The economic cost of cancer treatment in Iran

Alireza Jabbari[1], Marziye Hadian[2], Elaheh Mazaheri[3], Zahra Khakdel Jelodar[2]

Abstract:

BACKGROUND: With more than 12 million new cases of cancers and nearly 7.6 million deaths worldwide in 2020, cancer is currently the third leading cause of mortality in the world. The costs spent on treating patients with cancer account for a significant amount of healthcare costs. Healthcare expenditures for cancer treatment have also increased significantly and are projected to skyrocket further over the next decade. This study was conducted to determine medical and non-medical direct costs for the prevention of cancer in patients hospitalized in 10 selected educational hospitals in Iran.

MATERIALS AND METHODS: The study employed a cross-sectional design and was conducted in 10 selected educational hospitals in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz in 2020. Using a researcher-made questionnaire, we assessed direct medical costs and direct non-medical costs of cancer in patients over 20 years old with kinds of breast, prostate, leukemia, lymphatic, stomach, liver, lung, bladder, uterine, and intestine cancers who undertook oncology treatments ($n = 2410$). Data were analyzed using descriptive statistics including mean and standard deviation and analytic statistics such as Kolmogorov–Smirnov, analysis of variance, and t-test, using SPSS 18 and $P \leq 0.05$.

RESULT: The mean direct non-medical cost paid out of pocket per month was $99.6 ± $10.81 USD, and the mean direct medical cost per month was $1029.4 ± $68.5 USD. The total cost paid by the patients was $889.4 ± 69.81 USD per month.

CONCLUSION: Given the increasing number of patients with cancer, it is necessary to increase the number of special centers for the prevention and treatment of cancers. Dissemination of information about the costs of illnesses and their complications enables decision-makers to make a proper comparison between different uses of resources. Moreover, to support the patients, the health system must implement plans to decrease out-of-pocket payments by patients.

Keywords:

Cancer, direct medical costs, direct non-medical costs, economic cost, Iran

[1]Associate Professor, Health Services Management, Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran, [2]Student Research Committee, Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran, [3]Health Information Technology Research Center, Student Research Committee, Department of Medical Library and Information Sciences, School of Management and Medical Information Sciences, Isfahan University of Medical Sciences, Isfahan, Iran

Address for correspondence:
Dr. Zahra Khakdel Jelodar, Student Research Committee, Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan 81746-73461, Iran.
E-mail: jabbaria@mng.mui.ac.ir

Received: 24-06-2021
Accepted: 01-08-2022
Published: 31-01-2023

Introduction

Nearly 20 million people from around the world are currently living with cancer, which will probably exceed 30 million people by 2020.[1] Currently, cancer accounts for about 13% of all deaths worldwide, and of all patients with cancer; about 60% die regardless of their gender. It is estimated that over 70,000 new cases of cancer annually occur in Iran, and about 30,000 patients die from cancer annually.[2] Cancer has a significant impact on individuals and communities and results in a complex network of physical, mental, family, and social problems affecting human and social factors.[3]

Cancer treatment is an essential and vital medical process; however, treatment procedures that are used for treating patients with cancer are usually invasive, severe, and require many resources. Cancer treatment is very costly; it not only threatens the patient's life and well-being but also can endanger the financial security of the patient.[4] The cost of treating patients with cancer is provided by out-of-pocket payments, medical insurance schemes, or cash aid from social and welfare service

How to cite this article: Jabbari A, Hadian M, Mazaheri E, Jelodar ZK. The economic cost of cancer treatment in Iran. J Edu Health Promot 2023;12:32.

providers.[5] Regardless of the type of cancer, every type of cancer in the world incurs a treatment cost of about two to three thousand dollars per month.[6] The costs of diagnosis and treatment of patients with cancer, the costs of drugs, and in particular, the chemotherapy drugs account for a large proportion of the costs spent by both inpatients and outpatients.[7]

Cancer-related costs generally include direct costs, indirect costs, and mental costs. Direct costs include medical direct costs, non-medical direct costs, and costs associated with the patient's lost time.[8] Part of the medical direct costs includes costs spent on medical and hospital services, healthcare activities, the purchase of specialized equipment, facilities, food and nutritional supplements, home nursing services, revisits, alternative treatments, counseling, physiotherapy, and laboratory services. Moreover, part of the non-medical direct costs includes the costs spent on travel, accommodation, food, telephone, recruitment of servants for housekeeping, caring for the children by a nurse, parking, and patient's clothing.[9]

Moreover, part of the indirect mental costs associated with cancer includes costs effective in production, declining productivity, work absences (short- and long-term), and early death; moreover, it might also include costs spent on transportation, travel, unusual treatments, and even costs spent on fuel.[10] The costs spent on treating patients with cancer account for a significant amount of healthcare costs. These types of patients have a long length of stay in treatment centers, and it significantly increases the cost of treatment for these patients.[11] Chemotherapy, surgery, and diagnostic services are costlier than other costs imposed on patients; furthermore, patients coming from other cities to seek treatment services face additional costs, such as travel, accommodation, and food costs.[3] Such costs limit the access to effective services, especially for cancer patients who live away from the focal cancer treatment centers.[12]

In a cross-sectional study by Farokhi *et al*.,[10] entitled the "study of costs of cancer in Kerman" reported the most costly cancer was breast cancer and the least costly cancer was male reproductive organ cancer. In a cross-sectional descriptive analytical study entitled the "study of medical and non-medical direct costs of cancer patients admitted to the cancer center of Imam Khomeini Hospital in Tehran in 2010," the mean medical and non-medical direct costs paid out of patients' pocket during the initial treatment were 20,609,000 and 2450,000 IRR, respectively.[8] In the study by Longo *et al*.[13] breast cancer patients spent a larger amount of monthly out-of-pocket payments than those with colorectal, lung, and prostate cancers. In addition, patients with breast cancer also suffered from a larger financial burden, as compared with other patients (31% vs. 17%). Langa

et al.[14] reported in the cohort study that the annual out-of-pocket payment for groups 1, 2, and 3 was $1210, $1,450, and $1,880, respectively. Low-income people under treatment spent about 27% of their annual income on out-of-pocket payments. However, only 5% of the annual income of high-income people without cancer was spent as out-of-pocket payments.

Cancer has many direct and indirect costs and such costs have a significant impact on health policymaking. Although some studies tried to record, detect, or diagnose various cancers in different provinces or in the whole country, most of the reported studies have focused on the cost of only one type of cancer and they have all faced some similar limitations.[10] Therefore, the present study aimed to investigate and compare medical and non-medical direct costs spent as out-of-pocket payments by cancer patients admitted to 10 selected hospitals in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz, Iran; it was also aimed to identify the factors affecting the costs and their rates.

Materials and Methods

Study design and setting
This study was a descriptive cross-sectional study that was conducted from April to July 2020 in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz University of Medical Sciences, Iran.

Study participants and sampling
The study population included all cancer patients aged over 20 years old with different types of cancers (breast, prostate, blood, lymph nodes, stomach, liver, lung, bladder, uterus, and intestine) who were actively under treatment in 10 selected educational hospitals in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz ($n = 2410$). Confidentiality was kept by putting no name or other personal information in the questionnaires. The questionnaire was completed on the day of discharge through a personal interview with the patient or his/her companion. It should be noted that all questions asked from the patients were related to the month before the interview; in total, 2500 questionnaires were distributed; 90 questionnaires were removed due to incompleteness and finally 2410 complete questionnaires were obtained. The overall response rate for inclusion in the analyzes is 96.4%.

Data collection tool and technique
For data collection, the research team initially developed a questionnaire in two parts after an extensive review of the relevant literature to achieve good content validity. We developed the questionnaire In Persian to reconcile study issues and concepts culturally and linguistically for Persian-speaking study participants and also due

to the lack of a currently validated questionnaire. The questionnaire included questions about the demographic characteristics of patients, the general health status of patients, insurance coverage, occupational status, income status, the amount of income lost for the treatment of the disease, type of treatment ward, the status of non-medical direct costs, the status of medical direct costs. The main objective of this questionnaire was to determine the costs patients directly paid from their pockets to treat their cancer during the procedure of treatment in a month.

The content validity of the questionnaire was approved by 10 professors of the Tabriz, Tehran, Isfahan, Mashhad, and Shiraz University of Medical Sciences. Also, the reliability of the questionnaire was determined with internal consistency and infraclass correlation coefficients (ICCs). Cronbach's alpha coefficient was 0.87, and ICC was used to establish the test–retest reliability of the questionnaire over an interval of 2 weeks using two-way mixed ICCs for absolute agreement at the level of individual items. Its results were interpreted as follows: 0.0-0.2 as low, 0.21–0.40 as fair, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1 as almost perfect.[15] To assess the suitable sample size for the test–retest reliability, power analysis was performed. The power analysis identified that a sample of 30 was required to have a power of 0.80 to detect a test–retest correlation of 0.90.

Data analyses

The collected data were analyzed by SPSS 18 software through descriptive statistics (mean, frequency, and standard deviation) and by analytical statistics including the Kolmogorov–Smirnov test was conducted to indicate that the data were sampled from a population with a normal distribution, one-way analysis of variance (ANOVA), and t-test.

Ethical consideration

Participation in this research was voluntary, and the confidentiality of the data was ensured.

Results

A total of 2410 patients were included in the study; 959 patients (39.8%) were between 20 and 40 years old and 60 patients (2.5%) were over 80 years old. Of all, 1547 patients (64.2%) were married. Moreover, 549 patients (22.8%) were living in Tehran, 446 patients (20.9%) were living in Shiraz, 501 patients (19.8%) were living in Tabriz, and 446 patients (18.5) were living in Mashhad and 434 patients (18%) were living in Isfahan. Of all, 790 patients (32.8%) were admitted to the general ward of the hospital, 395 patients (16.4%) to the blood diseases ward, 851 patients (35.3%) to the chemotherapy ward, and 374 patients (15.4%) to the radiation therapy ward. Furthermore, 528 patients (21.9%) were illiterate, 1294 patients (53.7%) had a high school diploma or lower, and the rest had a higher education degree. Other demographic characteristics are shown in Table 1.

As shown in Figures 1 and 2, the seven factors that had the highest share in the total out-of-pocket payment in

Table 1: Demographic characteristics of cancer patients

	Number	Percentage	Demographic characteristics	Number	Percentage
Sex			Living location		
Man	1164	48.3	Tehran	549	22.8
Female	1246	51.7	Shiraz	504	20.9
Age status			Tabriz	477	19.8
20-30	540	22.4	Mashhad	436	18.5
31-40	419	17.4	Isfahan	444	18.4
41-50	359	14.9	Number of household members		
51-60	419	17.4	1-5 people	1834	76.1
61-70	407	16.9	6-10 people	564	23.4
71-80	205	8.5	<10	12	0.5
80<	61	2.5	Name of admission ward		
Marital status			General	790	32.8
Married	1547	64.2	Blood diseases	395	16.4
Single	576	23.9	Chemotherapy	851	35.3
Divorced or widowed	287	11.9	Radiotherapy	374	15.4
Head of Household			Education level		
Father	1711	71	Illiterate	528	21.9
Mother	482	20	Diploma and sub-diploma	1294	53.7
Others	217	9	Undergraduate and Bachelor	492	20.4
Region					
City	1784	74	MA	72	3
Rural	626	26	Ph.D. and higher	24	1

patients living in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz were chemotherapy (31%), radiation therapy (15%), surgery (12%), laboratory services (11.5%), bone marrow transplantation (11.2%), medicine (5.8%), and MRI (3.5%); however, in patients living in rural areas, the seven most important factors were chemotherapy (26.3%), surgery (14.8%), radiation therapy (12.5%), medicine (8.2%), travel (7%), accommodation and food (6.2%), and laboratory services (5.9%).

The result shows that the mean direct non-medical cost paid out of pocket per month was $99.6 ± $10.81 USD and the mean direct medical cost per month was $1029.4 ± $68.5 USD. The total cost paid by the patients was $889.4 ± 698.1 USD per month. The mean direct non-medical cost and direct medical cost, as well as the mean total costs, are shown in Table 2.

In general, patients were classified into 10 cancer groups. Leukemia and colon cancer, respectively, were the most prevalent and the least prevalent types of cancer among the patients. This table also shows the mean direct medical cost and direct non-medical costs and the mean total cost of each group of cancer. There were no significant differences between the total mean costs of different types of cancers (*P*-value = 0.05). Moreover, there was no significant relationship between costs and type of cancer (*P*-value = 0.5), as shown in Table 3. Among the studied cancers, blood cancer with a mean total cost of $1146 USD and bladder cancer with a mean total cost of $692 USD, respectively, were responsible for the highest and lowest amounts of out-of-pocket payments, as shown in Table 3.

Discussion

Cancer treatment is a significant driver of healthcare costs worldwide. It is quite hard to fight the cancer. Patient not only suffers financially but also emotionally. So, he or she needs best cancer treatment at a very reasonable cost. Based on the results of this study, overall, the mean direct medical costs were higher than the mean direct non-medical costs spent by the patients, which is mainly attributed to the high costs of chemotherapy, Radiation Therapy and Surgery. In addition, the costs spent on chemotherapy, radiation therapy, and laboratory services, respectively, in patients living in city accounted for 31%, 15%, and 12% of the total costs and were higher than the costs spent by patients living in rural. As stated, chemotherapy and radiation therapy were the costliest factors in patients living in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz; this might be attributed to the fact that almost all studied patients were in the early stages of their treatment. In general, according to the routine standards of treatment for these patients, chemotherapy and radiation therapy were performed for almost all of
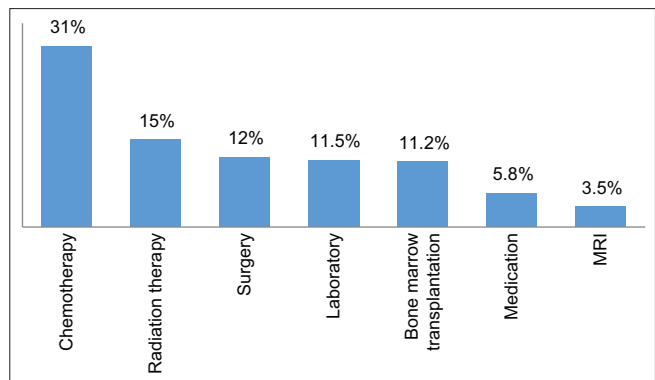

Figure 1: Seven factors with the highest share in total out-of-pocket payments by patients living in Urban areas
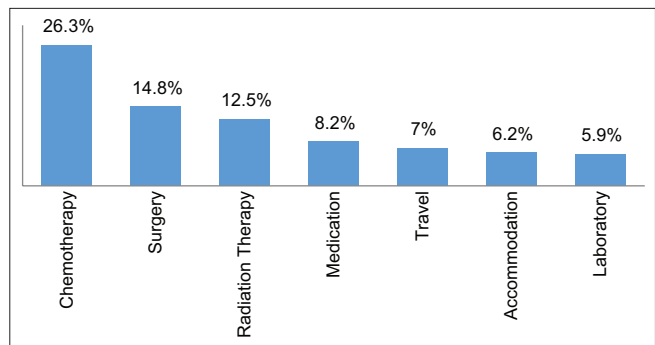

Figure 2: Seven factors with the highest share in total out-of-pocket payments by patients living in rural areas

Table 2: Mean costs of cancer

Cost type	Average cost (USD)
Direct non-medical costs	$99.6 ± $10.81
Direct medical costs	$1029.4 ± $68.5
Total	$889.4 ± 69.81

them. However, the high cost of chemotherapy drugs and the numerous rounds of using this medication are considered as a major cause of the high financial burden on the patients.

In a study by Bazyar *et al*.,[8] the costs of chemotherapy spent by patients living in Tehran and other cities, respectively, accounted for 48% and 34% of the total costs and formed the highest share of patients' out-of-pocket payments. Moreover, there was a significant difference between the costs of chemotherapy spent by patients in Tehran and the costs spent by patients living in other cities, and this difference was statistically significant. In a study by Gordon *et al*.,[16] the costs spent by patients under radiation therapy were significantly higher ($5,135). Therefore, the results of the mentioned studies are consistent with the results of this study.

The results of the present study showed that the cost of medications was another high-cost factor in all of patients living in urban and in rural areas. The high

Table 3: Mean direct medical costs and direct non-medical cost spent by cancer patients by cancer groups (USD)

Type of cancer	Number and percentage	Mean non-medical direct costs	Mean medical direct costs	Mean total out-of-pocket payments	One-way ANOVA
Breast	467 (19.4%)	89.9±11.9	738.9±55.85	828.4±59.92	P<0.05
prostate	229 (9.5%)	90.7±6.94	720.3±65.2	811.1±25.38	
Blood	730 (30.3%)	102±11.3	1044±90.8	1146±91	
Lymph nodes	169 (7%)	190±15.4	806±41.6	996±44.2	
Stomach	157 (6.5%)	141±19	871±48.8	1012±47.1	
Liver	189 (7/8%)	67±6.2	822±55.8	889±55.9	
Lung	189 (7/8%)	67±6.3	940±89	1007±88.9	
Bladder	96 (4%)	26±6.7	665.4±46.93	692±51	
Uterus	96 (4%)	138±12.7	891±72.8	1029±84.3	
Intestine	84 (3.5%)	84±4.3	759±35.5	843±36	

costs of medications might be attributed to the import of some drugs, the scarcity of drugs, especially drugs for cancer patients, and the impact of inflation on the cost of drugs. In a study by Langa *et al*.,[17] the annual drug cost was $120, and it was one of the main factors increasing the total costs spent by patients. In Gordon *et al*.'s[16] study, the drug cost was $823, and it was considered as a high-cost item.

Moreover, the cost spent on laboratory services was considered one of the most expensive items in urban areas. The patients living in urban areas spent more money on this item than other patients; this finding might be attributed to the accessibility of private laboratories in urban areas, which motivates them to receive such services more prevalently. However, because a large number of laboratory tests for cancer patients are not available in public laboratories, cancer patients inevitably refer to laboratories owned by the private sector. In Bazyar *et al*.'s[8] study, the use of diagnostic services (laboratory, radiology, endoscopy, and colonoscopy) by patients living in other cities (18%) was higher than the use by patients living in Tehran (8.6%). In a study by Farokhi *et al*.,[10] the cost of diagnostic services accounted for about 65% of the total out-of-pocket payments. In Gordon *et al*.'s[16] study, the mean estimated cost of diagnostic tests was $869, which was one of the costliest items.

The results of the present study indicated that among the studied cancers, blood and bladder cancer were responsible for the highest and lowest amounts of out-of-pocket payments. In Farokhi *et al*.'s[10] study, the costliest and least costly cancers, respectively, were breast cancer and male reproductive organ cancers with monthly mean costs of 4.3 and 2.6 million IRR. In the study by Gordon *et al*.,[16] breast cancer with a mean cost of $5469 and reproductive organ cancer with a mean cost of $2168 were the costliest and least costly types of cancer, respectively.

In the present study, patients with leukemia (*n* = 730) were the largest group of cancer patients. In studies by

Longo *et al*. and Gordon *et al*., breast cancer was observed in 74 and 139 patients, respectively, and was the most prevalent type of cancer.[4,16]

The results of the present study indicated there was no significant difference between the mean total cost of the studied types of cancer (*P*-value = 0.05). In addition, no significant relationship was found between the costs and the types of cancer (*P*-value = 0.5). In Farokhi *et al*.'s[10] study, there was no significant relationship between the cost of cancer and the type of cancer, and therefore, their finding is consistent with the results of our study. In Longo *et al*.'s[18] study, there was a significant correlation between the type of cancer and its costs, and this finding is inconsistent with the result of the present study.

The results showed the mean estimated total cost spent by cancer patients in this study was $889.4 USD. In Farokhi *et al*.'s[10] study, the mean total out-of-pocket payment for each cancer patient was $1.2 million per month. In Gordon *et al*.[16] study, the total cost of cancer was $1.8 million, and the mean total cost spent by cancer patients was $4,826. In Longo *et al*.'s study, the total cost of breast cancer was $393, and the cost of each of colorectal, lung, and prostate cancer was $149.[18] In Bazyar *et al*.'s[8] study, the estimated mean costs of medical and non-medical direct out-of-pocket payments by patients during the initial treatment were 20,609,000 and 2,450,000 IRR, respectively. In another study by Longo *et al*., the mean monthly cost of out-of-pocket payment was $312.[4]

Limitation and recommendation
Cancer patients face direct and indirect healthcare during their treatment. Given the fact that 10 selected educational hospitals in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz are state hospitals and usually the patients referring to it are poor and low-income groups in the community, this volume seems to be very heavy in paying for pocket money, putting a lot of pressure on the patient and families. They bring in more than half of the patients with catastrophic costs, and their

continued treatment leads to borrowing. Apart from these costs, rural patients were faced with additional costs, including travel, accommodation, and meals for additional expenses, which make it difficult to access effective services, especially for cancer patients who live far away from cancer treatment centers.

Therefore, it is necessary to adopt new policies in the insurance plans regarding the ones that impose the highest costs on patients. To remove the financial barriers ahead of them, cancer patients who receive treatment for them more than other diseases are not delaying their treatment due to their inability to finance or the high cost of drugs.

In this regard, insurance companies must fully cover healthcare for cancer patients to prevent the families from suffering from the cost of living and will lead to the achievement of the goal of the health system, which is to achieve health for the community. Also, access to financing of pockets of justice by reducing the amount of money needs to be provided.

The estimation of these costs can help governmental policymakers in treating cancer patients, help insurance organizations in providing insurance services, improve patients' access to the service, and promote overall health in the community.

Conclusion

Therefore, it is suggested to increase the number of special centers for cancer prevention and treatment to cover the huge volume of cancer patients in Tabriz, Tehran, Isfahan, Mashhad, and Shiraz University of Medical Sciences. Insurance companies must fully cover healthcare for cancer patients in order to prevent the families from suffering from the cost of living, which will lead to the achievement of the goal of the health system, which is to achieve health for the community.

In addition, the related organizations must provide people with further training to reduce the incidence of cancer in the community. Moreover, the health system must pay special attention to these patients and adopt other supportive measures to reduce the patients' share of the payment, especially the share of out-of-pocket payments.

Conflicts of interest
There are no conflicts of interest.

References

1. Hadian M, Mazaheri E, Jabbari A. Strategic purchasing and the performance of health-care systems in upper middle income countries: A comparative study. J Educ Health Promot. 2021 Mar 31;10:84. doi: 10.4103/jehp.jehp_290_20.
2. Busco S, Buzzoni C, Mallone S, Trama A, Castaing M, Bella F, *et al*. Italian cancer figures--Report 2015: The burden of rare cancers in Italy. Epidemiol Prev 2016;40 (1 Suppl 2):1-120.
3. Hajat C, Kishore SP. The case for a global focus on multiple chronic conditions. BMJ Global Health 2018;3:e000874.
4. Hadian M, Jabbari A, Mazaheri E. What must Iran do for Palliative care? A systematized review. J Educ Health Promot. 2020 Oct 30;9:276. doi: 10.4103/jehp.jehp_107_20.
5. Pisu M, Azuero A, Benz R, McNees P, Meneses K. Out-of-pocket costs and burden among rural breast cancer survivors. Cancer Med 2017;6:572-81.
6. Jabbari A, Jafari A, Hadian M, Ghasemi M. Model-based Cost-effectiveness Analysis of Atorvastatin Drugs for Prevention of Cardiovascular Diseases in Iran. Int J Prev Med. 2020 May 19;11:57. doi: 10.4103/ijpvm.IJPVM_578_18.
7. Narang AK, Nicholas LH. Out-of-pocket spending and financial burden among medicare beneficiaries with cancer. JAMA Oncol 2017;3:757-65.
8. Bazyar M, Akbari F, Mahmoudi M. Medical and non-medical direct costs of cancers in patients hospitalized in Imam Khomeini cancer institution-2010. J Hosp 2012;11:39-50.
9. Pisu M, Azuero A, McNees P, Burkhardt J, Benz R, Meneses K. The out of pocket cost of breast cancer survivors: A review. J Cancer Survivorship 2010;4:202-9.
10. Bahmei J, Rahimi H, Jafari A S, Habibyan M. Examination of medical and non-medical direct costs of outpatients and hospitalized cancer patients in Shiraz, Iran. Payesh 2015;14 :629-37.
11. Rezaei S, Akbari Sari A, Woldemichael A, Soofi M, Kazemi A, Karami Matin B. Estimating the Economic Burden of Lung Cancer in Iran. Asian Pac J Cancer Prev 2016;17:4729-33.
12. Eisavi M, Mazaheri E, Rezapour A, Vahedi S, Hadian M, Jafari A. The Cost-Effectiveness and Cost-Utility of Statin Drug for the Treatment of Patients with Cardiovascular Disease, A Systematic Review. Int J Prev Med. 2021 May 15;12:39.
13. Longo CJ, Fitch M, Deber RB, Williams AP. Financial and family burden associated with cancer treatment in Ontario, Canada. Support Care Cancer 2006;14:1077-85.
14. Pashaei Asl Y, Faraz Allah Bike Nouri M, Mousayi E, Khakdel Jelodar Z, Mohammadi M, Ghanbari Ghozhikali M, *et al*. Managerial evaluation of defending natural disasters maneuver (A case study of Tabriz maneuver in October 2013). International Journal of Pharmacy and Technology 2015;7:9088-95.
15. Hadian M, Mozafari MR, Mazaheri E, Jabbari A. Challenges of the Health System in Preventing Non-Communicable Diseases; Systematized Review. Int J Prev Med. 2021 Jun 25;12:71. doi: 10.4103/ijpvm.IJPVM_487_20.
16. Gordon LG, Ferguson M, Chambers SK, Jeff D. Fuel, beds, meals and meds: Out-of-pocket expenses for patients with cancer in rural Queensland. Cancer Forum 2009;33:202-8.
17. Langa KM, Fendrick AM, Chernew ME, Kabeto MU, Paisley KL, Hayman JA. Out-of-pocket health-care expenditures among older Americans with cancer. Value Health 2004;7:186-94.
18. Longo C, Bereza B. A comparative analysis of monthly out-of-pocket costs for patients with breast cancer as compared with other common cancers in Ontario, Canada. Curr Oncol 2011;18:e1-8.