ORIGINAL RESEARCH

Quality of Life and Socioeconomic Status in Northwest of Iran: First Wave of the Persian Traffic Cohort Study

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Abstract

This study aimed to evaluate the association between Quality of Life (QOL) and independent factors, emphasizing Socio Economic Status (SES) in northwestern Iran. A population-based cross-sectional study was performed within the Persian Traffic safety and health Cohort in 2020. Participants were chosen using stratified random sampling method. The majority of participants (69%) were aged between 30 and 65. Around half of the participants were males (54.44%). Most of the female respondents were categorized as very low and medium levels of SES Based on multiple linear regression analysis, the QOL among females was lower compared to males (β: −0.92, 95% CI −1.82 to −0.22). There was a negative association between SES and QOL; individuals with low and very low levels of SES had a lower QOL than those with a medium level of SES (β: −4.38, 95% CI −5.9 to −2.86) (β: −2.65, 95% CI −4.08 to −1.22). The current study highlights that higher SES and educational levels are positively associated with higher QOL. Conversely, older age, females, and widowed individuals are linked with lower QOL.

Keywords Cohort study · Epidemiology · Traffic accidents · Quality of life · Socio economic status

Introduction

Health-Related Quality Of Life (HRQOL) is becoming an increasingly important concept in medical, psychological, and social domains (Wippold & Frary, 2022). Quality of Life (QOL) is defined by the WHO as individuals' apprehension of their situation in life within the context of the value and culture systems in which they live and is related to their expectations, goals, concerns, and standards (https://www.who.int/tools/whoqol). HRQOL is used to determine the burden of injuries and

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preventable diseases (Yazdani et al., 2015). It is also beneficial for monitoring public health programs. Despite its common use, there is often a lack of a clear definition or understanding of it (Niedzwiedz et al., 2012). Different definitions of QOL encompass consensus on the dynamic, objective, and subjective concepts of QOL (Vanleerberghe et al., 2017). Evaluation and measurement of this concept depict the state of human development in society. For this reason, governments are increasingly using QOL assessments to measure a society's progress (Stiglitz et al., 2009; Yazdani et al., 2015).

In Numbeo's 2022 quality of life report, Switzerland is ranked first with a score of 195/27. Denmark, the Netherlands, and Finland had the highest quality of life after Switzerland. Iran is ranked 86th among the other countries. Tabriz was categorized as a very low group with the score of 79.14 (https://www.numbeo.com/quality-of-life/comparison.jsp).

Quality of life is the product of mutual interactions among society, health, economy, and environmental conditions that affect human and social development (Kaczmarek et al., 2017). Iran's Gross Domestic Product (GDP) was U.S. $ 366.43 billion in 2023, and Iran was ranked 42nd (https://www.imf.org/en/Publications/WEO/weo-database/2023/April). The debate on whether a higher income in a country is related to a better QOL is considered crucial for policy purposes and scientific.

Socioeconomic status (SES) is an important determinant of health at all ages, and it has become an important challenge for healthcare systems globally (Stringhini et al., 2017). Although some studies have investigated the association between SES and QOL, there has not been a comprehensive evaluation of SES, at least in Iran. In these studies, the evaluation of the SES was done using only one or a few associated variables, such as insurance coverage or income level (Behzadifar et al., 2016; Ghahramani et al., 2023).

Although Iran has undergone notable economic and social transformations in recent years, there has been no population-based study conducted in northwestern Iran to assess the correlation between QOL and SES utilizing a comprehensive scale. Therefore, the current study aimed to investigate the association between the QOL of Iranians and sociodemographic factors, emphasizing SES.

Methods

Study Design and Participants

A population-based cross-sectional data was collected as part of the Persian Traffic Cohort (PTC) (Golestani et al., 2024). PTC is the first population-based traffic cohort in Eastern Mediterranean region. The PTC has two separate parts; the registered-based cohort for post-crash and the population-based cohort for pre-crash. The pre-crash cohort study, was started in 2019 to evaluate the risk factors of traffic crashes in Tabriz, the capital of East Azerbaijan Province, Iran, and will continue for the next 30 years (https://cohortsafety.tbzmed.ac.ir; Mousazadeh et al., 2021; Sadeghi-Bazargani et al., 2022). Tabriz, located in the northwest of Iran, is the largest city and representative of the population of East Azerbaijan province. Based on

the 2022 national census, the population of Tabriz was 1,726,293, of which 87.67% lived in the urban area.

Data Collection

Data were gathered in 2020. To categorize the neighborhoods of Tabriz by SES level, an expert panel (provincial health center experts and the traffic research center experts) was conducted. The experts included one epidemiologist, one psychiatrist, one psychologist, one medical geneticist, one general practitioner, one nurse, four healthcare providers, and two health economists. In total, the neighborhoods of Tabriz were categorized into three strata based on their socioeconomic status (SES): low, medium, and high levels. Subsequently, 20 neighborhoods were randomly chosen from each of the three SES levels. Then, within each cluster, 20 households have been randomly selected. At the end, all people in each household entered the study (Fig. 1).

Inclusion criteria were being at least 14 years old, eager and volunteer to participate in this study, resident at Tabriz. Persons under 14 years old and those did not complete more than 50% of questions were excluded from the study. Based on the initial pilot study ($n = 200$) mean (SD) quality of life was 69.32 (11.87). The sample size was estimated at 1829, considering that $\alpha = 0.05$, 95% confidence interval, $d = 0.6$, and the mean $(SD) = 69.32$ (11.87). Assuming design effect $= 1.3$ the final sample size set at 2012.

Instruments and Variables Section

We used trained data collectors for conducting interviews and gathering data. The data collectors filled out the questionnaire through face-to-face interviews and home-to-home visits. The QOL was measured using the WHO Quality Of Life Questioner (WHOQOL-BREF) (Nejat et al., 2006). The current tool was validated in the Iranian population with Intra class Correlation Coefficient (ICC > 0.7) and Cronbach's alpha test ($\alpha > 0.70$) for all domains. WHOQOL-BREF is a self-reported tool that measures the QOL over the last month. This tool includes 26 items and addressed four QOL domains: psychological health (six items), physical health (seven items), environment health (eight items), and social relationship (three items). Two beginning items assess general health and overall QOL. Items are designed on a 5-point Likert scale (1 is the lowest and 5 is the highest score). The minimum possible score is 26 and the maximum is 130. A higher score on this scale indicated higher QOL.

Moreover, ultra-short versions Socioeconomic Status Questionnaire for Urban Households (SESIran) was used for assessing of participants' SES level (Sadeghi-Bazargani et al., 2015). Cronbach's alpha test was estimated ($\alpha > 0.65$) for this tool. This self-reported questionnaire contains 6 items: occupation, education, house cost, car cost, and health expenditure. Items 1 to 3 were rated on a 7-point Likert scale, and items 4–5 and item 6 were rated on a 6 and 5-point Likert scale, respectively. Except for item 1, 1 is the lowest score in all items. Therefore, to calculate the total score, it's necessary to reverse the score of the first question. Next, items 3 to 6 are
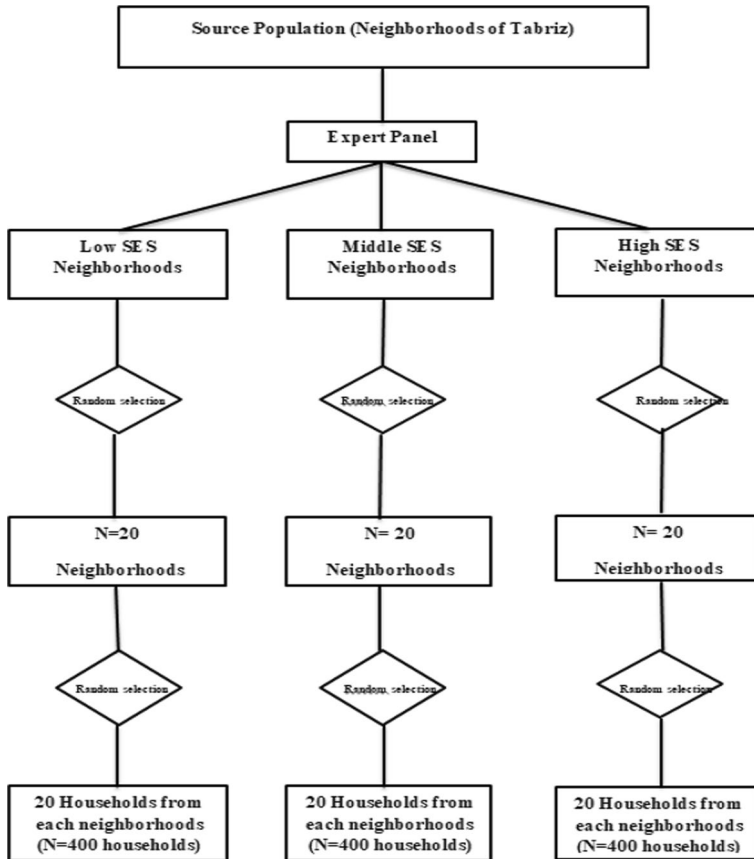
Fig. 1 Strategy for selecting participants in the present study

weighted by 0.25. Finally, the scores of all items are summed. A higher score indicates a higher level of SES. Furthermore, to categorize the quantitative variable of SES after data normalization, we utilized the quintile of data method.

Data Analysis

Mean (*M*), Standard Deviation (*SD*) and frequency percentage were reported for quantitative and qualitative variables, respectively. Q-norm plot and skewness-kurtosis test were used for checking data normality. The total QOL score was considered as a dependent variable. At first simple linear regression analysis was used to assess the association between the QOL score and independent variables. Next, all variables with a *p* value less than 0.1 were included in multiple linear regression. Considering the cluster selection of samples (household) and for adjusting the cluster effect and sampling weigh a multi-level surveillance analysis

(Svy) group was used. The statistically significant level was considered 0.05. STATA software package version 16 was utilized for statistical analysis.

Results

A total of 2132 individuals who were invited to the study, 120 cases declined to participate. The response rate was computed as 94%. Table 1 presents the demographic and socioeconomic characteristics of the respondents. The majority of respondents were aged between 30 and 65 years. Almost 55% of participants were male. Approximately, 75% of females and 73% of males were married. High and very high levels of SES were reported by 19.83 and 19.23% of participants, respectively. Most of the females were classified as having very low or medium levels of SES. Almost 42% of participants spent 10–20% of their income on health. Health expenditures exceeding 60% were reported by nearly 9% of the participants. Of the total participants, 14.41 and 26.19% did not have their own house, and private car, respectively.

The obtained median, 25th and 75th percentiles and lower and upper whiskers of QOL and its domains by SES level are demonstrated in Fig. 2. The largest median (74.28) was related to physical health and the lowest median (65) was related to environment domain. Furthermore, Fig. 3 shows the distribution of the total score of QOL by sex in each level of SES.

Simple and multiple linear regressions of factors affecting QOL score are shown in Table 2. According to the simple linear regression analysis, there was a significant association between QOL and the following variables: age, sex, education, SES and some categories of marital status ($P < 0.05$). The multiple linear regression analysis indicated that there was a statistically significant association between age groups and QOL. Age groups 14–29 and 30–65 years old, showed higher QOL than the age group 66 years old and above (β:3.61, 95% CI 1.58–5.65) and (β:2.40, 95% CI 0.90–3.90), respectively. Moreover, females had a lower QOL compared to males. (β: − 0.92, 95% CI − 1.82 to − 0.22).

Although there were no statistically significant differences between the single, divorced, and married categories of marital status in QOL, widowed people had lower QOL than married individuals (β: − 4.01, 95%CI − 6.43 to 1.58). The analysis showed that there was statistically association between academic level of education and QOL. People with undergraduate and postgraduate had higher QOL than people with illiterate and primary level of education, respectively (β: 1.74, 95% CI − 0.12 to 3.66) (β: 2.03, 95% CI 1.1–6.02). Additionally, there was a statistically significant difference between SES levels and QOL. Individuals with very low and low levels of SES had lower QOL compared to the medium level of SES. Conversely, respondents with high and very high levels of SES had a higher QOL than those with medium level of SES (β: 2.13, 95%CI − 0.7 to 3.56) and 9(β: 9.10, 95% CI 7.54–10.66).

Table 1 Demographic and socioeconomic characteristics of the participants, Northwestern Iran, 2020

Variable		Male N (%)	Female N (%)	Total N (%)
Age group (year)	14–29	199(19.23)	182(18.63)	381(18.94)
	30–65	702(67.83)	685(70.11)	1387(68.94)
	≥66	134(12.95)	110(12.13)	244(12.13)
Marital status	Single	255(24.64)	166(16.99)	421(20.92)
	Married	759(73.33)	731(74.82)	1490(74.06)
	Widow	16(1.55)	66(6.76)	82(4.08)
	Divorce	5(0.48)	14(1.43)	19(0.94)
Education	Illiterate and Primary	231(22.32)	236(24.16)	467(23.21)
	Secondary	452(43.67)	431(44.11)	883(43.89)
	Undergraduate	240(23.19)	220(22.52)	460(22.86)
	Postgraduate	112(10.82)	90(9.21)	202(10.04)
SES*	Very low	182(17.58)	213(21.80)	395(19.63)
	Low	200(19.32)	176(18.08)	376(18.69)
	Medium	229(22.13)	226(23.13)	455(22.61)
	High	215(20.77)	184(18.83)	399(19.83)
	Very high	209(20.19)	178(18.22)	387(19.23)
Proportion of health expenses**	<10%	209(20.19)	203(20.78)	412(20.48)
	10–20%	438(42.32)	404(41.35)	842(41.85)
	21–40%	182(17.58)	178(18.22)	360(17.89)
	41–60%	114(11.01)	105(10.75)	219(10.88)
	>60%	92(8.89)	87(8.90)	179(8.90)
Salary (U.S.$)	<50 U.S.$	14(1.35)	24(2.46)	38(1.89)
	50–111	58(5.60)	70(7.16)	128(6.36)
	111–160	224(21.64)	228(23.34)	452(22.47)
	160–222	277(26.76)	239(24.46)	516(25.65)
	222–278	188(18.16)	178(18.22)	366(18.19)
	278–478	230(22.22)	197(20.16)	427(21.22)
	>478	44(4.25)	41(4.20)	85(4.22)
House value (U.S.$)	Have not house	147(14.20)	143(14.64)	290(14.41)
	<11,000	10(0.97)	9(0.92)	19(0.94)
	11,000–22,000	48(4.64)	44(4.50)	92(4.57)
	22,000–42,000	241(23.29)	230(23.54)	471(23.41)
	42,000–84,000	303(29.28)	278(28.45)	581(28.88)
	>84,000	286(27.63)	273(27.94)	559(27.78)
Car value(U.S.$)	Have not car	249(24.06)	278(28.45)	527(26.19)
	<2,000	13(1.26)	11(1.13)	24(1.19)
	2,000–4,000	72(6.96)	60(6.14)	132(6.56)
	4,000–8,000	264(25.51)	230(23.54)	494(24.55)
	8,000–16,000	177(17.10)	160(16.38)	337(16.75)
	>16,000	260(25.12)	238(24.36)	498(24.75)

*Socio economic status

**Proportion of Health Expenses in total cost
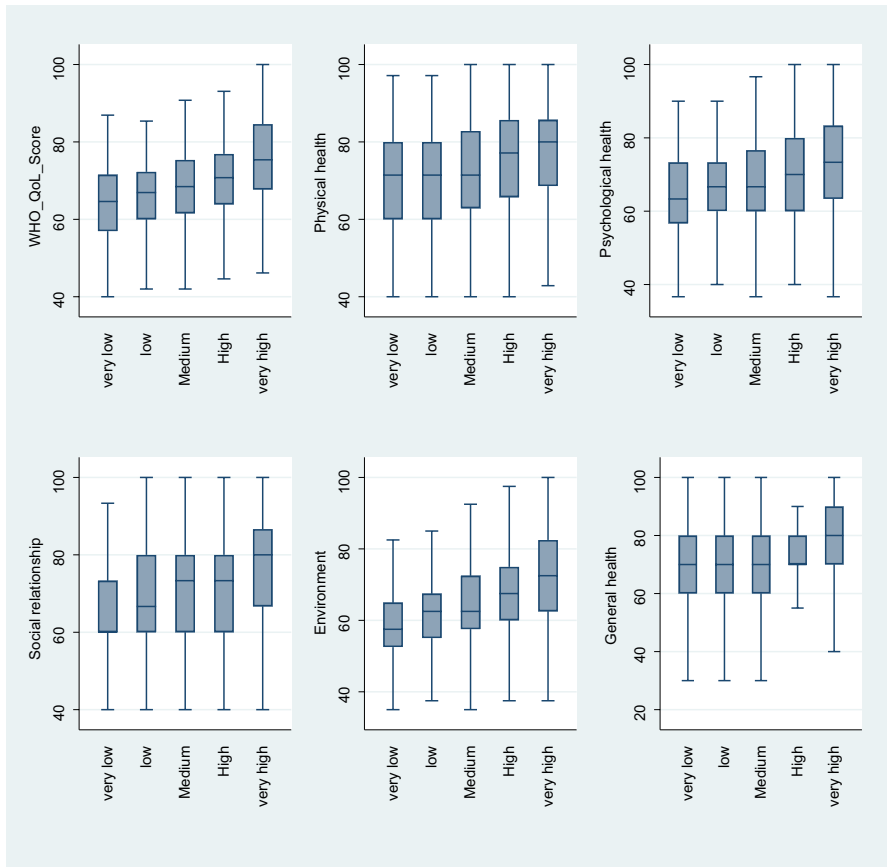
Fig. 2 Distribution of the total score of quality of life and its domains by socioeconomic status level among participants, Northwestern Iran, 2020

Discussion

The aim of this study was to explore the factors affecting the QOL in Tabriz, northwest of Iran. We have shown that variables sex, age, SES and some categories of marital status and education were significantly related to QOL.

In the present study, a direct significant statistical association was revealed between SES and QOL. In other words, QOL was highest and lowest in people who were classified at the very high and very low level of SES, respectively. The findings of the present study are similar to the results of Pappa et al., Molsted et al., Younesi et al., and Dai et al. studies (Dai et al., 2015; Molsted et al., 2021; Pappa et al., 2015; Younsi & Chakroun, 2014). Another study on the population of Isfahan, Iran that was conducted by Keyvanara et al. showed a significant association between SES and QOL, similarly (Keyvanara et al., 2015). Structural inequality in social and economic status impacts individuals' health and QOL in various ways (Fakhari et al., 2022).
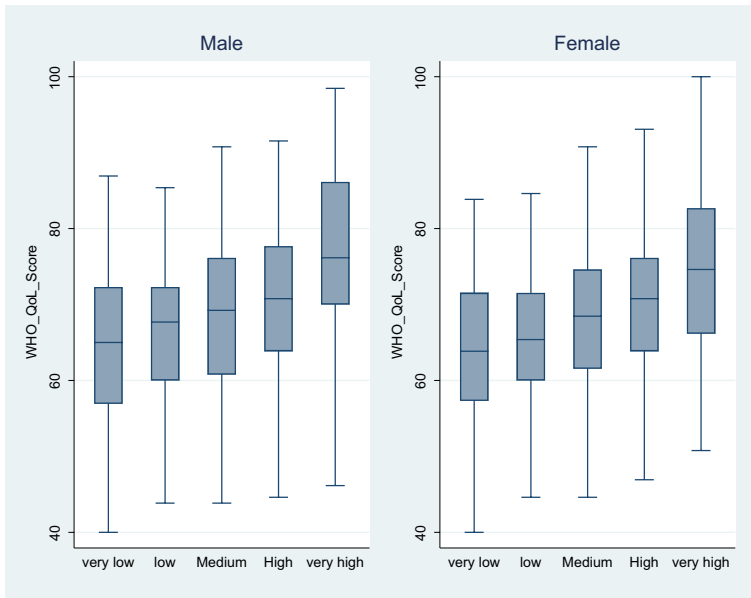
Fig. 3 Distribution of total score of quality of life by sex in levels of socioeconomic status, northwestern Iran, 2020

Children from poor families are often limited to attending public schools, which may offer a lower quality education compared to schools in wealthier areas. So, they may achieve lower grades in university entrance exams and miss out on opportunities for higher education and better-paying jobs in the future. Additionally, individuals with lower SES often lack access to health insurance, leading them to delay seeking medical attention until their conditions become life-threatening. On the other hand, individuals with low incomes are often confined to living in lower-income neighborhoods and smaller, lower-quality housing. These neighborhoods typically have limited access to public infrastructure such as sports facilities, public transportation, healthcare services, and green spaces, while also experiencing high levels of air pollution. This combination of factors contributes to a higher prevalence of chronic diseases, comorbidities, and mental health issues among individuals with lower SES, ultimately resulting in a lower QOL for these individuals.

In our study, a statistically significant association was found between sex and QOL. This finding is in line with different previous studies worldwide that showed males have better QOL compared to females (Baghbanian, 2012; Emrani et al., 2020; Janevic et al., 2012; Molsted et al., 2021; Nguyen et al., 2019; Pappa et al., 2009). A possible explanation for this result is social disparities e.g. wage inequality, work capacity, and high prevalence of mental disease and symptoms such as depressive disorders in females. Likewise, in our study it could be due to more proportion of the illiterate and primary level of education in females than males, which was because by existing cultural limitations for female gender in societies like our society. Many years ago, some members of our society believed

Table 2 The results of the univariate and multiple linear regression analysis for association between quality of life and sociodemographic/economic characteristics among participants, Northwestern Iran, 2020

Variable	Categories	Simple linear regression		Multiple linear regression	
		Beta coefficient (95% CI)	*P*-value	Beta coefficient (95% CI)	*P*-value
Age group (year)	14–29	4.60(2.83–6.37)	**0.001**	3.61(1.58–5.65)	**0.001**
	30–65	4.22(2.72–5.71)	**0.001**	2.40(0.90–3.90)	**0.002**
	≥ 66	Ref	Ref	Ref	Ref
Sex	Male	Ref	Ref	Ref	Ref
	Female	− 1.38(− 2.34 to 0.41)	**0.005**	− 0.92(− 1.82 to 0.22)	**0.045**
Marital status	Single	− 0.37(− 1.55 to 0.81)	0.415	− 1.32(− 2.78 to 0.13)	0. 074
	Married	Ref	Ref	Ref	Ref
	Widowed	− 7.87(− 10.31 to 5.43)	**0.001**	− 4.01(− 6.43 to 1.58)	**0.001**
	Divorced	− 3.48(− 8.45 to 1.48)	0.166	1.51(− 6.09 to 3.06)	0.512
Education	Illiterate and Primary	Ref	Ref	Ref	Ref
	Secondary	3.59(2.38 to 4.80)	**0.001**	0.89(0.40–3.19)	0.161
	Undergraduate	5.89(4.50–7.28)	**0.001**	1.74(0.12–3.66)	**0.020**
	Postgraduate	8.41(6.31–10.19)	**0.001**	2.03(1.1–6.02)	**0.036**
SES	Very low	− 4.88(− 6.29 to 3.47)	**0.001**	− 4.38(− 5.9 to 2.86)	**0.001**
	Low	− 2.67(− 4.1 to 1.25)	**0.004**	− 2.65(− 4.08 to 1.22)	**0.001**
	Medium	Ref	Ref	Ref	Ref
	High	1.48(0.089–2.88)	**0.037**	2.13(− 0.7 to 3.56)	**0.004**
	Very high	7.59(6.27–8.91)	**0.001**	9.10(7.54–10.66)	**0.001**

SES Socioeconomic status, *CI* Confidence Interval

that it was disgraceful for girls to go to school and university. Consequently, some girls were deprived of the opportunity to pursue education.

Regarding present study results, there was a reverse statistically significant association between age group and QOL. In another word, QOL was decreased with increasing age. Studies were conducted by Menati et al., and Etxeberria et al. had similar finding with that of ours (Etxeberria et al., 2019; Menati et al., 2017). This could be explained by physiological and anatomical changes that happen in people by aging. A higher prevalence of chronic diseases such as cardiovascular, cancer, psychological, and degenerative disease in elderly compared to younger individuals can also lead to this difference. Likewise, it can be related to low income and insurance coverage in elderlies (Menati et al., 2017).

The results obtained in this study indicated that academic level of education is directly related to high QOL. This finding is concordant with the result of studies were conducted by Gomez et al., Robert et al., and Menti et al. (Gómez et al., 2013; Menati et al., 2017; Robert et al., 2009). This is because university education is a pre-condition for a good occupation, income, and well-being in Iran and many other countries as well. Also, people with academic levels of education, are well informed about health determinants and are more sensitive about their health status.

Widowed people, in our study, had lower QOL than married individuals. High QOL in married individuals compare to singles was evaluated in previous studies (Fakhari et al., 2023; Hagedoorn et al., 2006; Molsted et al., 2021; Puciato et al., 2022; Williams & Umberson, 2004). Although, based on our result, singles had lower QOL than married individuals; this association was not statistically significant. Consistent with the results of our study, the results of Yang et al., and Soleimanpour H et al. studies showed that QOL and life satisfaction in widowed elderlies was lower than non-widowed ones (Soleimanpour et al., 2023; Yang et al., 2022). This significant association could be explained through the high prevalence of elderly individuals that exists among widowed persons. It could be due to feeling life pressures, loneliness, less life satisfaction, more prevalence of chronic mental and physical diseases, and less social support for elderly individuals.

The obtained median, 25th and 75th percentiles, and lower and upper whiskers of quality of life and its domains by SES level are demonstrated in Fig. 2. The largest median was 74.28 that related to physical health. Likewise, the lowest median was 65 that related to the environment domain.

Regarding few investigations of the association between SES and QOL in Iran, it is recommended to carry out more and even national level studies to assess the issue at various levels with including various variables such as different environmental and latitude exposures.

Strengths and Limitations

Unlike various cross-sectional studies that suffer from selection bias due to the use of non-representative sampling, our sampling which was taken from within the cohort and conducted randomly in multiple stages, is a good representation of the source population and reduces selection bias. Due to the use of highly experienced teams to manage and implementing the PTC cohort, there was only a 6% non-response rate in this project, which did not include the questionnaires that were used in the present study. Therefore, the present study is not influenced by non-response bias. The present study has several limitations. Firstly, although we adjusted confounding factors using multiple linear regressions, due to the cross-sectional design of the study, it's not possible for ascertaining temporality or causal inference. The second limitation of this investigation is due to using self-evaluation nature of questionnaires. This can lead to information bias because the respondents may not have the same understanding of the questions and provide what they believe to be socially acceptable. This limitation was reduced using the trained interviewers. The training course consists of, how justifying individuals and gaining their trust for the filling

out of the questionnaires. The third limitation of this study is associated to using a SES questionnaire. This standardized and valid questionnaire consists of 6 questions to evaluate the SES. It appears that one of the questions (health care expenditure) may be biased in its content and classification of individuals. In countries with government-provided universal healthcare like Iran, the poorer individuals frequently have lower healthcare costs, while wealthier individuals may opt to use more premium private services. This differentiation could influence the understanding of healthcare expenditure as an SES indicator.

Conclusion

The current study highlights that higher SES and educational levels are positively associated with higher QOL. Conversely, older age, females, and widowed individuals are linked with lower QOL.

Given the high importance of QOL as a determinant of health and social issues, it could be effective to emphasize supportive programs such as free health insurance, facilitating access to health care, and creating Geriatric Centers to improve the social participation of older ages. Also, it is suggested to establish counseling and psychological support centers to improve the mental and physical health of individuals, especially females. According to the finding of this study, other effective policies for QOL can be planning various social and economic programs for supporting widowed individuals, especially widowers, and creating suitable infrastructures for everyone to access a high level of education. Furthermore, considering the significance of GOL in personal and social life, it is recommended to carry out future studies involving a wider range of variables to identify the factors influencing GOL. The findings of these studies should be utilized in decisions making associated to health and society.

Authors' Contributions HSB developed the original idea and the protocol. EDE, SHJ and MY interpreted and analyzed data, and drafted all the manuscript sections. HSB, MR, MG, HP, KS contributed to the protocol development, editing, and revising of the manuscript, technical comments, and interpretation. All authors contributed to the manuscript development and/or made substantive suggestions for revision. All authors read and approved the final version of the manuscript.

Declarations

Conflict of interest The authors have no competing interests to declare.

Ethics Approval and Consent to Participate The study protocol was approved by the Ethics Committee at Tabriz University of Medical Sciences (ECTUMS) (Ref No. IR.TBZMED.REC.1401.716). Written

informed consent was obtained before the beginning of the interviews. Also, for children aged 7–15 years, written informed consent was obtained from the legal guardian and depending on the child's level of understanding, verbal or written informed consent was also obtained from the child. For children over 15 years old, written informed consent was obtained from both the legal guardian and the child the study was carried out in accordance with the ethical standards of the 1964 Helsinki Declaration. All methods were carried out in accordance with relevant guidelines and regulations.

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