

The Patients' Cost Analysis for Eye Care Services: An Investigation in Hospitals of Tehran

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Abstract

Introduction: The costs of the eye care services are considered as one of the most important obstacles to timely diagnosis and treatment of eye disorders, but there is little evidence about patients' cost for receiving these services. This paper aimed to investigate the costs paid by patients for eye care services in Tehran hospitals.

Methods: 346 patients referring to ophthalmology wards of Tehran's educational hospitals were selected through convenient sampling method. The data were extracted through researcher-made checklist and investigating the hospital bills in 2017. Then, they were analyzed using descriptive statistics methods, as well as Mann-Whitney and Kruskal Wallis tests in SPSS 21.

Results: The share of hospital bills, informal payments like bought & brought goods, and non-medical costs were 32.8%, 1.85%, and 66.06%, from the total cost paid by patients, respectively. Further, 10.24%, 83.1%, and 6.85% of medical costs were paid by patients, insurance organizations, and government, respectively. Age ($P=0.008$), type of basic insurance ($P=0.000$), and the type of the treated disorder ($P=0.000$) affected the patients' medical costs. On the other hand, the level of income ($P=0.001$) and place of residence ($P=0.001$) variables caused significant differences in the total costs paid by patients.

Conclusion: The patients' out-of-pocket payments for ophthalmology services are evaluated as reasonable. Nevertheless, a large share of the total costs paid by patients was non-medical ones. Improving equity in geographical access to ophthalmology services across regions of the country can reduce non-medical costs and increase the possibility of benefiting from the needed ophthalmology services for all population.

Keywords: Medical costs, Non-medical costs, Out-of-pocket payment, Vision impairment, Eye care services.

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Background

Despite of recent advances in improving health indicators in the world (1), evidence demonstrated that more than 1 billion people all over the world live with some form of disability (2). One of the important parts of this disability spectrum is blindness (3). Estimations suggested that 36 million people were blind and 216.6 million people were suffering from moderate to severe vision impairments in the world (4). Eye diseases are placed in the 14th and 11th ranks in terms of Disability-adjusted life year (DALY) in the world and developing countries, respectively. There are different statistics on the prevalence of blindness in Iran, ranging from 0.39 to 6.9 per million population (5). According to estimations of global burden of diseases in a study

conducted in 2016, Iran with a prevalence rate of 584 blind persons per 100,000 population stood in the 22nd rank in the world (6)

Blindness increases the rate of unemployment, higher levels of poverty, and hunger. It also limits the access to education and other opportunities (3). Furthermore, it negatively influences the quality of life (7-9). Finally, its financial burden is considerable for both the person and society, because of the damage caused by the loss of productivity as well as other direct and indirect costs (10).

Some of the most important causes of blindness in the world are known as un-operated cataracts, uncorrected refractive errors, and glaucoma. On the other hand, uncorrected refractive errors, un-operated cataracts, age-related macular degeneration,

glaucoma, and diabetic retinopathy are the major causes of moderate to severe vision impairment (11). One of the public health challenges is that if these disorders were diagnosed at early stages, more than 80% of these diseases as well as vision disorders through the current available ophthalmology treatments would be reversible or even preventable (12, 13). However, the costs of the eyes care taking are considered as the obstacles to achieving these cares (14-16).

Acquiring knowledge about the factors involved in increasing vision impairment and blindness is the prerequisite for success in prevention, and also for implementing appropriate plans about health policies (13). Absence of economic development in a society is one of the underlying factors for eye disorders because poverty leads to a diminished access to healthcare (3, 17). Recent estimations showed that 90% of those affected by eye disorders were living in the poorest countries (3). Prevalence of blindness in the lowest socioeconomic group is nine times larger than that in individuals belonging to the top socioeconomic group (18). In Iran, studies performed in Varamin and Shahroud cities have indicated that the chance of people with a poor socioeconomic status to confront blindness and impaired vision is two and three times larger than that for individuals with a good socioeconomic status (19, 20).

Affording the health care payments or financial protection is among the most controversial issues associated with access to healthcare in developing countries (17, 21). We realize financial protection when direct payments for receiving healthcare do not predispose persons to financial difficulty and do not threaten their standards of living (22). The payments of consumers through heterogeneous reduction of healthcare use by poor groups of the society, and delay in searching for healthcare services by those who are living in poverty increase inequality in access to healthcare (23). In Iran, health financing and benefiting from health care has been emphasized in national plans and is one of the social preferences. Nevertheless, studies have indicated that the current government has not been able to achieve these objectives as well as the previous ones (24, 25). Families claim a large share in financing of health care costs in Iran. In 2013, the out-of-pocket expenditure was 51.06% as a percentage of current health expenditure in the country. And it reduced to 39.66% in 2015 with the implementation of the health transformation plan from 2014. However, this value is still higher than that of upper-middle income countries (32.22%) and the world (31.65%) (26).

This research has been designed with the aim of investigating the patients' costs for treating vision disorders in educational hospitals of Tehran to create an image of the families' financial accessibility to these cares in the society.

Methods

The present descriptive and analytical study was performed in 2017. The research population consisted of all patients referring to ophthalmology wards of Tehran educational hospitals. Using the sample size formula and concerning the confidence level of 95%, and the out-of-pocket payment reported in the latest statistics of health national accounts as (35%) (27), we calculated the sample size as 349 individuals. Inclusion criteria were referral to the hospital for treating vision disorders and the willingness of the patients or their companions to participate in the study.

$$n = \frac{z_{1-\frac{\alpha}{2}}^2 \times p(1-p)}{d^2} = \frac{1.96^2 \times 0.35 \times 0.65}{0.02^2} = 349.58$$

Amongst all educational hospitals in Tehran, three of them which offered eye surgery services were chosen, where the sample size was divided across them based on the load of referrals. The subjects were chosen through convenience sampling method.

The data collection instrument was a researcher-made checklist and the financial bills of the patients' medical records. This form included items about background information, informal payments (these payments are part of OOP payments that are paid to individuals or organizations providing healthcare out of formal payment channel such as cash payments and gift giving (28)), costs for purchasing goods, and services out of the hospital (cost of bought & brought goods), and non-medical costs (transportation, food, accommodation, and telephone). In order to collect the data, at first, we recorded the name and surname of the patient, date of admission, and their phone number; in addition, we interviewed the patients and asked questions about the background variables. Then, in order to acquire information about informal payments and the costs of bought & brought goods, we asked the patients to make phone calls one week after discharge. Eventually, the information related to the bills of patients was extracted from the hospital information system. The data were analyzed through descriptive statistics as well as comparative hypothesis tests for nonparametric data in SPSS 21.

Figure 1 shows that the patients' costs included

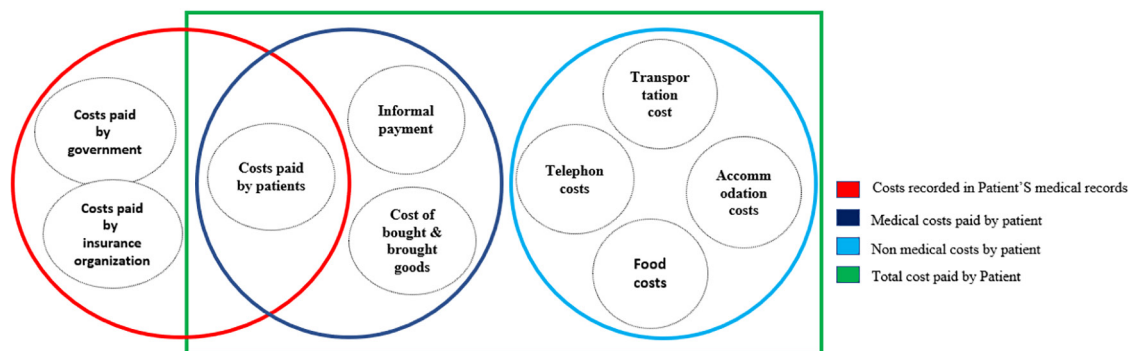


Figure 1: The structure of costs examined in the study

medical and non-medical costs. The medical costs included the costs paid by patients in the bill (formal payments), informal payments, and costs paid by the patient for bought & brought goods. Non-medical costs were the costs paid by patients for transportation, accommodation, food, and telephone.

Results

Overall, the information of 343 patients was included in the final analyses (The reason for this

difference from the estimated sample size was that the information of some patients interviewed in step 1 was not found in the hospital information system, or some participants were not responsive in the third stage despite their initial consent to participate in the study). Most patients (61%) were in the age group of older than 50. Further, 50% were men and 50% were women. Most participants (58.7%) were married, and 75.8% did not have an academic education. The percentage of living in urban regions was 60.9%, and

Table 1: Baseline characteristics of the patients

Variable	Groups	Number	Percent	Variable	Groups	Number	Percent
Age	Younger than 20 years	66	19.1	Type of basic insurance	Not insured	5	1.4
	20-50 years	66	19.1		Iranian Health insurance	174	50.4
	Above 50 years	211	61		Social welfare	149	43.2
Gender	Male	170	49.5		Armed forces	7	2.0
	Female	173	50.5		Others	6	1.7
Marital status	Married	203	59.1	Type of treated disorder	Retina and posterior chamber	65	18.8
	Single	140	40.8		Glaucoma	17	4.9
Income status (Average monthly income)	Less than 250 \$*	169	48.8		Cornea and anterior chamber	175	50.6
	250\$-750\$	148	42.8		Eyelid and lacrimal ducts	11	3.2
	Above 750\$	21	6.1		Strabismus and amblyopia	51	14.7
Place of residence	Rural	132	38.3	Employment status	Farmer	74	19.3
	Urban	210	60.9		Worker	39	10.2
Level of Education	Non-academic	260	75.8		Employee	35	9.1
	Academic	83	24.2		Retired	34	8.9
Home ownership	Yes	242	70.5		Freelancer	150	39.1
	No	101	29.5	Unemployed	10	2.6	
Households expenditure funding source	Households who used their income	179	52.3				
	Households who used up their savings	24	6.9				
	Households who borrowed from their relatives	123	36.1				
	Households who taken loans	5	1.4				
	Households who sold their assets	1	0.3				

*Based on the exchange rate of 2017 in the Iranian market(1\$=40453 IRR) (29), they have been converted from Rials to US dollars.

70.1% were owners of their houses. Further, 48.8% had an income of less than \$ 250 per month. Also, 50.6% had corneal and anterior chamber disorders, 18.8% had retina and posterior chamber disorders, 14.7% had amblyopia and strabismus, 4.9% had glaucoma, and 3.2% had eyelid and lacrimal duct disorders. Because of financial burden of the expenditures, 6.9% of the patients had used the family savings, 36.1% borrowed from their relatives, 1.4% had received a loan, and 0.3% had sold their assets (Table 1).

The total cost recorded in the patients' medical records was 150760.91\$: 83.53%, 6.9%, and 9.75% which were paid by insurance, government, and patients, respectively. The maximum share of the bill belonged to the costs of consultation and ophthalmology surgery (62.36%) (Table 2). Only 1.7% of patients had informal payments. All informal payments had been paid to non-clinical staff and were for gratitude. In addition, 6.49% of patients had bought & brought goods.

The total medical costs were calculated, after adding the patients' costs for informal payments and bought & brought goods to the costs of hospital bills paid by patients. Based on the obtained results, the patients had paid 10.24% of their medical costs. Out of this value, 9.69%, 0.003%, and 0.54% were formal payments, informal payments, and costs paid for bought & brought goods. The total non-medical costs of patients for receiving ophthalmology services were calculated as \$29612.14. The maximum share of non-medical costs was related to transportation

costs (84%). The total costs of patients for receiving ophthalmology services were calculated as 44820.83\$. The maximum share of the patients' costs was related to non-medical costs (66.06%) (Figure 2).

Normality test revealed that the distribution of patients' medical costs (P=0.000) and their total costs (P=0.000) did not follow the normal distribution, so to determine the significance of the relationship between the baseline characteristics and these variables, we used Mann-Whitney and Kruskal-Wallis tests. All baseline characteristics presented in Table 1 were tested, but Table 2 presents the significant cases. Age (P=0.008)1, type of basic insurance (P=0.000), and the type of treated disorder (P=0.000) affected the medical costs of patients. On the other hand, the variables of the level of income (P=0.001) and place of residence (P=0.001) caused significant differences in the total costs paid by patients (Table 3).

Discussion

All costs paid by patients were \$14671.64, based on the results, out of which 32.8%, 1.85%, and 66.06% were bill costs, sum of informal payments and costs for purchasing goods and services outside the hospital, and non-medical costs, respectively. The share of patients in paying medical costs has been 10.24%, which is mostly called "out-of-pocket payment". This is in line with the objectives of the health transformation plan in order to reduce the amount of share, paid by people for hospitalization services to less than 10%. In 2014, a set of reforms

Table 2: The medical costs in the patients' bills

	Total sum	%	Insurance sum	%	Subsidy sum*	%	Patient payment	%
Hoteling and nursing	5911.87	3.92	5275.25	89.23	86.49	1.46	550.12	9.30
Drugs and consumable medical supplies	30761.41	20.40	15225.81	49.49	9695.45	31.51	5840.15	18.98
Operation room and anesthesia	18787.50	12.46	17282.73	91.83	489.75	2.60	1355.12	7.21
Consultation and surgery by physician	94379.64	62.60	812169.46	92.76	52.35	0.05	6795.23	7.22
Diagnostic services	920.49	0.61	725.43	78.80	64.02	6.95	131.02	14.23
Total	150760.91	100	125979.78	83.56	10398.06	6.89	14671.64	9.75

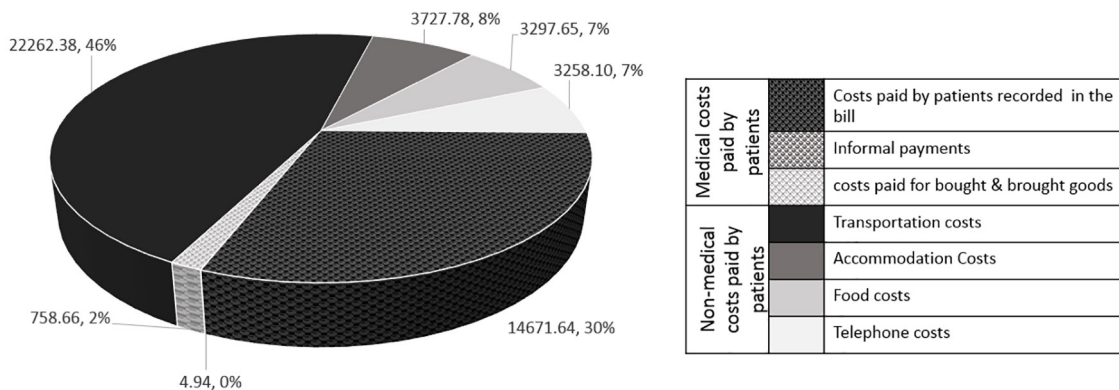


Figure 2: Costs paid by patients for treating vision disorders

Table 3: Comparing the level of medical costs of patients (out-of-pocket payment) and their total cost based on baseline characteristics

Variable	Groups		Medical costs of patients		Total costs of patients	
			Mean(\$)	P value	Mean(\$)	P value
Normality test P value			0.000		0.000	
Age	Younger than 20 years	Kruskal-Wallis	41.85	0.008	137.37	0.340
	20-50 years		54.96		132.03	
	Above 50 years		47.13		128.15	
Income status	Less than 250 \$	Kruskal-Wallis	49.23	0.426	146.36	0.001
	250\$-750\$		47.63		121.21	
	Above 750\$		34.59		71.80	
Employment status	Farmer	Kruskal-Wallis	50.79	0.430	145.42	0.035
	Worker		43.31		152.12	
	Employee		46.78		121.00	
	Retired		59.87		136.67	
	Freelancer		44.87		119.07	
	Unemployed		49.19		134.48	
Place of residence	Village	Mann-Whitney	46.99	0.349	152.61	0.001
	City		48.21		117.41	
Type of basic insurance	No insurance	Kruskal-Wallis	83.55	0.000	182.68	0.375
	Iranian Health insurance		49.54		113.37	
	Social welfare		45.55		119.72	
	Armed forces		6.41		88.95	
	Others		28.79		176.58	
Type of treated disorder	Retina and posterior chamber	Kruskal-Wallis	55.83	0.000	188.56	0.284
	Glaucoma		71.88		124.82	
	Cornea and anterior chamber		43.98		102.63	
	Eyelid and lacrimal ducts		37.87		132.11	
	Strabismus and amblyopia		33.21		137.30	
	Others		53.58		188.56	

was implemented with the aim of enhancing the population coverage of basic healthcare insurances, increasing the quality of cares, and reducing the out-of-pocket payment for hospitalization services under the name of health transformation plan by Iranian healthcare system (30). A study performed in educational hospitals of Tehran in 2015 also reported a similar value for the out-of-pocket payment, similar to the present study (10.3%) (31).

More than 10.24% of out-of-pocket payments were formal payments (recorded in the bill) as 9.69%, informal payments as 0.003%, and costs paid for bought & brought goods as 0.54%. The maximum share (62.36%) of the patients was for hospital bills which were related to ophthalmology surgery, and also for consultation services, where the patients had almost the minimum extent of contribution to the payment (7.22%). Therefore, the insurance system has been successful for developing financial protection in this regard. The costs of drug and items have been the second costly item in the bills (20.6%), which had the minimum extent of contribution of insurance (49.49%) in reimbursing the costs. Although the government has been trying to reduce the financial burden of

this part on families through paying subsidy, and has covered 31.51% of the costs, also the percentage of out-of-pocket payment for patients in this part is still higher than the amount for other sectors (18.98%). In previous researches, drug costs claimed a considerable portion of the patients' payments (31-33). Drug costs have a significant effect on confrontation of families with the catastrophic health expenditure (34). Indeed, the current health systems have failed at fulfilling adequate financial protection for out-of-pocket payments in the drug sector (35). Also, there are various challenges for financial supply of the pharmaceutical system in Iran. According to the insurance rules, the patients should pay only 10% of drug costs, while 90% of the remaining is undertaken by insurer organizations. However, in reality, as with this study, a larger percentage of drug costs are paid by patients (36, 37). This can be attributed to some reasons like lack of coverage of some drugs costs by insurer organizations, preference of physicians for prescribing important drugs or more expensive brands, and lack of a proper regulatory system for supply chain in hospitals (36). According to the World Health Organization report, the inefficiencies

of the pharmaceutical system are amongst the main causes of loss of resources in healthcare (38). The extent of drug loss in hospitals, due to the type of pharmaceutical products, patients, and hospitals has been reported to vary between 16.6 to 28.7% (39). Therefore, establishment of pharmaceutical sector management and reduction of the loss of resources in this sector can reduce its financial burden on patients, as it is the priority of managerial plans of hospitals.

According to the results of this study, only 1.7% of the patients had informal payments, and the share of these payments has also been very low (0.03% of the out-of-pocket payment of patients). This level of informal payment is lower than the values reported in other studies (31, 32), and that have been paid voluntarily and as a kind of gratitude towards non-clinical staff. One of the reasons of the low level of these payments can be supposed to be the shorter duration of accommodation of these patients, and their less contact with providers, which reduces the probability of the informal payments. Informal payments occur outside formal bodies, which put the healthcare systems at increasing risk of corruption (40). The health transformation plan reviewed and modified the tariffs in order to reduce receiving the illegal sums (41). The results of the present study are in the same line with findings of other studies (40), suggesting the success of the transformation plan strategies in reducing informal payments in the country.

Although the level of the patients' payment for medical costs lied within a reasonable range, these costs have accounted for only 34% of the total costs paid by patients. Further, 66% of the patients' costs were related to non-medical costs. This indicates the expenses for which the families receive absolutely no financial support instead of their payments. Even if patients are completely supported against medical costs, many people still experience financial obstacles to gain access to care (42). The reason is that many people cannot afford the concurrent payment of both medical and non-medical costs. Nevertheless, proper mechanisms for reducing such costs are very limited (43).

The age, type of insurance, and type of treating disorder have been amongst the factors of developing significant differences in medical costs. In this regard, individuals aged 20 to 50 years old, those without insurance coverage, and patients with glaucoma had higher out-of-pocket payments. Similarly, in the study done by Islek, as with the present study, no significant difference existed in out-of-pocket payment concerning the income, occupational status, or level of education of patients. However, the out-

of-pocket payment was higher in patients without social insurance in comparison with others with insurance (44). In spite of having vision disorders, a considerable percentage of individuals still do not seek ophthalmology care. A study by Centers for Disease Control and Prevention indicated that the costs of eye care without insurance were among the most common causes of not seeking ophthalmology care (45).

After introducing non-medical costs to the patients' costs basket, the variables of the level of income and place of residence affected the patients' costs; for example, those with a lower level of income and rural patients endured higher costs. Therefore, under the influence of non-medical costs, the insurance support coverage has been inefficient for developing the families' financial protection. In the research by Emamian et al., it was found that the insurance did not have any significant effect on the prevalence of vision disorders (20), which can be due to the mere effect of insurance on medical costs.

Based on the results of this study, low income groups paid the maximum costs for receiving ophthalmology services. Bremer indicated that people with low income would face higher financial burden and greater refusal to receive healthcare costs (46). The individuals belonging to deprived socioeconomic groups and marginalized people are more likely to suffer the conditions leading to loss of vision (3). For example, in the study by Emamian et al., the extent of the prevalence of vision disorders in the low-income groups of Shahroud City was three times larger than high income groups (20).

The extent of the costs of villagers has also been higher significantly. Since consideration of non-medical costs has been the cause of development of such differences in costs, the answer to this problem can also be traced in these costs. The most expensive item in the non-medical costs of patients has been transportation costs. Other studies have also mentioned the considerable effect of transportation costs on the patients' costs (32, 33). One of the reasons for the high level of these costs is lack of proper infrastructures like adequate human resources in some regions of the country. Iran has one ophthalmologist every 40,000 people and one optometrist every 45,000 people, which are even better than the target set by the World Health Organization (10, 47). Nevertheless, the research by Mohammadi showed that there was a great difference in their density. Tehran province has 10.7 ophthalmologists and optometrists every 100,000 people, which is even larger than the corresponding

value in high income countries. In order to reduce the distribution of the ophthalmology care services, special policy corrections should be made in order to provide financial, physical, cultural, and information access. The recent reforms in the healthcare sector in the country have reduced the costs paid by patients for surgical services in governmental centers. In order to improve the physical access to these services, the geographical distance between healthcare providers and patients as well as the ratio of ophthalmology care providers to the population should decrease again. The reforms of the health sector should also fulfill the permanence of specialists as well (47).

Specifically, 6.9% of the patients had used their savings in order to cover the costs, and 36.3% had borrowed from their family and relatives. Similarly, the study by Karami et al. also showed that due to financial burden of health care costs, 21.4% of families had sold their assets, 16.7% had used their savings, and 47.6% of them had to borrow from others (48). Although families can use their savings for reducing the economic difficulty problems caused by healthcare shocks, the magnitude of savings is low in developing countries. Accordingly, families have to borrow from their families or friends mostly, or even sell their assets (49).

Study Limitations

In this research, only patients referring to academic governmental hospitals had been studied. Concerning the high tariff for services in private hospitals and inadequate coverage of healthcare insurance for the services of this sector, the results of the present study cannot be generalized to this sector. We also cross-sectionally studied only the costs of receiving services by the patients once, and it was not possible to investigate the costs paid by patients for subsequent stages of the treatment follow-up. It is suggested that the patients' costs for ophthalmology services should be also investigated in the private sector and in other regions of the country for future studies.

Conclusion

The patients' out-of-pocket payments for ophthalmology service were in a reasonable level. However, a large share of the total costs paid by patients for receiving these services was related to non-medical costs. Developing equity in geographical access to ophthalmology services through reducing the financial burden of non-medical costs for families can facilitate benefiting from these services. In order to enhance the financial access of families to ophthalmology care services, some measures

should be taken like correcting the financing of the pharmaceutical sector, enhancing the efficiency of drug consumption in hospitals, and promoting equity in distribution of human resources required for development of ophthalmology services across different regions of the country.

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