14] The cost of cancer care varies with each location and hospital even within the same geographical area. Once cancer is diagnosed, it is better to understand the treatment costs so as to plan the finances and make well-informed decisions. Knowledge of preventive measures of cancer and importance of early detection and treatment helps to reduce the cost of cancer care.

As per the World Cancer Report, the incidence rate of cancer worldwide is expected to reach about 20 million by 2030.[15] The cost of treatment of head-and-neck cancers which is the most common cancer in India is between Rs. 15,000/month and 20,000/month in government hospitals.[7] In the study done by Mohanti *et al.*, the average economic burden for a cancer patient at AIIMS, Delhi, was found to be Rs. 36,812.[16] Economic burden is calculated by adding the direct and indirect costs of treatment of cancer. In the present study, direct cost contributed 75% toward the total cost of cancer care. Overall costs of drugs (81%) followed by investigation (16%) were the main contributors toward the direct cost of illness. In this study, it was found that for

breast cancer patients, the medication cost including procedure cost (79%) where applicable and investigation cost (13%) contribute to 92% of its total economic burden. Consultation charge was the highest for pancreatic cancer (9%). Medication cost (including procedure cost, where applicable) was seen maximally in patients with stomach cancer (96%), whereas investigation cost was the highest in ovarian cancer (68%). Percentage contribution of cost of stay was found to be higher in patients suffering from tongue (11%) and prostate cancers (10%). The contribution of indirect cost is 25% of the total cost. In this study, it is evident that the income lost by the patient (44%) contributes to the largest chunk of indirect cost, with income loss of the caregiver at 37%. Average travel cost has been found to be 8% and average food cost contributing 4%. Transportation cost was higher in patients with cancer of lower extremity (16%) and spine (14%).

In the present study, the average direct cost was Rs. 25,606 and the average indirect cost was Rs. 8772. Thus, the average total cost of cancer care was calculated to be Rs. 34,378.

The national incidence and prevalence of cancer are 0.08% and 0.20%, respectively.[2,17] The prevalence of cancer in Kerala is 3.20% and that in Vypin Block Panchayat is 0.22%.[2,18]

By extrapolating the average total cost for cancer care per patient to this prevalence rate of cancer in the Vypin Block Panchayat, the economic burden is calculated at Rs. 218,256,977.

Therefore, leaving this economic impact fully on the patients also will not be feasible as in the current study the ratio of average income to average cost is skewed (income/cost 0.22). It indicates the lack of affordability for cancer care in this population. A very large gap, therefore, exits between

income levels and cost of cancer care. Even if we assume that the entire income is spent on cancer care (which cannot be the case), there is a vast gap between affordability and cost of treatment and care which clearly necessitates a definite policy intervention. The average income was found to be Rs. 7419.15, and if we expect 20% of it to be spent on cancer care, there remains a huge deficit amounting to Rs. 208,836,438. This calls for an interventionist mass insurance policy in which government and private hospitals need to be partners in making this care affordable. Other means could include a community funding scheme or a corpus creation that would ensure that the complete economic burden does not fall on patients alone.

Looking at age- and gender-wise economic burden, although the most common age group affected in females was 51–60 years, the cost burden is the highest in the 41–50 years age group (Rs. 228,438) followed by 31–40 years (Rs. 142,973). Similarly, in males, the highest economic burden was found to be in the 71–80 years (Rs. 449,690) followed by 50–60 years age group (Rs. 303,135).

The current study also shows that there exists a significant statistical difference between the income level of populations dependent on private and government institutions for cancer care. A clear dependency on private versus government care depends on income levels, which is a pointer to the issue of affordability of cancer care.

Significant statistical variations were also found between direct and indirect costs incurred for cancer care between private hospitals and government hospitals. Private hospitals need to look at reducing indirect cost. This points to the greater need for a joint working between government and private hospitals in reducing the cost of cancer care. The difference as seen in the study is currently to the tune of 33%. A high proportion of these patients (27%) reported to have sold their assets. This will also obviously have social consequences. It has been reported in different studies that a significant number of such patients become poor due to the increasing health-care costs.[19,20] In their study, Mahal *et al*. stated that 50% of households with a cancer patient have huge monthly spending.[21] In India, public expenditures on cancer remain to be $10/person (as compared with more than $100/person in high-income countries with an equal number of cancer patients). One of the greatest threats to cancer patients and their family members in India is the out-of-pocket payments that account for more than 75% of cancer expenditure.[22] A study done by Goyal *et al*. found that the cost incurred in the treatment of Stage 1 and Stage 2 patients of oral cancer did not vary much, but the cost for Stage 3 patients was significantly high.[23] Lower mean income levels reported in the present study obviously correlate the need for cancer care and economic support for the nonincome/low-income group, as the study reports larger prevalence among lower income groups/lower stratum of the society. It is also important to understand the costs associated with early detection of cancer to determine the fiscal implications of government-funded screening programs and health insurance plans. Authors also would like to stress the fact that according to this study, a larger prevalence of cancer is seen in females, and therefore, any policy formulation on the above lines needs to take into consideration this gender ratio.

Conclusion

Breast cancer is the most common cancer in Vypin Block of Ernakulam. Health workers need to ensure that the residents of this area are more aware about the various cancer screening programs and the healthy lifestyle changes, which can prevent cancers. The economic burden of cancer in the area is also very high. The incidence of a particular cancer may be low in an area, but its impact on the economic burden might be high. As most of the people are in the lower middle class, adequate measures are needed to keep a check on the cost of cancer therapy, particularly cost of medications. The social health insurance schemes should be more effective in reaching out to more number of people and also increasing their limit. There is a need for joint ventures by government and private sectors to make the treatment affordable. The authors strongly recommend that additional funds should be allocated in the budget for drug and disposables support for poor patients; promote setting up of super specialty hospitals in all states by reducing cost of land, electricity, water and taxes, furniture, equipment, drugs and disposables; and promote emergence of new health institutions and ensure high-quality care at affordable cost.

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Conflicts of interest
There are no conflicts of interest.

References

1. Indian Council of Medical Research. Publications. Available from: http://www.icmr.nic.in/Publications/Publications.html. [Last accessed on 2018 Jan 29].
2. Indian Council of Medical Research. Based on Cancer Incidence Report (2009-2011) and the Report on Time Trends in Cancer Incidence Rates (1982-2010). Bangalore: NCDIR-NCRP (Indian Council of Medical Research); 2013.
3. Indian Council of Medical Research. Based on Cancer Incidence Cases and Pooled M/I Ratio of Mumbai Data (2009-2011) Report. NewDelhi: National Cancer Registry Programme of Indian Council of Medical Research; 2014.
4. Zafar SY, Peppercorn JM, Schrag D, Taylor DH, Goetzinger AM, Zhong X, *et al*. The financial toxicity of cancer treatment: A pilot study assessing out-of-pocket expenses and the insured cancer patient's experience. Oncologist 2013;18:381-90.
5. Brooks J, Wilson K, Amir Z. Additional financial costs borne by cancer patients: A narrative review. Eur J Oncol Nurs 2011;15:302-10.
6. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: A multicountry analysis. Lancet 2003;362:111-7.
7. Guilford JP, Fruchter B. Fundamental Statistics in Psychology and Education. 5th ed. New York: McGraw-Hill; 1973.
8. An Annotated Cost Questionnaire for Completion by Patients by Sally Thompson and Sarah Wordsworth On Behalf of the UK Working Party on Patient Costs HERU Discussion Paper No. [03/01]. Available from: https://www.abdn.ac.uk/heru/documents/BP/HERU_Discussion_paper_03-01.pdf. [Last accessed on 2018 Feb 14].
9. Nair KS, Raj S, Tiwari VK, Piang LK. Cost of treatment for cancer: Experiences of patients in public hospitals in India. Asian Pac J Cancer Prev 2013;14:5049-54.
10. Regional Cancer Centre. Hospital Cancer Registry 2013 Regional Cancer Centre, Thiruvananthapuram. Trivandrum: Regional Cancer Centre; January, 2014. Available from: http://www.rcctvm.org. [Last accessed on 2018 Feb 14].
11. Jayalekshmi P, Gangadharan P, Mani KS. Cancer in women in Kerala – a transition from a less-developed state. Asian Pac J Cancer Prev 2006;7:186-90.
12. Augustine P, Jose R, Peter A, Lal AA, Prabhakar J, Sreedharan J, *et al*. Risk factors of breast cancer in Kerala, India- a case control study. Acad Med J 2014;2:7-13.

13. Mathew IE, Mathew A. Rising thyroid cancer incidence in Southern India: An epidemic of overdiagnosis? J Endocr Soc 2017;1:480-7.
14. Hassanipour-Azgomi S, Mohammadian-Hafshejani A, Ghoncheh M, Towhidi F, Jamehshorani S, Salehiniya H. Incidence and mortality of prostate cancer and their relationship with the human development index worldwide. Prostate Int 2016;4:118-24.
15. World Health Organization, International Agency for Research on Cancer. World Cancer Report. Geneva: World Health Organization; 2008.
16. Mohanti BK, Mukhopadhyay A, Das S, Sharma K, Dash S. Estimating the Economic Burden of Cancer at a Tertiary Public Hospital: A study at the all India Institute of Medical Sciences, Discussion Paper; 2011. p. 11-09.
17. International Agency for Research on Cancer. Cancer Incidence and Mortality Worldwide: IARC Cancer Base No 11. Lyon, France: International Agency for Research on Cancer; 2013. Available from: http://www.globocan.iarc.fr. [Last accessed on 2018 Mar 10].
18. Amma JP, Paul S. Burden of cancers – Registry based data from Kerala, India. J Health Syst 2016;2:3-7. Available from: http://www.journals.publishmed.com/index.php/JHS/article/view/100>. [Last accessed on 2018 Sep 19].
19. Dror DM, van Putten-Rademaker O, Koren R. Cost of illness: Evidence from a study in five resource-poor locations in India. Indian J Med Res 2008;127:347-61.
20. Kulkarni BB, Hiremath SV, Kulkarni SS, Hallikeri UR, Patil BR, Gai PB. Decade of breast cancer-trends in patients profiles attending tertiary cancer care centre in South India. Asian J Epidemiol 2012;5:103-13.
21. Mahal A, Karan A, Engelgau M. The Economic Implications of Non-Communicable Diseases for India. Washington, D.C.: World Bank; 2010.
22. Jain M, Mukherjee K. Economic burden of breast cancer to the households in Punjab, India. Int J Med Public Health 2016;6:13-8.
23. Goyal S, Tiwari VK, Nair KS, Raj S. Risk factors and costs of oral cancer in a tertiary care hospital in Delhi. Asian Pac J Cancer Prev 2014;15:1659-65.