



# Vision-Related Quality of Life of Older People in Tehran and their Access and Utilization of Eye Care Services

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## Abstract

**Background:** Access to and utilization of eye care services may improve vision-related quality of life (VRQoL) of older people. This study aimed to evaluate the VRQoL of older adults and its associations with access to and utilization of eye care services.

**Methods:** This is a community-based cross-sectional survey conducted in Tehran, Iran, on 566 older people in 2018. The NEI-25 VFQ was used to measure the VRQoL. Multilevel Linear Regression analysis used to test the study hypotheses.

**Results:** The average score of the VRQoL was 80 out of 100. About 61% of the participants did not utilize the annual routine eye examination and the mean score of overall access to eye care was 85 out of 115. Having a higher physical, socio-cultural and overall access were significantly associated with higher VRQoL, but those with regular utilization had no better VRQoL status compared to non-users.

**Conclusion:** Access to eye care services showed to be very important in improvement of the VRQoL, whereas higher utilization was not found to be associated with better VRQoL statue of older people, as there might have a reverse causality with using more eye services with higher Visual impairment.

**Keywords:** Visual function questionnaire; Vision related quality of life; Older people; Eye care services

## Introduction

Visual impairment (VI) is a condition affecting a sizable proportion of the elderly population. Although prevalence rates vary depending upon the definition applied, current population estimates indicate that about 60% of adults over the age of 60 experience some degree of VI in Tehran (1). Blindness and low vision are one of the ten major causes of disability that decrease life expectancy. Since almost 80% of a person's information about the environment is acquired by the eye, any VI can lead to a person's inability to communicate

properly with the environment, can lead to social isolation, and profoundly influences on their quality of life (QoL) (2). QoL is defined shortly as "overall enjoyment of life" and a longer definition is "the degree to which a person or group is healthy, comfortable, and able to enjoy the activities of daily living" (3). Concerns about the diminished QoL of visually impaired older adults are magnified by the adverse outcomes including poorer physical health and increased risk of mor-



tality (3). A large body of research has demonstrated an association between VI among older adults and an increased dependence on others to perform daily activities, decreased participation in social activities, higher rates of depression, increased likelihood of falls and injury, and other undesirable health outcomes (4, 5).

Vision-related QoL (VRQoL) is a specific type of QoL, which actually reflects people's understanding of vision and their daily activities' limitation associated with vision (6). The VRQoL could highly be negatively affected by various types of VI, particularly in old age. By disrupting daily activities that require visual health, the elderly's independence is declined and various aspects of maintaining their health in aspects such as accident prevention, driving accidents, physical activity, food and drug consumption are compromised (7). The WHO's Global Eye Plan 2014-2019 aims to reduce avoidable VI as a global public health concern. The magnitude and causes of VI must be identified in order to identify priorities, monitor progress, and advocate for greater commitment to eye health (8). Surveillance of visual health is essential in order to document rates of VI, eye disease, vision-related functioning, and access to vision and eye care (9). One of the key factors in achieving the goals of Vision 2020 is access to and utilization of eye care services (10). Some studies found the important role of utilization and access to eye care in the probability of affecting by VI (11-13). The impacts of VI are likely to be different where older people are poor and lack of utilization or access to vision health services, and have higher rates of disability (1). An association between deprivation, access to eye care and adverse glaucoma outcomes have also been reported by earlier studies (14). Additionally, people with VI are more likely to have limitations in their physical activity and have less access to economic, social, and psychological resources (15, 16). Identifying barriers to health care access and utilization of vision-related health services are critical for informing public health interventions aimed to improve prevention, detection, treatment, and rehabilitation for those at risk for or affected by VI. However, few studies examined de-

terminants of QoL of visually impaired older people (4). The handful of studies that have explored this issue focused on a single explanation rather than on a more comprehensive set of determinants that would allow an assessment of their relative contributions.

We aimed to address this gap by examining associations between the VRQoL of older people and their utilization and level of access to eye care services in Tehran. Having higher access and using more eye care services are associated with having an improved VRQoL status.

## Methods

### *Study design*

The analysis employed cross-sectional data from representative sample of community- resident older people aged 60+ in Tehran, Iran in 2018. Participants were recruited from three municipal districts of Tehran using random multistage stratified clustering method, explained further in earlier studies (17, 18), with different development level (19, 20). Since the prevalence of ophthalmic problems in the study of Nodehi Moghaddam (1) was estimated to be 61%, considering  $\alpha = 0.05$  and  $\beta = 0.20$  and in consideration of the difference in prevalence of ocular problems between different SES groups equal to 15%, and with the proposed design effect of 1.5 and 90% response rate, the sample size in the poor area calculated at 208 and in the medium and rich areas calculated at 416 and in total 623 people, of which 566 people responded (Response rate = 90%).

### *Measurement of study variables*

The data were collected using a structured multi-sectional questionnaire administered to respondents through face-to-face interviews conducted in their own homes. The VRQoL was the outcome variable, assessed by the 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ25), derived from NEI-VFQ51, originally developed in the previous study (21). This instrument is translated into Persian, and tested and validated on adults living in Tehran (22). The NEI-

VFQ25 are grouped into 12 subscales (including 11 items related to vision and 1 item that is related to general health [GH]). The score of each subscale is expressed on a scale from 0 (the worst function) to 100 (the best function). The items are averaged to form subscales and the means of subscales yield composite scores.

Access and utilization of eye care services and demographic and SES of older people are independent variables of this study. "Access" to health services, including subscales of physical access, economical access, cultural and social access, was measured by a 28-item questionnaire, developed by Saeed poor, J, specifically for older people in Iran (23). Overall access was calculated by adding up the scores of all 28 questions, and scores ranged between 12 and 115. "Utilization" of visual services, was also measured by a questionnaire available in the WHO's website. Validity and reliability of this questionnaire has been approved by another study (10). A list of demographic and SES characteristics of older people were also measured in the study questionnaire both for descriptive reasons and also using in analytical statistics.

### **Statistical analysis**

Descriptive characteristics of the study population are reported by tables and figures. Differences between males and females were checked through t-tests and  $\chi^2$  tests. Since the data of this study were clustered due to collecting data from different geographical areas in Tehran, multilevel mixed-effect linear regression analysis was applied. The level of significance was set at 0.05. Explanatory variables for the multivariate regression of the NEI-VFQ25 and utilization and access, were selected from the available set of variables displayed in Table. All statistical analyses were conducted using SPSS Release 22.0.0.0 (IBM Corp., Armonk, NY, USA).

### **Ethics Approval**

Ethics approval for this study was received from the ethical committee of the TUMS (Ethics number: IR.TUMS.SPH.REC. 9413382002). All participants of the study signed the consent form before interviews.

### **Results**

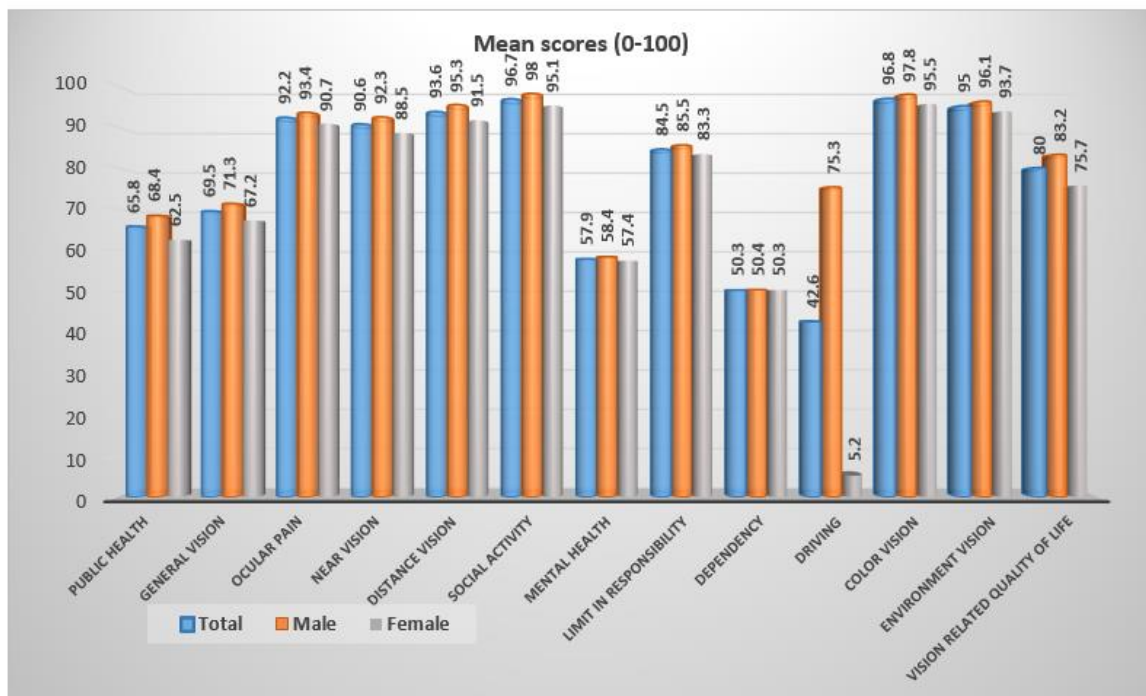
Characteristics of older people participated in this study were described in Table 1. Of, 566 people participated in the study, 57% were men and 43% were women. The mean age of the participants was 70.5 years.

The total score and the 12 dimensions of the VRQoL of older people were calculated, using the NEI-VFQ25, ranging between 0 and 100. As shown in Fig. 1, the dimensions of "color vision" and "social activity" with the scores of 96.8 and 96.7 respectively gained the highest scores, and the dimensions of "driving", "dependency", and "mental health" with the scores of 42.6, 50.3, and 57.9, respectively had the lowest scores. The mean score of the VRQoL was calculated at 80 out of 100. In all dimensions of the VRQoL, the scores of men were higher than women indicating better VRQoL among older men compared to their age-mate women.

The results of the access of older people to eye care services in different aspects and in total are also presented in Table 2. The mean score of overall access of the elderly to eye care services was calculated at 85.3 out of 115. Moreover, 74% of the elderly were in the optimum condition regarding access to eye care services. However, economical/financial access was the poorer than the other aspects of access.

**Table 1:** Demographic and SES characteristics of older adults in Tehran

Frequency (%)		Total N=(566) (100 %)	Gender		SES of Living Area		
			Male n=(322) (56.9 %)	Female n=(244) (43.1 %)	Rich n=(157) (27.7 %)	Moderate n=(165) (29.2 %)	Poor n=(244) (43.1 %)
Gender	Male	322(56.9)	-	-	78(49.7)	115(69.7)	129(52.9)
	Female	244(43.1)	-	-	79(50.3)	50(30.3)	115(47.1)
Age	Average +/- (SD)	70.5 ± 8.2	71 ± 8.5	70 ± 7.7	70 ± 8.3	70.6 ± 8	70.8 ± 8.3
Marital Status	Married	412(72.8)	286(88.8)	126(51.6)	125(79.6)	126(76.4)	161(66.0)
	Other	154(27.2)	36(11.2)	118(48.4)	32(20.4)	39(23.6)	83(34.0)
Education	Uneducated	75(13.3)	21(6.5)	54(22.3)	6(3.8)	18(10.9)	51(21.2)
	Primary School	222(39.4)	119(37.1)	103(42.6)	36(22.9)	73(44.2)	13(46.9)
	Secondary School	69(12.3)	44(13.7)	25(10.3)	22(14.0)	16(9.7)	31(12.9)
	Diploma	110(19.5)	71(22.1)	39(16.1)	37(23.6)	35(21.2)	38(15.8)
	University Degree	87(15.5)	66(20.6)	21(8.7)	56(35.7)	23(13.9)	8(3.3)
Occupational Status	Employed	41(7.3)	40(12.5)	1(0.4)	11(7.1)	14(8.5)	16(6.7)
	Retired	296(52.8)	245(76.3)	51(21.3)	84(53.8)	99(60.0)	13(47.1)
	Unemployed	224(39.9)	36(11.2)	188(78.3)	61(39.1)	52(31.5)	11(46.3)
Financial Status	Poor	150(28.0)	76(24.7)	74(32.6)	3(2.2)	61(37.4)	86(36.3)
	Moderate	306(57.2)	192(62.3)	114(50.2)	63(46.7)	97(59.5)	46(61.6)
	Rich	79(14.8)	40(13.0)	39(17.2)	69(51.1)	5(3.1)	5(2.1)
Having health Insurance	Yes	520(92.0)	289(89.8)	231(94.7)	147(93.6)	146(88.5)	227(93.4)
	No	45(8.0)	33(10.2)	12(4.9)	10(6.4)	19(11.5)	16(6.6)



**Fig. 1:** Scores of dimensions and overall score of VRQoL of elderly in Tehran

**Table 2:** Scores of different types of access and the total score

<i>Type of Access</i>	<i>Access scores</i>		<i>Access status</i>		
	Range of Score	Mean (SD)	Unfavorable N (%)	Average N (%)	Favorable N (%)
Physical access	3-45	35.3(4.7)	3(0.6)	100(17.7)	461(81.7)
Socio-cultural access	4-20	15.2(2.7)	26(4.7)	172(30.9)	359(64.5)
Financial access	4-40	27.3(6.8)	35(6.2)	258(45.6)	273(48.2)
Common in all types	1-10	7.9(1.3)	9(1.6)	169(29.9)	387(68.5)
Total Access	12-115	85.3(11.4)	5(0.9)	142(25.1)	419(74.0)

Table 3, shows the status of utilization of eye care services by older people in Tehran. About 61% of the participants did not utilize the annual regular routine eye examination and more than 8% had

never an eye examination in their whole life. However, 47% of older people have received an eye care in the last one year.

**Table 3:** The status of elderly utilization of eye examination in recent years

<i>When was your last eye exam?</i>	<i>Female N (%)</i>	<i>Male N (%)</i>	<i>Total N (%)</i>
Last month	17(7.3)	32(10.4)	49(9.1)
Last year	114(48.9)	144(46.9)	258(47.8)
The last two years	38(16.3)	49(16.0)	87(16.1)
The last five years	46(19.7)	55(17.9)	101(18.7)
I had none at all	18(7.7)	27(8.8)	45(8.3)
Total	233(43.1)	307(56.9)	540(100)
Regular yearly eye examination	Yes	96(39.3)	124(38.5)
	No	148(60.7)	198(61.5)

In this study, we also examined association between a number of main demographic and SES characteristics of older people with their access to and utilization of eye care services using multi-level linear regression analysis (Table 4). Of the examined characteristics, three factors showed significant associations with access; “employment” (Coef. = -4.8,  $P=0.005$ ) and “being poor” (Coef. = -2.2,  $P=0.03$ ) had a negative effect on access, while having “health insurance” compared to lack of that insurance had a great positive effect on access (Coef. = 8.9,  $P<0.001$ ). The second set of analyses on associations between the characteristics and the utilization of eye care services among older people, showed that of all the factors tested, only “economic status” had a significant effect on the utilization and the probability of utilization among poorer people compared was the half of non-poor

people (Coef. = -0.5,  $P=0.02$ ). Finally, the main hypothesis of this study was tested using multi-level linear regression analysis, adjusting for the effects of covariates (Table 5). The selection of covariates in these analyses was based on the earlier results shown in Table 4, and they were the factors which showed significant associations with access and utilization. The results of analyses approved the hypothesis with regard to access but not utilization; having higher physical (Coef. = 0.4,  $P<0.001$ ), socio-cultural (Coef. = 0.4,  $P=0.03$ ) and overall access (Coef. = 0.18,  $P<0.001$ ) were all significantly associated with higher VRQoL score, but those with regular yearly utilization had no better VRQoL status compared to those lacking such a service ( $P=0.16$ ). Moreover, all covariates in both models, including employment, economic

status and having health insurance were all significantly associated with the VRQoL score of older people.

**Table 4:** Mixed-effect linear regression analysis of associations between characteristics of older people and access and utilization to eye care service in Tehran (outcome measures: Access and Utilization)

Variable	Access (total)		Utilization		
	Coefficient (CI)	P Value	Coefficient (CI)	P Value	
Constant	-	80.2(71.6_88.8)	<0.001	-0.7(-2.6_1.1)	0.4
Age	-	0.01(-0.1_0.1)	0.8	0.001(-0.02_0.02)	0.9
Gender	Women	Ref		Ref	
	Men	0.08(-1.9_2.1)	0.9	-0.2(-0.6_0.2)	0.4
Marital status	Non-married	Ref		Ref	
	Married	-1.7(-4.8_1.4)	0.3	0.35(-0.3_1)	0.3
Living arrangement	Not alone	Ref		Ref	
	Living alone	-2.4(-5.7_0.9)	0.15	0.2(-0.45_0.9)	0.5
Education	Literate	Ref		Ref	
	Illiterate	-2.1(-4.9_0.5)	0.1	-0.26(-0.8_0.3)	0.4
Being employed	No	Ref		Ref	
	Yes	-4.8(-8.1_-1.4)	0.005	-0.5(-1.3_0.2)	0.2
Financial Status	Rich	Ref		Ref	
	Poor	-2.2(-4.3_-0.2)	0.03	-0.5(-0.9_-0.08)	0.02
Having health Insurance	No	Ref		Ref	
	Yes	8.9(5.8_12.1)	<0.001	0.3(-0.44_0.97)	0.46

**Table 5:** Mixed-effect linear regression analysis of associations between access and utilization of eye care service and VFQoL of elderly in Tehran (outcome variable: VFQoL)

Variable	Model 1- Effect of Access on VFQoL		Model 2- Effect of Utilization on VFQoL		
	Coefficient (CI)	P-value	Coefficient (CI)	P-value	
Constant	-	64.8(55.6_74.1)	<0.001	81.4(78.6_84.1)	<0.001
Access	Physical access	0.4(0.2_0.6)	<0.001	-	-
	Socio-cultural access	0.4(0.05_0.8)	0.03	-	-
	Financial access	-0.06(-0.2_0.1)	0.5	-	-
Regular yearly utilization	Total access	0.18(0.08_0.27)	<0.001	-	-
	No	-	-	Ref	
Being employed	Yes	-	-	-1.5(-3.5_0.59)	0.16
	No	Ref		-	-
Financial Status	Rich	6.8(3.1_10.6)	<0.001	-	-
	Poor	Ref		Ref	
Having health Insurance	Poor	-2.8(-5.1_-0.4)	0.02	-2.5(-4.8_-0.2)	0.03
	No	Ref		-	-
Var Level 1 (individual)	Yes	-4.1(-7.8_-0.5)	0.03	-	-
	Var Level 1 (individual)	123(109_139)	<0.001	131.2(116_148.4)	<0.001
Var Level 2 (area)	72(0.06_23.6)	0.5	1.6 (0.12_22.5)	0.45	

## Discussion

We achieved a very high participation rate by older people in this study and response rate was about 90%, confirming the external validity of this study and a high certainty of generalization of the study result to overall older population living in Tehran city. Individual characteristics of older participants in this survey, as reported in Table 1, are highly similar with those in previous surveys on the same population (17, 18).

The present study extends the results of two previous studies on VI measured by the NEI-VFQ25 conducted in Iran (22, 24). The domains of “color vision” and “vision specific” had the highest score and the domains of “driving”, “vision specific dependency” and “vision specific mental health” had the lowest scores respectively, except driving subscale (Fig. 1). On the basis of other study, the question referring to driving was more sensitive and had a higher false positive rate (22).

Descriptive results of access of older people to eye care services showed that financial access was poorer than the other types of access (Table 2), making the biggest barrier to receive the eye care services in the case of need. This is in line with other previous studies (25, 26) and indicates that Iranian older people suffers more by financial problems than the other barriers in satisfaction of their health needs. In addition, while older people aged 60 and above should have regular yearly eye examination, in this study only 39% of older people reported to follow such recommendation (Table 3). This might also highly be linked to financial barriers as further analysis identified this factor as to be highly associated with eye care utilization (Table 5).

Notably, the study showed that occupational status, financial status and insurance status were three factors affecting the access of the elderly to eye care (Table 4). This, in line with the previous studies (23, 27), highlights that financial barriers and lack of insurance would highly limit the intention of older people to refer to health centers even in the case of essential need. Similar association was

found between being poor and lack of utilization of eye care services (Table 4), which highly needs the attention of policy makers as previous studies emphasizes (28, 29). The results of this study also showed that higher level of VRQoL is substantially associated with higher access to eye care in studied population (Table 5). This result is in line with the study of Bal (30). Our findings demonstrated, the moderate proportion of economic access in comparison with higher level of other aspects of access, are influenced by financial factors. In contrast, more utilization of eye care services was not a predicting factor for higher VRQoL score (Table 5). This is actually sensible, as it is most likely when older people is affected by any kind of eye disorders, may refer to health service more frequently to get their required care and treatment. Therefore, it is highly expected for reverse causality, as higher utilization might be correlated with poorer vision or eye diseases, who has also poorer VRQoL. The study results also showed that individual's VRQoL score is associated with occupational status and income. This study accounted for similar control variables and found comparable results on their measure of eye care utilization in Tehran population in previous study conducted in 2006 (11).

This study contributes new knowledge on the level of VRQoL, utilization and access to eye care services and SES variables in addition to the relationship between these factors in a group of older population in Tehran. However, one limitation is the cross-sectional design of this study and evaluation is carried out at the time of referrals. The inverse relationship might be between VRQoL and some independent variables such as occupation, education and financial status. Therefore, elderlies occupation, financial and educational status could be influenced by VRQoL. A further limitation is the lack of willingness in people to participate in study because of social and cultural problems, which led to recruitment of participants less than calculated sample size.

## Conclusion

Low vision and vision impairment are very common among older people of Iran, which makes disability, dependency and inability to communicate properly with the environment and can lead to social isolation and profoundly influences on VRQoL of older people, thus demands special attention of health policy makers. In this study, the main hypothesis was “having higher access to health services and doing regular eye care examination are associated with having an improved VRQoL status”. The statistical analysis indicated that higher VRQoL score was substantially associated with having higher access to eye care service in older people. Decreased access to eye care occurs secondary to SES factors such as health insurance, financial and occupational status in elderly people, and lower financial status was common barrier to eye service utilization. It is therefore important when planning for the provision of eye care services to take into consideration of background variables for this disadvantaged population. However, those with regular utilization had no better VRQoL status compared to non-users, most probably due to existing of a reverse causality between utilization and vision impairments, as hypothesized in this study, determined in further longitudinal or experimental studies. The main policy implication of this research is the importance of provision of good quality and affordable eye care services for all older people and endeavors to eliminate the access barriers to such services, as poor vision would substantially diminish the quality of life and overall health of elderly.

## Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors. (Ethics number: IR.TUMS.SPH.REC. 9413382002)

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## Conflict of interest

The authors declare that there is no conflict of interest.

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