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Health-related quality of life and perceived health status of Turkish population

Gönül Dinç Horasan[1] · Kevser Tarı Selçuk[2] · Sibel Sakarya[3] · Kaan Sözmen[4] · Gül Ergör[5] · Nazan Yardım[6] · Gülay Sarıoğlu[6] · Meltem Soylu[6] · Bekir Keskınkılıç[6] · Turan Buzgan[6] · Ünal Hülür[6] · Halil Ekinci[6] · Banu Ekinci[6] · Belgin Ünal[5]

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Abstract

Purpose This study was conducted to assess the health-related quality of life (HRQOL) and perceived health status of the Turkish population.

Methods The data came from a nationwide survey, which was conducted by Ministry of Health on prevalence and risk factors for chronic diseases in Turkey, with a representative random sample of 18,477 people aged ≥ 15 years from Turkey. Each family physician invited two individuals selected from their registered population to the Family Health Center, conducted the survey by face to face interviews using an electronic form. HRQOL was determined using EQ-5D-3L scale.

Results In Turkish population, each four women out of 10, two men out of 10 have problems in pain/discomfort and anxiety/depression dimensions of the scale; three women out of 10, one man out of 10 have some or severe problems in mobility. Proportion of people without health problems (health state 11,111) were 64,1% in men, 40,7% in women. The mean VAS score for males was 71.5 ± 0.2 (95% CI 70.9–72.1), 66.4 ± 0.2 (95% CI 65.8–66.9) for females ($p < 0.05$).The most important determinants of having a problem in any of the five dimensions are age, gender, education, diabetes mellitus, coronary heart disease, stroke, alzheimer, cancer, renal failure. The OR of having some or severe problems in any dimensions was 4.6 (95% CI 38–5.4) for over 65–74 and 7.5 (95% CI 5.8–9.6) for over 75 compared to 15–24 age group.

Conclusions The perceived health level and HRQOL is worse in women, in older age groups, in people from lower socioeconomical status.

Keywords EQ-5D-3L · HRQOL · Perceived health level · Socioeconomical factors

Introduction

Quality of life (QOL) is a multidimensional scale proposed as a health indicator of a population, and it is used to evaluate health promotion actions [1, 2]. QOL has been defined by the World Health Organization (WHO) as "individuals' perception of their position in life in context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [3]. A component of QOL, the Health-Related Quality of Life (HRQOL) is a useful indicator for determining general health status because it contains information about both the physical and mental health status of the individual and the impact of health status on QOL [4]. In addition to yielding information concerning patient management and policy development, HRQOL has become an important indicator to assess outcomes of health interventions [4, 5]. Therefore, there is a need to define population data based on HRQOL.

There are some studies at local level to examine HRQOL in Turkish adults in which the Turkish validated general HRQOL questionnaires such as The Short-Form 36 Health Survey (SF-36) [6–10], World Health Organization Quality of Life Scale (WHOQOL-BREF) [11–13], The European Quality of Life Five Dimensions Questionnaire (EQ-5D) [8, 14–18] were implemented. Some local studies mainly among patients and the elderly using SF36, WHOQOL-BREF, and World Health Organization Quality of Life Old Module (WHOQOL-OLD) [19], demonstrated varying results due to different characteristics of the study groups or instruments used [6, 9, 11, 12, 16, 18, 19]. In summary,

✉ Gönül Dinç Horasan
dincgonul@gmail.com

Extended author information available on the last page of the article

these studies indicate that HRQOL was worse in older age groups when compared to younger age groups [6, 9, 19]. Local studies used EQ-5D showed that when compared to daily activities and self-care, HRQOL was especially worse in the domains of pain/discomfort, anxiety/depression and mobility [15, 16, 18]. These studies also demonstrated that HRQOL is quite low among the elderly, women, and less educated people [6–19].

To our knowledge, the data on HRQOL and the perceived health status in adults at national level in Turkey were scarce. Hence, there is a need to define population data on HRQOL at the national level. This study was conducted to assess the HRQOL and perceived health status of the Turkish population using the EQ-5D questionnaire.

Methods

Participants and settings

This study was a community based cross sectional survey. We used data from the Chronic Diseases and Risk Factors Survey, 2011 conducted by the authors of this article in collaboration with the Turkish Ministry of Health. The methodology and descriptive findings of the survey have been described earlier [20]. The minimum sample size was estimated to determine 1% prevalence with 0.15% absolute precision at 95% confidence was 16,622. In order to overcome non-response bias, two individuals from the registered ≥ 15 years population of each family physician ($n = 20{,}044$) were randomly sampled by the Turkish Statistical Institute. All the individuals selected ($n = 40{,}088$) were invited to the Family Health Centre for interview. In total 18,477 (46.1%) individuals completed the questionnaire. A consent form explaining the study was provided to the participants, and they were informed that the data would be confidential. This study was based on secondary analysis of data with no participant identifiers from the Chronic Diseases and Risk Factors Survey 2011, which is freely available upon request from the Ministry of Health; therefore, it is not possible to trace any of the data to the actual individual. Thus, formal ethical clearance was not required [20]. Informed consents were obtained before data collection. Family physicians conducted the survey via face to face interviews using an electronic questionnaire form.

Measures

The Turkish version of the European Quality of Life Five Dimensions Three Level Questionnaire (EQ-5D-3L) was used to determine HRQOL. The EQ-5D-3L scale is a general HRQOL questionnaire developed by the EuroQOL Group aiming to provide a simple, generic measure of health to be used for clinical and economic appraisal [21]. Eser et al. conducted the Turkish validation [22]. EQ-5D-3L is comprised of two sections: the EQ-5D-3L descriptive system and the EQ Visual Analogue Scale (VAS). The EQ-5D-3L descriptive system is composed of five different dimensions, which are mobility, self-care, daily activities (i.e. working, studying, doing housework and family or leisure time activities), pain/discomfort and anxiety/depression. Participants were asked to rate their health status using the following scale for each dimension: (1) no problems, (2) some problems, or (3) severe problems. This three-way classification yields 243 possible "health states" for each dimension. These range from no problems (health state 11,111) to severe problems across all dimensions (health state 33,333). The participants evaluated according to their HRQOL on the day of the interview in five dimensions of EQ-5D-3L as "no problems-Level I", "some problems-Level II", and "severe problems-Level III".

In the second part of the EQ-5D-3L, a vertical VAS was used with values ranging between 0 and 100; "0" indicating "worst imaginable health state", and "100" indicating "best imaginable health state" [23]. After being informed about the scale, the participants were asked to tick their perceived health status.

Statistical analysis

The proportion of participants reporting no problems, some problems, or severe problems for each health state, the proportion of participants reporting health state 11,111, mean ± s of VAS (95% CI) was calculated according to age and sex. While evaluating health state 11,111, individuals who did not answer any of the items of EQ-5D-3L dimensions were excluded. Since Turkish population EQ-5D-3L tariff had not been developed yet, EQ-5D-3L utility scores were not calculated. Chi-square test, Kolmogorov Smirnov test, Mann Whitney-U test, Kruskal–Wallis test (with Bonferroni correction), and multivariate logistic regression analysis were used for data analysis. In order to correct provincial differences in response rates in the survey, weighed analysis according to weights of the provinces were implemented [20]. The SPSS 22.0 software (SPSS, Inc., Chicago, IL, USA) was used for data analysis; $p < 0.05$ was considered as statistically significant.

Results

Descriptive characteristics of the study sample are presented in Table 1. Of the study population, 10.9% are over 65 years old, 39.0% have primary school education, 18.4% live in Istanbul, 9.5% have no health insurance, and 29.4% live in rural areas. The percentages of known some morbidities

Table 1 Descriptive characteristics of the study sample, Turkey 2011

Descriptive characteristics	Male (*n*: 8748) (%)	Female (*n*: 9729) (%)	Total (*n*:18,477) (%)
Age			
15–24	19.6	19.2	19.4
25–34	21.1	20.9	21.0
35–44	19.6	19.4	19.5
45–54	16.7	17.6	17.2
55–64	12.4	11.7	12.0
65–74	6.7	6.6	6.7
75+	3.9	4.6	4.2
Education level***			
Illiterate	3.7	18.2	11.3
Literate	3.6	6.6	5.2
Primary	38.8	39.1	39.0
Secondary	20.0	13.7	16.7
High school	22.2	15.4	18.6
University	11.6	7.1	9.2
Region**			
Istanbul	18.2	18.6	18.4
Western Marmara	4.8	4.6	4.7
Aegean	13.3	14.6	14.0
Eastern Marmara	9.7	9.6	9.6
Western Anatolia	9.2	10.2	9.7
Mediterranean	12.9	12.4	12.6
Central Anatolia	5.1	5.3	5.2
Western Black Sea	6.4	6.5	6.4
Eastern Black Sea	3.6	3.5	3.6
North- Eastern Anatolia	2.9	2.6	2.7
Eastern Central Anatolia	5.0	3.9	4.4
South-Eastern Anatolia	8.8	8.3	8.5
Health insurance***			
Yes	88.7	92.2	90.5
No	11.3	7.8	9.5
Residence*			
Urban	69.8	71.4	70.6
Rural	30.2	28.6	29.4
Diabetes mellitus***			
Yes	6.8	8.7	7.8
No	93.2	91.3	92.2
CHD[a]***			
Yes	4.7	2.5	3.5
No	95.3	97.5	96.5
Stroke history			
Yes	1.3	1.4	1.3
No	98.7	98.6	98.7
Alzheimer			
Yes	0.8	0.7	0.7
No	99.2	99.3	99.3
Cancer*			
Yes	0.9	1.2	0.7
No	99.1	98.8	99.3
Renal failure			
Yes	0.7	0.6	0.7
No	99.3	99.4	99.3
Total	100.0	100.0	100.0

*$p<0.05$, **$p<0.01$, ***$p<0.001$, Chi square test

[a]Individuals with acute myocardial infarction, coronary by-pass operation or balloon angioplasty were accepted as coronary heart disease patients

were 7.8% for diabetes mellitus, 3.5% for coronary heart disease (CHD), 1.3% for stroke, 0.7% for alzheimer, 0.7% for cancer, and 0.7% for renal failure. There are slight differences in terms of the descriptive characteristics among males and females (Table 1).

The proportion of the participants stating that they experienced some or severe problems in any dimension is 49.7% while it was 37.4% in males and 60.9% in females. The number of people mentioning some or severe problems are more common in males and females in the dimensions of pain/discomfort (%22.8 and 44.7%, respectively), anxiety/depression (%20.3 and 36.37%, respectively), and mobility (%14.5 and 31.1%, respectively) ($p<0.001$, for both males and females). Four females out of 10 and two males out of 10 mentioned problems in the pain/discomfort and anxiety/depression dimensions of the scale; three females out of 10 and one male out of 10 mentioned some or severe problems concerning mobility. For both sexes, HRQOL decreases as age increases. Two males out of three among the 65-and-above age group, and nine females out of 10 mentioned problems in at least one of the five dimensions. In the young adult age group, problems in pain/discomfort and anxiety/depression are more frequent (Tables 2, 3).

The mean ± s of VAS score for males was 71.5 ± 27.9, and 66.4 ± 28.0 for females. For both sex, mean VAS scores decrease with age. The mean of VAS score is higher among males than females in all age groups (Table 4).

Using a multivariate logistic regression model, the ORs of having a problem in at least one of the five dimensions were examined for age, sex, education, region, residence, and health insurance (Table 5). The results revealed that the most important deterministic factors were age, sex and educational level, known diabetes mellitus, known CHD, stroke history, known alzheimer, known cancer, and known renal failure. The OR of experiencing a problem in at least in one of the five dimensions increases with age. Compared to the ORs of the 15–24 age group, the

Table 2 Proportion with some/severe problems for EQ-5D-3L dimensions among males, Turkey 2011

Dimensions	Age groups							Total[a] (%)	Total (standardized)* (%)
	15–24 (%)	25–34 (%)	35–44 (%)	45–54 (%)	55–64 (%)	65–74 (%)	75+ (%)		
(A) Mobility									
1 No problems	96.4	93.0	90.3	85.1	77.7	60.3	36.5	85.5	87.0
2 Some problems	3.5	6.9	9.6	14.9	22.1	38.7	61.4	14.3	12.8
3 Severe problems	0.1	0.1	0.1	0.0	0.2	1.0	2.1	0.2	0.2
(B) Self-care									
1 No problems	98.8	98.6	98.0	97.1	94.1	88.1	67.5	95.8	96.3
2 Some problems	0.5	1.1	1.7	2.5	5.0	10.2	27.2	3.4	3.0
3 Severe problems	0.7	0.3	0.3	0.4	0.9	1.7	5.4	0.8	0.7
(C) Usual activities (i.e. working, studying, house errands, and family or leisure time activities)									
1 No problems	97.3	96.4	95.1	94.6	90.5	81.8	58.4	92.8	93.5
2 Some problems	2.3	3.4	4.6	5.1	9.0	15.0	35.3	6.4	5.8
3 Severe problems	0.4	0.2	0.3	0.3	0.6	3.2	6.3	0.8	0.7
(D) Pain/discomfort									
1 No problems	90.6	83.9	79.1	73.0	68.8	57.4	42.8	77.2	78.6
2 Some problems	9.1	15.0	20.4	26.1	30.0	40.1	53.6	21.8	20.4
3 Severe problems	0.3	1.1	0.5	0.8	1.2	2.6	3.6	1.0	0.9
(E) Anxiety/depression									
1 No problems	82.2	79.5	77.7	80.1	80.3	79.6	76.3	79.8	79.9
2 Some problems	16.3	18.7	20.6	17.8	18.4	18.5	21.0	18.5	18.4
3 Severe problems	1.5	1.8	1.7	2.2	1.3	1.9	2.7	1.8	1.8
% of reporting some problems, or severe problems in any dimension	23.7	30.7	36.1	39.6	46.1	58.8	74.0	37.4	35.9
*n***	1719	1847	1714	1467	1085	591	338	8761	

*Standardized using Turkey 2010 population

**There are missing values between 116 and 159 in various dimensions

[a]$p < 0.001$, the differences between % of some/severe problems in the dimensions were compared

OR is as high as 5.0 (95% CI 3.6–6.8) for males, and 12.9 (95% CI 8.3–20.2) for females among the elderly over 75. Compared to males, females also have an increased OR of 2.5 (95% CI 2.3–2.7). The OR of suffering from a problem in at least one of the five dimensions decreases according to increasing educational levels. Compared to their counterparts with a university education, the OR is as high as 3.2 (95% CI 2.7–3.8) for illiterate people, 2.4 (95% CI 10.7–25.2) for literate people. When compared to Istanbul, the results of the multivariate model for experiencing a problem in at least one of the five dimensions indicated a slightly decreased OR within some regions such as the Western Marmara, Aegean, and Mediterranean regions, and a slightly increased OR of absence of health insurance. We found statistically significant relationships between presence of a chronic disease such as diabetes, CHD, stroke, cancer, alzheimer, renal failure, and HRQOL. The ORs ranged from 5.9 (95% CI 2.6–13.4) for alzheimer to 1.5 (95% CI 1.3–1.8).

Discussion

This is the first study to report EQ-5D-3L data for a large, randomly selected, community-based general population sample in Turkey. These results provide important insights into the HRQOL of the Turkish population.

In the five dimensions of the HRQOL, it is apparent that there are a higher proportion of Turkish people who experience problems pertaining to mobility, pain/discomfort, and anxiety/depression. When compared according to age, the HRQOL for older people and for females was much worse overall. Two out of three men and nine out of ten women above the age of 65 experience problems in at least one dimension of the HRQOL.

Recent studies in which the EQ-5D questionnaire was used in countries such as the UK, Italy, Australia, Poland, China, and Brazil, reported similar results pertaining to increases in problems of mobility, pain/discomfort, and anxiety/depression [24–29]. Szende et al. conducted a study in 2014 in which data from 18 countries

Table 3 Proportion with some/severe problems for EQ-5D-3L dimensions among females, Turkey 2011

Dimensions	Age groups							Total[a] (%)	Total (standardized)* (%)
	15–24 (%)	25–34 (%)	35–44 (%)	45–54 (%)	55–64 (%)	65–74 (%)	75+ (%)		
(A) Mobility									
1 No problems	92.0	85.0	75.8	60.3	45.1	31.8	17.7	68.9	70.4
2 Some problems	7.9	14.9	24.2	39.6	54.5	67.6	78.7	30.8	29.3
3 Severe problems	0.2	0.1	0.0	0.1	0.4	0.6	3.7	0.3	0.3
(B) Self-care									
1 No problems	98.9	97.9	97.6	94.3	89.4	75.8	50.8	92.8	93.1
2 Some problems	0.9	1.5	2.1	5.4	9.7	21.5	35.6	6.0	5.8
3 Severe problems	0.2	0.6	0.3	0.4	0.9	2.7	13.6	1.2	1.2
(C) Usual activities (i.e. working, studying, house errands and family or leisure time activities)									
1 No problems	97.0	92.0	87.1	79.1	68.6	57.9	35.6	82.2	83.0
2 Some problems	2.8	7.5	12.4	20.8	30.3	39.4	48.6	16.6	15.7
3 Severe problems	0.2	0.6	0.4	0.1	1.2	2.7	15.7	1.3	1.3
(D) Pain/discomfort									
1 No problems	83.9	70.8	56.1	43.1	31.3	23.3	15.6	55.3	57.1
2 Some problems	15.9	27.8	40.9	53.1	61.9	66.9	68.1	40.9	39.4
3 Severe problems	0.2	1.4	3.0	3.8	6.7	9.8	16.3	3.8	3.6
(E) Anxiety/depression									
1 No problems	74.6	66.2	62.4	56.2	58.3	61.6	58.6	63.7	64.4
2 Some problems	23.4	29.3	33.4	39.1	36.6	34.3	33.8	32.1	31.5
3 Severe problems	2.0	4.5	4.2	4.7	5.2	4.1	7.6	4.2	4.1
% of reporting some problems, or severe problems in any dimension	34.7	49.0	60.1	72.2	80.7	88.4	93.9	60.9	59.3
*n***	1866	2030	1882	1713	1138	643	443	9715	

*Standardized using Turkey 2010 population

**There are missing values between 109 and 175 in various dimensions

[a]$p < 0.001$, the differences between % of some/severe problems in the dimensions were compared

Table 4 Mean scores of EQ-5D-3L visual analogue scale according to age and sex, Turkey 2011

Age groups	*n*	Total Mean ± s	Male Mean ± s	Female Mean ± s	*p
15–24[a]	3585	76.3 ± 27.7	77.1 ± 27.9	75.5 ± 27.5	< 0.001
25–34[b]	3877	71.5 ± 28.3	74.1 ± 27.1	69.1 ± 29.2	< 0.001
35–44[c]	3596	69.0 ± 27.7	71.6 ± 27.4	66.6 ± 27.8	< 0.001
45–54[d]	3180	66.5 ± 27.2	69.4 ± 27.9	64.0 ± 26.3	< 0.001
55-64[e]	2224	65.0 ± 26.6	68.9 ± 26.9	61.2 ± 25.7	< 0.001
65–74[f]	1234	59.4 ± 27.9	63.1 ± 29.4	56.0 ± 26.0	< 0.001
75+[g]	781	55.5 ± 25.9	60.6 ± 25.7	51.6 ± 25.5	< 0.001
Total	18,477	68.8 ± 28.1	71.5 ± 27.9	66.4 ± 28.0	< 0.001
**p		< 0.001 a > b > c > d = e > f > g	< 0.001 a > b > c = d = e > f = g	< 0.001 a > b > c > d > e > f = g	

*p Mann Whitney-u test

**p Kruskal Wallis test with Bonferroni correction, Type 1 error was accepted as 0.0025 for statistically significance of pairwise comparisons

Table 5 Adjusted ORs, and 95% confidence intervals of risk factors for having some or severe problems in any dimensions of EQ-5D-3L in males and females

Variables	Male		Female		Total	
	Some or severe problems		Some or severe problems		Some or severe problems	
	%	OR (95% CI)[a]	%	OR (95% CI)[a]	%	OR (95% CI)[a]
Sex						
Male					**37.4**	1.00
Female					**60.9**	2.5 (2.3–2.7)***
Age						
15–24	23.7	1.00	34.7	1.00	29.4	1.00
25–34	30.7	1.4 (1.2–1.7)***	49.0	1.5 (1.3–1.8)***	40.2	1.5 (1.4–1.7)***
35–44	36.1	1.7 (1.5–2.1)***	60.1	2.3 (2.0–2.7)***	48.7	2.1 (1.9–2.4)***
45–54	39.6	1.9 (1.6–2.3)***	72.2	3.5 (2.9–4.1)***	57.2	2.7 (2.4–3.03)***
55–64	46.1	2.2 (1.8–2.7)***	80.7	4.8 (3.9–5.9)***	63.9	3.3 (2.9–3.8)***
65–74	58.8	3.0 (2.4–3.8)***	88.4	7.4 (5.5–10.01)***	74.1	4.6 (3.8–5.4)***
75+	74.0	5.0 (3.6–6.8)***	93.9	12.9 (8.3–20.2)***	85.2	7.5 (5.8–9.6)***
NUTS 1 regions						
Istanbul	37.6	1.00	61.3	1.00	50.2	1.00
West Marmara	33.8	0.7 (0.5–0.9)**	60.0	0.7 (0.5–0.9)**	47.3	0.7 (0.6–0.8)***
Aegean	34.3	0.7 (0.6–0.9)**	59.7	0.8 (0.7–0.9)**	48.2	0.8 (0.7–0.9)***
E. Marmara	37.6	0.9 (0.8–1.1)	60.6	0.9 (0.7–1.08)	49.5	0.9 (0.8–1.04)
W. Anatolia	35.5	0.9 (0.7–1.04)	62.4	0.9 (0.8–1.2)	50.4	0.9 (0.8–1.05)
Mediterranean	34.0	0.8 (0.7–0.9)**	55.7	0.8 (0.6–0.9)**	45.2	0.8 (0.7–0.9)***
Central Anatolia	38.2	0.9 (0.7–1.2)	66.0	1.01 (0.8–1.3)	52.9	0.9 (0.8–1.2)
W. Black Sea	41.6	0.9 (0.8–1.2)	65.7	0.9 (0.7–1.1)	54.3	0.9 (0.8–1.1)
E. Black Sea	40.5	0.9 (0.7–1.3)	66.9	1.2 (0.9–1.7)	54.1	1.09 (0.9–1.3)
N.E. Anatolia	41.3	1.1 (0.8–1.5)	65.8	1.05 (0.9–1.5)	53.5	1.05 (0.8–1.3)
E.C. Anatolia	38.2	1.1 (0.9–1.4)	63.7	1.1 (0.8–1.5)	50.0	1.09 (0.9–1.3)
S.E. Anatolia	43.7	1.3 (1.04–1.6)*	56.9	0.7 (0.6–0.9)**	50.4	0.9 (0.8–1.09)
Educational level						
University (ref)	28.6	1.00	40.2	1.00	33.3	1.00
Illiterate	68.7	2.8 (2.1–3.9)***	82.8	3.2 (2.6–4.1)***	80.6	3.2 (2.7–3.8)***
Literate	61.9	2.3 (1.7–3.1)***	74.8	2.5 (1.9–3.2)***	70.5	2.4 (2.0–2.9)***
Primary (first level)	42.6	1.5 (1.3–1.8)***	64.3	2.0 (1.7–2.4)***	54.1	1.7 (1.5–1.9)***
Primary (second level)	30.7	1.3 (1.1–1.6)**	43.6	1.6 (1.3–1.9)***	36.2	1.4 (1.3–1.7)***
High school	29.7	1.2 (0.9–1.4)	45.3	1.4 (1.1–1.7)**	36.4	1.3 (1.1–1.5)***
Residence						
Rural	39.9	1.00	64.6	1.00	52.6	1.00
Urban	36.3	1.01 (0.9–1.1)	59.3	1.08 (0.9–1.2)	48.5	1.05 (0.9–1.1)
Health insurance						
Yes	37.6	1.00	60.9	1.00	50.1	1.00
No	35.7	1.2 (1.03–1.4)*	60.7	1.2 (1.04–1.5)*	46.4	1.3 (1.1–1.4)***
Diabetes mellitus						
No	35.9	1.00	58.6	1.00	47.7	1.00
Yes	57.2	1.5 (1.2–1.8)***	84.1	1.5 (1.2–1.9)***	73.0	1.5 (1.3–1.8)***
CHD[b]						
No	36.5	1.00	60.1	1.00	49.0	1.00
Yes	57.6	1.2 (0.9–1.5)	90.8	1.9 (1.2–3.2)**	70.0	1.2 (1.01–1.5)*
Stroke history						
No	36.8	1.00	60.4	1.00	49.2	1.00
Yes	82.4	4.2 (2.4–7.1)***	85.9	1.7 (0.9–2.9)	84.3	2.7 (1.8–3.9)***

Table 5 (continued)

Variables	Male		Female		Total	
	Some or severe problems		Some or severe problems		Some or severe problems	
	%	OR (95% CI)[a]	%	OR (95% CI)[a]	%	OR (95% CI)[a]
Alzheimer						
No	36.9	1.00	60.6	1.00	49.4	1.00
Yes	93.8	11.5 (3.4–38.8)***	93.9	2.5 (0.8–7.7)	93.9	5.9 (2.6–13.4)***
Cancer						
No	37.1	1.00	60.5	1.00	49.4	1.00
Yes	69.4	2.4 (1.4–4.2)**	85.3	2.1 (1.2–3.8)*	79.0	2.2 (1.5–3.2)***
Renal failure						
No	37.1	1.00	60.6	1.00	49.5	1.00
Yes	69.0	2.5 (1.3–4.6)**	84.2	2.04 (0.9–4.5)	76.1	2.2 (1.3–3.6)**

[a]Dependent variable, health status 11,111 = 0, having some problems and severe problems in any dimensions of HRQOL = 1. Independent variables. Sex (Male: 0, Female: 1), Age (15–24: Reference group) NUTS1 (Istanbul: Reference group), Education level (University: 15–24: Reference group), Residence (Rural: 0, Urban: 1), Health insurance (Yes: 0, No: 1), Known diabetes mellitus (No: 0, Yes: 1), Known CHD[a] (No: 0, Yes: 1), Stroke history (No: 0, Yes: 1), Known Alzheimer (No: 0, Yes: 1), Known cancer (No: 0, Yes: 1), Known renal failure (No: 0, Yes: 1)

[b]Individuals with acute miyokard infarction, coronary by-pass operation or balloon angioplasty were accepted as coronary heart disease patients

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

were evaluated; comparable to our findings, the results of Argentina, Hungary, Korea, Thailand, the U.K., and the USA indicated problems in mobility, pain/discomfort, and anxiety/depression. The results from Belgium, Germany, Greece, Italy, the Netherlands, and Spain indicated problems in mobility, anxiety/depression, and the ability to carry out daily activities. However, in Denmark, New Zealand, and Slovenia, there appeared to be a higher proportion of people who suffered in daily activities, pain/discomfort, and anxiety/depression. In addition, the highest proportion of sufferers on the scale was found to be Slovenia and Thailand, whereas the lowest VAS scores were in Hungary and Korea. Similarly, while China indicated they had the lowest proportion of sufferers in the EQ-5D, the highest VAS score was found in Denmark [30]. In order to form an international data base for the EQ-5D, over a period ranging from 1994 to 2002, the EuroQOL Group gathered and published research data from 15 countries, most of whom were located in Europe. These nations were comprised of Armenia, Belgium, Canada, Finland, Germany, Greece, Hungary, Japan, the Netherlands, New Zealand, Slovenia, Spain, Sweden, and the UK [21]. The age categories used in these studies were not directly comparable to our study; therefore, the EQ-5D-3L data obtained for Turkey were recalculated to compare findings of the studies. The results obtained for those experiencing difficulty in daily activities, pain, and anxiety/depression were similar. The under 60 self-care data was similar too; however, there was a higher prevalence of some/severe problems in self-care in the over 60 group (21.9% and 13.0% respectively). Even more importantly, the Turkish population exhibited more problems in mobility than all 15 countries across all age groups. Compared to the 15 countries, the Turkish population experienced mobility problems of 5.0% and 10.2% in the 18–29 age group, 16.0% and 27.2% in the 40–59 age group, and 40.0% and 56.5% in those 60 and older [21].

In this national survey, we found higher percentages of having some or severe problems in any dimensions of HRQOL compared to Turkish validation study conducted in Manisa Region (22). In the Turkish Chronic Disease and Risk Factors Survey, the percentages were approximately 10% higher in each age group in men while approximately 20% higher in age groups between 35 and 74 in females. Better HRQOL in the Manisa Study may be due to a better living conditions in the Manisa city centre. Manisa is located in the Aegean Region of Western Turkey and is the eleventh largest of 81 provinces of Turkey based on gross domestic areas product data released by the National Statistics Office [31]. Manisa is considered relatively wealthy, urbanised district with lower total fertility rate, 1.8 and 2.16 in Manisa [32] compared Turkey [33]. We could not access a population-based survey using EQ-5D scale in Turkey. On the other hand, there are several studies conducted on patient groups [8, 14–18, 34]. The studies conducted on patients of psoriasis [16], cancer [18], cardiac disease [34] also show HRQOL has been affected in a bad manner in mobility, pain/discomfort, and anxiety/depression dimensions. The clinical

studies using some different QOL scales such as SF-36, WHOQOL-BREF showed older age groups and risk factors for worse HRQOL [6, 9, 11, 19, 35, 36].

In this study, the EQ-5D-3L mean VAS was 68.8 (71.5 for males and 66.4 for females). In the study conducted by Szende et al., the highest VAS scores were observed in Denmark (83.2), the U.K. (82.7), and Sweden (82.4). The lowest scores were Hungary (70.3), Korea (71.3), and Argentina (73.7) [30]. In studies conducted in Southern Australia, Italy, and the U.K., the VAS averages determined for both males and females were observed to be much higher than Turkey [24–26]. When Turkish EQ-5D-3L data are compared to the data of the EuroQOL Group study based on the data obtained from the 15 countries in Europe, the HRQOL is similar for all dimensions except for mobility. Although there were no major differences in EQ-5D-3L data other than in mobility between the Turkish society and the other 15 nations, there were critical differences in perceived health status [21]. Beginning with the 18–29 group and for each 10 year increment upwards, the VAS averages for both females and males were lower than the other 15 countries [21]. In 15 countries study, a negative linear relationship with unemployment was detected and it was reported that there was a direct correlation with a nation's developmental level and perceived health status [21]. When compared to the other nations, the low perception of health status in Turkish community may be a reflection of the country's relatively low socioeconomic status in Turkey.

In Turkey, the population of older people is increasing rapidly and this situation is accompanied by various health problems and social concerns [37]. Research indicates that there is an increase in the prevalence of health problems with age which result in negative impact in HRQOL and perceived health status for the elderly. These include chronic illnesses, decreases in daily activities, the regression of mobility, sleep problems, inability to benefit from adequate health care, loss of income following retirement, loss of role or status, isolation, the decrease in cognitive skills, and alienation from social life [38, 39]. Comparable to the literature, our study also observed deterioration in all fields of the HRQOL. As age increases, the proportion of individuals who experience some or severe difficulties in daily activities also increase and perceived health status get worse [24, 26, 27, 30, 40–42]. The U.K. Health Survey conducted in 2007 implemented the EQ-5D and evaluated the HRQOL of people 65 and older [43]. In five-year increments starting with age 65, Turkish elderly experienced more difficulties in EQ-5D-3L similar to the British population. Especially after 75 and above, the HRQOL of the Turks was much worse than the British elders. For example, the proportion of those people 85 or above who were not capable of maintaining self-care in Turkey and the U.K were 55.9% versus 14% for males, and 74.6% versus 27% for females respectively. These results are applicable to not experiencing difficulties in other dimensions of the EQ-5D as well. The distribution variations in not experiencing difficulties (EQ-5D 11,111) based on 5-year increments of individuals 65 or older range from 7.5–13.0% for males, and 3.2–13.0% for females. Compared to the U.K. data, it appears that especially for older women in Turkey, perceived health status is very poor [43].

In this study, we found the percentages of having some or severe problems in any dimensions of HRQOL were approximately twofold higher among women compared to men. VAS scores of women were also lower. Research conducted in Germany, South Korea, Poland, and Portugal indicated that HRQOL and perceived health status was lower in females than males [25–27, 38–42, 44]. Factors like lower educational level, lower participation to work force among women compared to men may be responsible of the difference in HRQOL according to sex. Life-course gender gap statistics of UNDP such as population with at least some secondary education (female-to-male ratio is 0.68), total unemployment rate (female-to-male ratio is 1.47) reflects the gender inequalities in Turkey in 2018 [45]. The lower HRQOL among less educated women and men compared to the ones with higher education also supports this argument. The reason of worse HRQOL among elderly women may also due to their high participation to workforce in agriculture during adulthood. Over 50% of these women in rural areas probably worked under hard circumstances till the beginning of 1990s [46]. High fertility may be another reason for low HRQOL among Turkish females. Total fertility rate in Turkey has varied between 4.6 and 3.31 in the past fifteen years [47].

The ORs of having some or severe problems in any dimensions of EQ-5D-3L as high as 11.5 (95% CI 3.4–38.8) for alzheimer and 4.2 (95% CI 2.4–7.1) for stroke in males. Presence of chronic diseases has been also found an important risk factor for worse quality of life in several studies [35, 48].

Strengths and limitations of the study

There are some strengths and limitations of this study. This is the first national study determining the quality of life using EQ-5D-3L. The possibility of measurement bias is probably low since the information of the participants was collected by their family physicians. The sample size of the survey is large. However, the response rate was lower than expected (47.5%). In some provinces, recent transition to family practice, weak administration of the health system, frequent replacement of family physicians emerged as important obstacles for the data collection of the study. However, the participation rates in the studies in developed countries have been gradually decreasing. The median participation rate for

a similar study, BRFSS, in the USA, was 71% in 1993, 49% in 2000, and 51% in 2005 [49]. On the other hand, different response rates between provinces were corrected using weighted analysis. The weights were calculated using the distribution rates of provinces to the total population and the distribution rates of individuals to the provinces. We think that the sampling bias due to low response rate might be random, because our crude and age-sex standardised estimations are quite similar. For example, we calculated crude percentage of reporting some or severe problems in any dimension as 49.7% while the standardised percentage was 47.6%. On the other hand, the similar results of the study compared to the other surveys conducted at similar years also support this argument. For example, smoking prevalence in this study (43% for males, 17% for females) is quite similar to the smoking prevalence in Global Adult Smoking Survey Turkey in 2012 (41.5% of males and 13.1% of females) [50]. The 5-level EQ-5D version (EQ-5D-5L) was introduced by the EuroQOL Group in 2009 to improve the instrument's sensitivity and to reduce ceiling effects, as compared to the EQ-5D-3L. In this version, the number of levels of perceived problems per dimension was changed from 3 to 5 [51]. Unfortunately, we used EQ-5D-3L scale in this study due to the absence of Turkish version of EQ-5D-5L at the time of planning of the survey. The results of the study should be interpreted with a caution of possible bias of ceiling effect on our results.

Conclusion

When compared to the data from European countries, the perceived health level and HRQOL among the Turkish population, especially among the elderly, is quite low. Turkey's relatively lower socioeconomical levels and high fertility among Turkish women may be responsible for the lower HRQOL scores found in the Turkish population compared to the European countries.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval We used data from the Chronic Diseases and Risk Factors Survey, 2011, conducted by the Turkish Ministry of Health. Thus, formal ethical clearance was not required.

Informed consent It were obtained before data collection.

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Affiliations

Gönül Dinç Horasan[1] · Kevser Tarı Selçuk[2] · Sibel Sakarya[3] · Kaan Sözmen[4] · Gül Ergör[5] · Nazan Yardım[6] · Gülay Sarıoğlu[6] · Meltem Soylu[6] · Bekir Keskınkılıç[6] · Turan Buzgan[6] · Ünal Hülür[6] · Halil Ekinci[6] · Banu Ekinci[6] · Belgin Ünal[5]

Kevser Tarı Selçuk
kevser_tari@hotmail.com

Sibel Sakarya
sibelsakarya@gmail.com

Kaan Sözmen
drmelihkaan@hotmail.com

Gül Ergör
gul.ergor@deu.edu.tr

Nazan Yardım
nazan.yardim@saglik.gov.tr

Gülay Sarıoğlu
Gulay.Sarioglu@saglik.gov.tr

Meltem Soylu
meltemboh@gmail.com

Bekir Keskınkılıç
bekir.keskinkilic@saglik.gov.tr

Turan Buzgan
tbuzgan@ybu.edu.tr

Ünal Hülür
unal.hulur@saglik.gov.tr

Halil Ekinci
halil.ekinci@saglik.gov.tr

Banu Ekinci
drbanutek@yahoo.com

Belgin Ünal
belgin.unal@deu.edu.tr

[1] Department of Public Health, Faculty of Medicine, Izmir University of Economics, Izmir, Turkey

[2] Department of Nutrition and Dietetics, Faculty of Health Sciences,, Bandirma Onyedi Eylul University, Balikesir, Turkey

[3] Department of Public Health, Faculty of Medicine, Koç University, Istanbul, Turkey

[4] Department of Public Health, Faculty of Medicine, Katip Celebi University, Izmir, Turkey

[5] Department of Public Health, Faculty of Medicine, Dokuz Eylul University, Izmir, Turkey

[6] Republic of Turkey Ministry of Health Turkish Public Health Institution, Ankara, Turkey