



## Research Paper

# Health-Related Quality of Life Among Elderly in Tehran: Urban HEART-1



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## ABSTRACT

**Background:** The aging growth rate is more rapid in developing countries than in more developed countries. This rate is higher in Tehran metropolitan than in most of the other regions of Iran. This study aimed to indicate of disparity and inequity of levels of health-related quality of life between different districts of the Tehran metropolitan.

**Methods:** This study analyzed the data of 1890 elderly aged  $\geq 65$  years who responded to questionnaires of the Urban-HEART survey. The Persian version of Short-Form Health Survey version 2 (SF 12 v2) was used for the assessment of the health-related quality of life. This instrument has two major components, including Physical Component Summary (PCS) and Mental Component Summary (MCS), and also has eight subscales. The mean of these scores was compared between genders and age groups and districts of the Tehran metropolitan using a one-way Analysis of Variance (ANOVA).

**Results:** Mean $\pm$ SD age of participants was 73.65 $\pm$ 5.91 years. The Mean $\pm$ SD age in men was 72.97 $\pm$ 5.76 years. The Mean $\pm$ SD PCS score in the participants was 33.36 $\pm$ 10.48 and Mean $\pm$ SD MCS score was 44.26 $\pm$ 11.22. The Mean $\pm$ SD PCS and MCS scores were lower in females than males. The highest Mean $\pm$ SD PCS scores were observed in district 22 (37.25 $\pm$ 11.51) and the lowest Mean $\pm$ SD PCS scores were observed in district 16 (30.17 $\pm$ 9.27).

**Conclusion:** The result of this study help health and urban policymakers could better diagnose and plan for decreasing these inequities in Tehran.

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## Introduction

The aging growth rate is more rapid in developing countries than in more developed countries [1]. Also, this rate is higher in Tehran metropolitan than in most other regions of Iran [2]. This increasing aging rate needs special attention to the consequences of demographic transition in our country. The normal aging process is accompanied by a range of declines in the reserved capacity of the organs [3]. On the other hand, the prevalence, incidence, and mortality of many chronic risk factors and diseases, such as diabetes mellitus, hypertension, cardiovascular disease, respiratory disease, and malignancies are increased with increasing age [4-6].

The concept of quality of life has been widely used in the medical literature in recent decades. Health-Related Quality of Life (HRQoL) is one of the aspects of quality of life, which is more related to a health condition. World Health Organization (WHO) defines the quality of life as "individuals' perception of their position in life in the context of the culture and value systems, in which they live and in relation to their goals, expectations, standards, and concerns" [7]. This concept refers to physical and psychological and social domains of health, which was affected by a person's beliefs, experiences, expectations, and perceptions [7]. This concept was accepted as one of the important surrogate health outcomes and it can represent the health status at individual and community levels [7].

HRQoL is an important measurable index of health status in populations and it was either to be a bridge between disciplines and quality of medical, social, and mental services [8]. At present, in some developed countries, such as the US, the HRQoL improvement of the population is one of the central health system goals and it is one of the most important indices for the assessment of the function of health systems [9].

HRQoL levels in aged people have more heterogeneity than in young and middle-aged adults. This heterogeneity occurs by the difference between individuals about health status, which is caused due to diversity in espousing many risk factors, chronic diseases, and injuries over their lives [10].

HRQoL among the elderly in Iran was reported by some studies [11-15], and one of them assessed the HRQoL by SF36 in Tehran [11]. Although Tehran metropolitan has more than 12049571 residents [16] and there is a lot of

inequity in health status between residents of different regions, a previous study did not report the HRQoL of older people based on distinct levels. We thought that study of the quality of life among older people in different urban regions of Tehran was essential for policymaking and our study was a response to this need of urban planners. We reported the level of mental and physical components of HRQoL among elderly aged  $\geq 65$  years by sex, age, and the distinct of residency. The population of this study was well representative of the elderly population of Tehran. This study could indicate disparity and inequity of levels of HRQoL between different districts of the Tehran metropolitan and the results of this study help health and urban policymakers could better diagnose and plan for decreasing these inequities in Tehran.

## Materials and Methods

Urban-Heart was a population-based cross-sectional survey that was conducted from April through June 2008 facilitated by WHO, which has assessed the health opportunity equity among the different regions of Tehran. This study analyzed the data on 1890 elderly aged  $\geq 65$  years who responded to questionnaires of the Urban-HEART survey by themselves. The population of this study is highly representative of aged people living in Tehran. The survey sample had a three-stage stratified design. Each of the districts of Tehran was taken as strata. Based on the master sampling frame, residence blocks were taken randomly as Primary Sampling Units (PSUs), then eight families were systematically selected within each block. There were approximately 1000 households in any strata, which were sampled using a systematic sampling in blocks. The information about the characteristics of each household member was collected by interviewing the head of the family, after taking the informed consent. The sampling method and framework were described in detail elsewhere [17, 18].

## Measurement of health-related quality of life

The Persian version of Short Form [12] Health Survey version 2 (SF 12 v2) was used for the assessment of HRQoL. Psychometric evaluation of this instrument was performed previously [19]. This instrument has two major components, including Physical Component Summary (PCS) and Mental Component Summary (MCS), and also has eight subscales of Physical Function (PF), Role Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Function (SF), Role Emotional (RE), and mental health. The range of scores for each of the subscales and summary components is from zero to 100. Higher scores indicate a higher level of HRQoL.

### The other measured variables

The demographic data, such as gender, age, educational level, marital status, and family size were collected in a questionnaire. Age was categorized into three age groups: people aged 65-75 years, people aged 75-85 years, and the group aged >85 years, education level was classified as illiterate, primary school, high school, diploma, and academic.

Marital status was classified into two groups: people who had spurious and who had not spurious and the family size was categorized into three groups family size=1, family size=2, and family size >2. Occupational status was categorized into three groups: 1) employees, 2- retired, and 3- without any certain occupation.

### Data analysis

The summary of the scores of components and subscales was calculated using the online software of the quality metric site. The data of each questionnaire were entered into the software and the output was assumed as a score of each component. The scores of mental and physical components and also the eight subscales of HRQoL were tested for normal distribution. The mean of these scores was compared between genders and age groups and districts of the Tehran metropolitan using a one-way Analysis of Variances (ANOVA). Means of the six groups were compared using multivariate ANOVA models for adjusting for age, group, and vice versa. Mean scores of mental and physical components of HRQoL were compared between districts of Tehran after adjustment for age group, sex, educational level, categorized family size, and occupational status using the multivariate ANOVA model. Post hoc analysis (Scheffe) was used for comparing each group with other groups. SPSS software version 19 (IBM) was used for analysis of these data. All values were assumed significant at a level of  $P < 0.05$  and a 95% confidence interval.

### Results

In this survey, 1890 residents of Tehran aged  $\geq 65$  years participated. Also, 49.15% of the participants were female (Mean $\pm$ SD age=73.65 $\pm$ 5.91 years). The Mean $\pm$ SD age in men was 72.97 $\pm$ 5.76 and in women was 74.35 $\pm$ 5.97 years ( $P < 0.01$ ). The youngest participants were in districts of 21, 22, and 4 (Mean $\pm$ SD age=71.27 $\pm$ 4.08, 71.78 $\pm$ 4.25, and 72.43 $\pm$ 5.04 years old, respectively) and the oldest participant were in districts 8 (Mean $\pm$ SD age=74.65 $\pm$ 6.26, (74.57 $\pm$ 6.18), and 74.44 $\pm$ 5.57 years old, respectively) (Figure 1). Repre-

sentativeness of the population was assessed by comparing the sex ratio and mean age of the Tehran aged population, which was acquired from the census 2006 with the participants of this study. There were no significant differences between the characteristics of aging people in the general population, which the data were extracted from census 2006, and the characteristics of the participants. The participants were categorized into three age groups (65-74 years old, 75-84 years old, and equal to and older than 85 years). The frequency of aging people in each group was 58.4%, 36.4%, and 5.2%, respectively. Regarding education, 31.9% were illiterate, 35.7% had an education at the level of primary school, 8.3% in high school, and 10.4% had academic education. Also, 26.7% of participants were living alone. The rate of living alone was very higher in the female than the male (26.7 in women versus 7.4 in men) (Table 1).

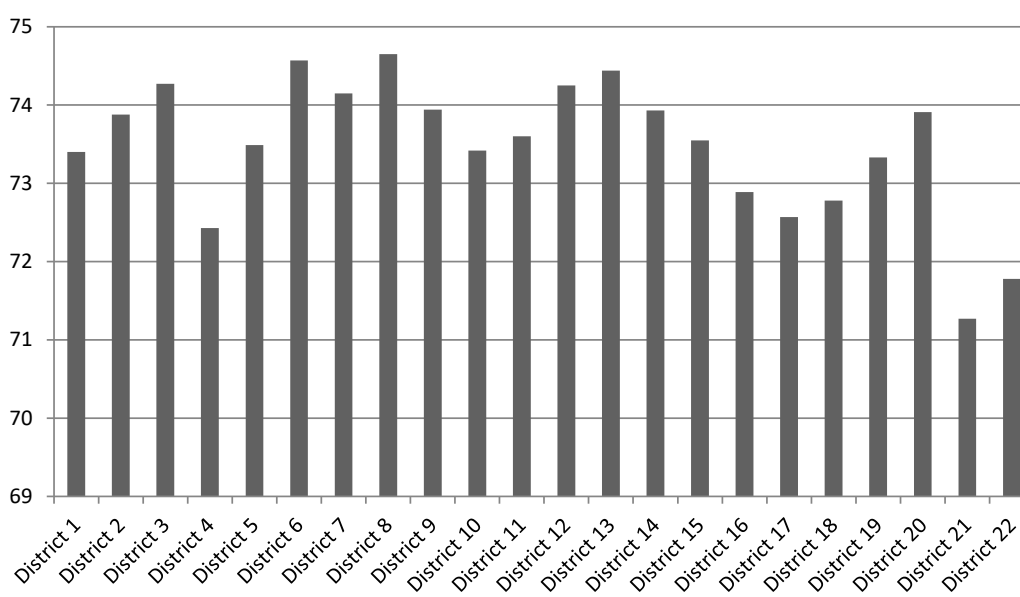
The mean Physical Components Survey (PCS) score in the participants was 33.36 $\pm$ 10.48 and the Mean $\pm$ SD Mental Components Survey (MCS) score was 44.26 $\pm$ 11.22. This difference between physical components and mental components was significant ( $P < 0.01$ ). The Mean $\pm$ SD PCS and MCS scores were lower in females than males (PCS=35.77 $\pm$ 10.38 in males and 30.86 $\pm$ 9.98 in females) and (MCS=45.57 $\pm$ 11.01 in males and 42.91 $\pm$ 11.29 in females;  $P < 0.01$ ). Also, scores of all other subscales of HRQoL were significantly lower in females than males (Table 2).

The scores of the components and the subscales of HRQoL were compared between of age groups (65-74 years, 75-84 years, and  $\geq 85$  years old) (Figure 2). Nearly all scores, except mental health and general health, significantly differed between groups before adjustment for co-varieties in univariate ANOVA ( $P < 0.01$ , and for MH and GH, P-values were 0.42 and 0.11, respectively) (Table 3). In post-hoc test, before adjustment for none of the HRQoL components and subscales, a significant difference was observed between age group 2 (75-84 years old) and age group 3 ( $\geq 85$  years old). However, there was a significant difference between all participants in age group 1 (65-74 years old) and age group 2 ( $P < 0.05$ ) except for the mental health subscale. After adjustment, the differences between scores of subscales in GH, MH, and MCS were not significant; however, in other components and subscales, the scores showed a significant difference ( $P < 0.05$ ).

The highest Mean $\pm$ SD PCS scores were in district 22 (37.25 $\pm$ 11.51), district 21 (35.26 $\pm$ 10.62), and district 1 (35.25 $\pm$ 9.96) and the lowest mean PCS scores were observed in district 16 (30.17 $\pm$ 9.27), district 14 (30.67 $\pm$ 10.40), and district 15 (30.85 $\pm$ 10.12).

**Table 1.** General characteristics of the participants

Variables	Mean±SD/(%)			P	
	Total (n=1890)	Male (n=961)	Female (n=929)		
Age (y)	73.65±5.91	72.97±5.76	74.35±5.97	<0.01	
Age groups	65-74	58.4	65.1	51.5	<0.01
	75-84	36.4	30.3	42.7	
	≥85	5.2	4.6	5.8	
Marital status	Without spouse	26.7	12.8	61.2	<0.01
	With spouse	73.3	87.2	38.6	
Education	Illiterate	31.9	21.9	42.2	<0.01
	Primary school	35.7	37.6	33.7	
	High school	8.3	9.6	6.9	
	Diploma	10.4	12.4	8.4	
	Academic	13.8	18.6	8.8	
Occupational status	Employed	8.1	11.6	4.5	<0.01
	Retired or pensioner	56.0	71.3	40.2	
	No had defined occupation	35.9	17.1	55.4	
Living arrangement (%)	Alone	26.7	7.4	46.6	<0.01
	With other family	73.3	92.6	53.4	



**Figure 1.** Mean age of the participants in different districts



**Table 2.** Mean scores of components and subscales of the health-related quality of life

Components & Subscales	Mean±SD			P
	Total (n=1890)	Male (n=961)	Female (n=929)	
Physical Functioning (PF)	33.97±11.95	36.96±12.09	30.99±11.05	<0.01
Role Physical (RP)	36.80±11.04	38.82±11.26	34.72±10.44	<0.01
Bodily Pain (BP)	36.25±11.37	38.66±11.46	33.76±10.74	<0.01
General Health (GH)	32.53±11.05	34.29±11.22	30.71±10.56	<0.01
Vitality (VT)	44.25±11.83	45.59±11.96	42.86±11.54	<0.01
Social Functioning (SF)	38.02±11.84	39.88±11.61	36.09±11.77	<0.01
Role Emotional (RE)	36.51±13.55	38.72±13.57	34.21±13.15	<0.01
Mental Health (MH)	45.42±12.17	46.84±11.99	43.96±12.18	<0.01
Physical Component Summary (PCS)	33.36±10.48	35.77±10.38	30.86±9.98	<0.01
Mental Component Summary (MCS)	44.26±11.22	45.57±11.01	42.91±11.29	<0.01

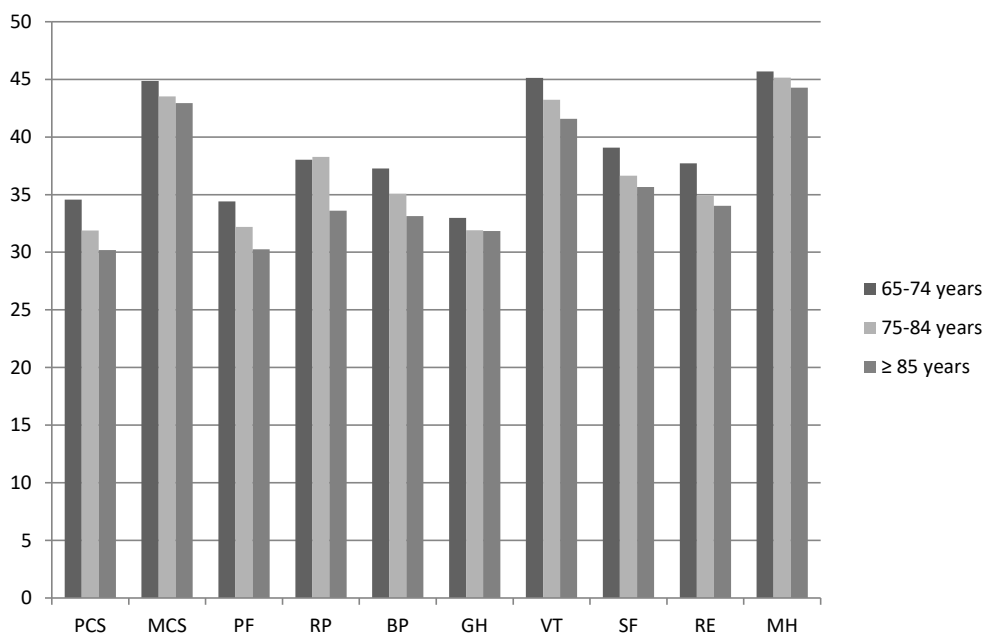


The HRQoL components and subscales were compared between different districts of Tehran metropolitan by Univariate ANOVA (Table 4). There were significant differences between the districts in terms of the scores of components and the subscales of HRQoL. After adjustment for age, sex, education, and living alone, these dif-

ferences were not significant except for bodily pain and emotional role (P=0.04 and P<0.01, respectively)

### Discussion

Data for this study was collected from the Tehran Urban-Heart-1 survey. This study was designed to as-



**Figure 2.** Trends of the health-related quality of life components and subscales with increasing age



PCS: Physical Components' Summary; MCS: Mental Components' Summary; PF: Physical Function; RP: Role Physical; BP: Bodily Pain; GH: General Health; VT: Vitality; SF: Social Function; RE: Role Emotional; MH: Mental Health

**Table 3.** Comparison of the health-related quality of life (HRQoL) components and subscales between age groups of aged people

Component of HRQoL	Age (y)/(Mean±SD)		
	1	2	3
	65-74 (n=1104)	75-84 (n=688)	≥85 (n=98)
Physical Function	35.41 ±12.10	32.19 ±11.43	30.25 ±11.52
Role Physical	38.03 ±11.02	35.28 ±10.86	33.60 ±10.64
Bodily Pain	37.26 ±11.31	35.08 ±11.25	33.13 ±11.67
General Health	32.98 ±11.05	31.99 ±10.89	31.83 ±11.96
Vitality	45.13 ±11.77	43.22 ±11.79	41.57 ±11.97
Social Function	39.08 ±11.68	36.65 ±11.93	35.67 ±11.80
Role Emotional	37.71 ±13.37	34.92 ±13.48	34.04 ±14.75
Mental Health	45.69 ±12.08	45.16 ±12.23	44.27 ±12.76
Physical Components	34.56 ±10.41	31.88 ±10.36	30.18 ±10.09
Mental Components	44.85 ±11.02	43.52 ±11.27	42.94 ±12.73

Component of HRQoL	Crude Values				Adjusted Values*			
	Total	P			Total	P		
		Between Groups				Between Groups		
		1-2	1-3	2-3		1-2	1-3	2-3
Physical Function	<0.01	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	0.07
Role Physical	<0.01	<0.01	<0.01	0.16	<0.01	<0.01	<0.01	0.09
Bodily Pain	<0.01	<0.01	<0.01	0.12	<0.01	0.03	<0.01	0.05
General Health	0.11	0.04	0.32	0.95	0.71	0.50	0.55	0.78
Vitality	<0.01	<0.01	<0.01	0.20	0.01	0.04	0.01	0.12
Social Function	<0.01	<0.01	<0.01	0.44	<0.01	<0.01	0.01	0.30
Role Emotional	<0.01	<0.01	0.01	0.44	<0.01	<0.01	0.02	0.44
Mental Health	0.42	0.38	0.27	0.50	0.68	0.81	0.43	0.38
Physical Components	<0.01	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	0.07
Mental Components	0.02	0.02	0.10	0.63	0.20	0.16	0.18	0.50

\*Adjusted for sex, education and living alone.



sess inequity in health and health opportunity. The proportion of sex and educational levels in our study was comparable to the findings of the national census 2006 [20]. According to a good model of sampling and comparison of our findings with other national surveys, it seems that the population of this study is a good representative of the Tehran population. The data of the participants aged ≥ 65 years were analyzed in our study

as a cross-sectional study with a relatively large sample of community-dwelling aged people.

The mean age of women was higher than men in this study. It can be explained by higher longevity and life expectancy for the female gender in Iran. The life expectancy of women was 77 years and in men was about 75 years in Iran in 2016 [21].

**Table 4.** Values of components of health related quality of life in elderly over districts of Tehran

Components Of HRQoL		Mean±SD (95% CI)	
District	No.	Physical Component Summary	Mental Component Summary
1	102	35.25±9.96 (33.29-37.21)	46.57±10.59 (44.48-48.65)
2	102	34.7±10.38 (32.66-36.74)	45.61±11.73 (43.31-47.91)
3	118	34.13±10.16 (32.28-35.98)	47.46±9.67 (45.69-49.22)
4	124	34.92±9.87 (33.17-36.68)	45.35±10.21 (43.53-47.17)
5	86	34.85±10.70 (32.56-37.15)	45.11±10.20 (42.93-47.3)
6	130	34.84±10.48 (33.02-36.66)	44.52±10.72 (42.66-46.38)
7	112	33.32±10.90 (31.28-35.36)	44.57±9.50 (42.79-46.35)
8	122	34.45±10.38 (32.59-36.32)	45.36±11.29 (43.34-47.39)
9	87	32.47±11.81 (29.95-34.98)	44.72±12.35 (42.08-47.35)
10	83	32.6±9.49 (30.53-34.67)	41.69±12.69 (38.92-44.46)
11	95	32.03±10.88 (29.81-34.25)	42.59±11.96 (40.16-45.03)
12	95	31.29±10.62 (29.12-33.45)	45.15±12.26 (42.65-47.65)
13	87	33.5±10.95 (31.16-35.83)	45.69±11.12 (43.32-48.06)
14	91	30.67±10.39 (28.51-32.84)	41.04±12.57 (38.42-43.66)
15	69	30.85±10.11 (28.42-33.28)	42.89±11.24 (40.19-45.59)
16	63	30.17±9.27 (27.84-32.51)	39.98±12.23 (36.9-43.06)
17	75	33.91±10.23 (31.56-36.27)	42.14±10.72 (39.68-44.61)
18	40	32.89±9.73 (29.77-36)	44.29±9.87 (41.13-47.44)
19	39	31.53±10.33 (28.18-34.88)	42.5±10.34 (39.15-45.86)
20	80	30.91±9.53 (28.79-33.04)	41.02±10.69 (38.64-43.4)
21	49	35.26±10.61 (32.2-38.31)	46.43±10.35 (43.46-49.4)
22	41	37.25±11.50 (33.62-40.88)	44.63±11.75 (40.92-48.34)
Total	1890	33.36±10.48 (32.89-33.83)	44.27±11.22 (43.76-44.78)



The results of this study indicated that most of HRQoL components and subscales decrease with increasing age and this discrimination is more prominent in physical components than mental components of HRQoL. However, after adjustment for confounding factors, such as education, sex, and aloneness, there was no difference between age groups in terms of mental components, mental health, and general health. The scores of mental and physical subscales as well as all components of

HRQoL were worse in females than in male participants. These differences remained after adjustment for education and age.

The PCS and MCS scores decreased by increasing the participants' age; however, this decrease was not significant in MCS. This can be justified by the fact that the individual concept of the mental health status of older people may be less affected by increasing age than



their physical health of them. This decrease in HRQoL is justified by an increase in the prevalence of chronic diseases, such as cardiovascular and chronic obstructive pulmonary diseases [22] as well as geriatric syndromes, such as frailty syndrome and dementia [23]. Several studies have reported that with increasing the number of comorbidities, the HRQoL scores decrease [23, 24].

The best mean PCS scores were reported in district 22 followed by district one, and the worst PCS scores were in district 20 followed by the 16th district's older people residents. The highest MCS scores were observed in older people who were living in third and first municipal districts and the worst scores were reported from the 20th and 16th municipal districts. In general, it appears that the older people who were living in northern districts had better HRQoL than those living in southern districts of Tehran. However, these differences disappeared after adjustment for age, sex, education, and living alone. The attractive point was that the difference disappeared only when education was entered into the model. In the other words, it seems that higher education level is one of the main causes of having higher MCS scores in the northern districts of Tehran. This pattern with the weaker association was observed in MCS scores. In some other studies, it has been approved that HRQoL levels of the population, especially the PCS scores have an association with the educational level of their participants [11, 12, 25].

We found that differences in most components of HRQoL between districts of the Tehran metropolitan were dependent on education level, age, and being alone in participants from different districts. However, it seems that there was a real difference between the district's standpoint of bodily pain and emotional role.

The education levels of the older women were lower than the elder men. This difference was more obvious in the illiterate and academic groups. The women were about two times more illiterate and the proportion of them who had academic education was less than half of the men who had this level of education.

The proportion of the women who were widowed was several times more than the men and also the percentage of them who had spouses was less than half of men who had wives. This can be justified by the higher life expectancy of women than men and also because the marriage of women after the death of their spouses is less acceptable in Iranian culture, while the marriage of a man after his wife's death is more acceptable. Therefore, the proportion of older women who are living

alone is several times huger than this proportion of older men. Living alone is accompanied by a dependency on economic resources and can indicate a high risk of vulnerability in this group [26] and it seems that there is a need for an urgent intervention by the governmental health services and other policymakers.

Also, our study found that the mean scores of the mental subscale of HRQoL in all age groups and in both sexes were higher than the physical subscale of HRQoL. This has consistency with other findings [27, 28].

Our findings on higher scores in MCS than PCS in older people were reported in another study that was conducted on HRQoL of the Iranian people. Tajvar et al. assessed 400 older participants using the SF36 questionnaire and reported that the scores of the physical subscale were lower than the mental subscale of HRQoL [11]. Similar to our study, they also reported that the MCS, PCS, and other eight components of HRQoL were lower in females than males [11]. In another study, which was conducted in one of the cities of Iran on about 1000 elderly participants with age  $\geq 65$  years and using the SF36 tool, it was found that the mean PCS and MCS scores were higher in male participants than female participants but this difference was not significant about the MCS score [12]. In this study, there were only significant differences between general health, physical function, and vitality between the male and the female participants.

According to our knowledge, this study is the first paper that reported the HRQoL of older people and related factors at the district level of the Tehran metropolitan. The weak point of this study is that the bedridden older adults might less participate because they could not communicate. This weak point may cause an overestimation of the HRQoL scores.

## Conclusion

It seems that the HRQoL in the aged population of Tehran is significantly less in the female sex and higher in districts, in which the population has higher socioeconomic levels. Moreover, the HRQoL has an association with the education levels of elderly residents of Tehran multipollutant. The results of this study could help the policymakers to have more knowledge about the distribution of quality of life levels among older adults between districts of Tehran. Study on other factors related ot HRQoL of older adults, such as social behaviors and relationship is reasonable.



## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the ethical committee of the [Tehran University of Medical Sciences \(TUMS\)](#). All the participants accepted enrollment in the study orally and all of the data that were gathered was considered confidential.

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Urban Heart II was found by Municipality of Tehran. This study is extracted from a thesis of MPH entitled "Assessment of association between socioeconomic household features with health related quality of life among elderly people living in Tehran with registry number 950-118", [University of Social Welfare and Rehabilitation Sciences](#).

### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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