



Demographic Variables, Clinical Characteristics, Quality of Life and Costs from Patient Perspective of Hematological Oncology Cases: A Study Conducted in Türkiye

İzzet AYDEMİR,¹ Mehmet Emin YAŞAR²

¹Department of Health Management, Bingöl University, Bingöl-Türkiye

²Bingöl University, Solhan Vocational School of Health Services, Bingöl-Türkiye

OBJECTIVE

To investigate the associations between socio-demographic and clinical characteristics, quality of life (QoL), and patient-borne costs among haematological oncology outpatients in Türkiye.

METHODS

This cross-sectional study included 137 adult haematological oncology outpatients treated at a public oncology centre between July and August 2024. QoL was assessed using the EQ-5D-3L and EQ VAS. Group differences were analysed using t-tests and ANOVA, while multiple linear regression identified independent predictors of QoL. Pearson correlation analysis was used to examine relationships between variables. Disease costs were calculated as total and average annual expenses per patient.

RESULTS

Respondents reported moderate QoL, with anxiety/depression being the most affected dimension. The mean EQ VAS score was 56.28±16.61. Gender and marital status were not associated with QoL ($p>0.05$). Older age was associated only with poorer self-care ($p=0.038$). Lower educational attainment, longer disease duration, and advanced cancer stage were associated with poorer QoL across several EQ-5D-3L dimensions ($p<0.05$). Regression analysis identified education ($\beta=-0.235$, $p=0.019$) and cancer detection time ($\beta=0.229$, $p=0.009$) as independent predictors of QoL. The average annual patient-borne cost was 77,378₺ (\$2,353), with income loss representing the largest financial burden.

CONCLUSION

Clinical characteristics, particularly cancer stage, exert a greater influence on QoL than socio-demographic factors. Strategies promoting early diagnosis, patient education, and financial support may improve quality of life and reduce the economic burden of cancer care.

Keywords: Cancer pain; cost of illness; hematological oncology cases, outpatients; quality of life.

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INTRODUCTION

Cancer remains one of the leading causes of death and disability worldwide, imposing a substantial dis-

ease burden on societies, and its incidence continues to increase steadily on a global scale.[1] The global incidence of cancer has risen dramatically in recent decades, driven by aging populations, lifestyle factors,

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Doç. Dr. İzzet AYDEMİR
Bingöl Üniversitesi,
Sağlık Yönetimi Bölümü,
Bingöl-Türkiye
E-mail: iaydemir@bingol.edu.tr



and advancements in diagnostic capabilities. In 2020 alone, an estimated 19.3 million new cases and 10 million cancer-related deaths were reported.[2] The course of cancer in Türkiye is no different from the trend in the world. According to 2022 data published by the WHO, 240.013 people were diagnosed with cancer in Türkiye in 2022, and about 129.672 (25.2%) people lost their lives.[3]

Cancer is the second leading cause of death after cardiovascular diseases, both globally and in Türkiye. Statistics indicate that approximately one in every six deaths worldwide and one in every five deaths in Türkiye are due to cancer. The five most common types of cancer globally and in Türkiye are breast, lung, prostate, colorectal, and thyroid cancers. In Türkiye, lung, prostate, and colorectal cancers are the most frequently diagnosed among men, while breast and thyroid cancers are more common among women. Each type of cancer has distinct causes, risk factors, diagnostic methods, and treatment approaches. Lifestyle factors such as tobacco use, obesity, poor nutrition, physical inactivity, and alcohol consumption significantly increase cancer risk. As such, early detection and screening strategies must be tailored to each cancer type. Moreover, implementing community-based screening programs as part of a comprehensive cancer control strategy is essential.[4]

Cancer treatment is often prolonged and poses significant physical, psychological, and socioeconomic burdens on patients. The disease and its treatment can substantially impact an individual's quality of life, which is a key factor in patient care and monitoring. Quality of life (QoL) encompasses physical, functional, psychological, and social well-being and is often diminished due to both the disease itself and its treatment.[5] Studies have highlighted that cancer patients generally experience a lower QoL due to the challenges associated with their condition.[6,7] Additionally, the financial burden of cancer is considerable. Direct medical costs, along with indirect costs such as lost productivity, long-term disability, and mortality, contribute to the overall economic impact of the disease.[8] A research indicates that indirect costs can sometimes rival or exceed direct medical expenses,[9] underscoring the need for comprehensive economic evaluations in oncology and haematological case. Taken together, survivors of cancer, especially in the early stages of their cancer journey, often face negative economic and health outcomes throughout their lives.[10]

Beyond clinical efficacy and safety, the quality of life of cancer patients and the economic burden of treatment is also crucial in decision-making process-

es. A holistic approach that incorporates these factors enables more informed and rational healthcare decisions while maximizing the potential value of treatments. Taking these factors into account, this study aims to examine the quality of life and costs associated with various types of hematological oncology cases from both the patient's and their companion's perspective in a sample of Türkiye.

MATERIALS AND METHODS

Study Purpose

The aim of this study is to present the disease and personal characteristics, QoL findings, and costs of hematological oncology patients receiving outpatient care from the patient perspective.

Research Type and Sampling

This descriptive cross-sectional study was conducted among individuals receiving outpatient care for cancer or suspected cancer at a public medical center in Malatya, Türkiye. The study collected data at a single point in time to describe the distribution and frequency of variables within the study population. The study was carried out between July 1, 2024, and August 31, 2024, without employing a specific sampling method; instead, it was applied to individuals who agreed to participate. As the study aimed to include all eligible cancer patients receiving outpatient care during the study period, no sampling method was employed. Questionnaires were administered to patients who voluntarily agreed to participate. For respondents who were unable to complete the questionnaire independently, assistance was provided by their relatives. A total of 137 cases who visited the relevant unit and consented to participate in the study were included.

Criteria for Inclusion

The inclusion criteria were: (1) age ≥ 18 years, (2) receiving outpatient treatment, (3) ability to respond to the study questions either independently or with assistance from a relative, and (4) having received treatment at the hospital for at least one year.

Data Collection and Measurements

Before data collection, verbal approval was obtained from the hospital administration. Patients were informed about the study, and those who provided informed consent completed the questionnaire administered by the researchers. Each questionnaire required approximately 10–15 minutes to complete. Data were collected at appropriate times to avoid periods of pain,

nausea, or vomiting, thereby ensuring participant comfort. For patients unable to complete the questionnaire themselves, a relative completed it on their behalf.

For data collection, the researchers utilized a Personal Information Form (including statements regarding patients' socio-demographic characteristics and cancer status) developed based on the literature, the EQ-5D-3L General Quality of Life Scale developed by EUROQOL already validated for reliability and validity in Türkiye to assess patients' quality of life, and a cost survey designed to capture patients' perspectives, based on previous studies conducted in Türkiye. It should be noted that as there is no validated value set for the EQ-5D-3L in the Turkish population, it was not possible to calculate utility index scores. Therefore, the data were analyzed using dimension-level scores – representing the frequency of reported problems across the five dimensions – and the EQ VAS, which provides a quantitative measure of the patient's self-assessed health status.

Cost-of-illness studies conducted from the patient perspective include out-of-pocket expenses incurred by patients or their caregivers for direct medical care, income losses due to morbidity and mortality, transportation costs related to healthcare access, non-medical out-of-pocket expenses, and transfer payments received due to illness.[11] Based on this reference, a 6-items form was developed through literature review in Türkiye to assess the monthly and annual cancer-related costs from the perspective of patients and their caregivers.[12–14]

The EQ-5D-3L was used to assess respondents' QoL based on the EUROQOL quality of life measurement system. The EQ-5D-3L consists of two main components: The EQ-5D descriptive system and the EQ visual analogue scale (EQ VAS). The EQ-5D-3L general QoL scale includes five dimensions: Mobility, self-care, usual activities (ability to perform daily tasks), pain/discomfort, and anxiety/depression. Each dimension has three levels: No problems, some problems, and extreme problems. Patients were asked to indicate their health status by selecting the most appropriate statement for each dimension. This selection results in a single-digit number representing the chosen level for that dimension.

The EQ VAS (Visual Analog Scale) measures patients' self-rated current health status on a scale ranging from 0 ("the worst possible health state") to 100 ("the best possible health state"). It provides a quantitative measure of health outcomes based on patients' own perceptions. As the EQ-5D-3L is a ge-

neric health-related quality of life instrument, it is considered a valid tool for assessing quality of life in patients with cancer. [15]

Statistical Analysis

The EQ-5D-3L demonstrated excellent internal consistency, with a Cronbach's alpha (α) of 0.905. Although the Kolmogorov–Smirnov and Shapiro–Wilk tests indicated statistically significant departures from normality ($p < 0.001$), the skewness (0.117) and kurtosis (-0.321) values were within the acceptable range (-1.50 to 1.50) for social science research.[16] Given the large sample size and the approximately normal distribution of the data, parametric tests were used for the analyses. The direction and strength of correlations were interpreted according to established criteria in the literature as follows:[17]

- 0.00–0.29: Weak relationship
- 0.30–0.64: Moderate relationship
- 0.65–0.84: Strong relationship
- 0.85–1.00: Very strong relationship

Data were analyzed using descriptive statistics (frequency, percentage, mean, and standard deviation). Parametric tests were used to compare QoL scores, while Pearson correlation analysis was performed to examine relationships between variables. Independent samples t-tests were used to compare the means of two groups, and one-way analysis of variance (ANOVA) was used to compare the means of more than two groups. To control for Type I error due to multiple comparisons, the Bonferroni correction was applied to the EQ-5D-3L dimension and subgroup analyses. Multiple linear regression analysis was performed to identify factors associated with QoL, as measured by the EQ-5D-3L index score. Cost analysis included total and mean costs per patient. As the hospital did not authorize access to direct treatment costs (e.g., radiotherapy, chemotherapy, and surgical interventions), the cost analysis was conducted from the patient's perspective. Statistical analyses were performed using IBM SPSS Statistics version 27.0. Statistical significance was set at $p < 0.05$, with a 95% confidence level.

Ethical Declaration

Ethical approval for the study was derived from the Bingöl University Social and Human Sciences Scientific Research and Publication Ethics Committee (Date: 13/08/2024, No: E.166497). Additionally, verbal informed consent was obtained from the patients included in the study after explaining the study's purpose to them. Moreover, this research was conducted in ac-

cordance with the principles of the Declaration of Helsinki (www.wma.net/e/policy/b3.htm).

RESULTS

Among the respondents, 59.9% were male, 76.6% were married, and 72.3% were unemployed. The largest age group was ≥ 60 years (40.9%), followed by 53–59 years (19.7%). Illiteracy and postgraduate education were uncommon, with most respondents having completed either primary school or university (Table 1). Monthly income was categorized according to the minimum wage established by public authorities in Türkiye at the time of the study. The largest proportion of respondents (43.8%) reported a monthly income of 10.000–20.000₺ (\$306–613). Given the universal health insurance system in Türkiye, most respondents (90.5%) were covered by public health insurance.

Table 2 summarizes the cancer-related characteristics of the respondents. Overall, 39.4% had been diagnosed within the previous 2 years, 41.6% had lived with the diagnosis for 3–5 years, and 19.0% for 6 years or longer, with the distribution differing significantly across categories ($t=28.439$, $p<0.001$). Most respondents (68.6%) had an unknown cancer stage. This high proportion is largely attributable to the predominance of hematological malignancies in the study sample, for which conventional staging systems are often not applicable. In addition, incomplete medical records, unavailable staging information for patients referred from other institutions, ongoing diagnostic evaluations at the time of data collection, and the retrospective nature of data retrieval may have contributed to the high proportion of cases with unknown stages.

Among patients with known disease stage, Stage I was the second most common category (12.4%), and the distribution of cancer stages differed significantly across categories ($t=32.515$, $p<0.001$). Acute Myeloid Leukemia (AML) was the most common cancer type (24.8%), followed by Multiple Myeloma (MM) (14.6%) and lymphoma (11.7%). The distribution of cancer types was also statistically significant ($t=20.319$, $p<0.001$). The cancer profile observed in this study differs from national and global epidemiological patterns, in which breast, lung, and colorectal cancer are the most prevalent. However, the study was not intended to represent all patients with cancer in Türkiye; rather, it reflects the characteristics of patients receiving care at the study center. Therefore, deviations from the overall epidemiological distribution of cancer types were ex-

Table 1 Socio-demographic characteristics of the respondents

Characteristics of respondents	n	%
Gender		
Female	55	40.1
Male	82	59.9
Marital status		
Single	32	23.4
Married	105	76.6
Age		
18–25	12	8.8
26–34	11	8.0
35–43	13	9.5
44–52	18	13.1
53–59	27	19.7
≥ 60	56	40.9
Education		
Illiterate	10	7.3
Primary school	35	25.5
Secondary school	26	19.0
High school	37	27.0
University	27	19.7
Postgraduate	2	1.5
Work status		
Employed	38	27.7
Non-employed	99	72.3
Income		
≤ 10.000 ₺ ($\leq \$306$)	32	23.4
10.000–20.000 ₺ (\$306–\$613)	60	43.8
20.000 TL–30.000 ₺ (\$613–\$919)	24	17.5
≥ 30.000 TL ($\geq \$919$)	21	15.3
Insurance		
Universal health insurance (UHI)	124	90.5
Private health insurance	3	2.2
No health insurance	10	7.3

pected. Additionally, detailed data on cancer types and frequencies are given in Table 2 and Figure 1.

Table 3 presents the respondents' EQ-5D-3L scores. Across all five dimensions, most respondents reported some degree of impairment, indicating reduced health-related quality of life. The highest mean score was observed for anxiety/depression (2.09 ± 0.66), with 82.5% of respondents reporting moderate or extreme problems, followed by pain/discomfort (1.99 ± 0.55 ; 84.7%), usual activities (1.94 ± 0.60 ; 78.8%), self-care (1.80 ± 0.70 ; 63.5%), and mobility (1.79 ± 0.61 ; 68.6%). The mean EQ VAS score was 56.28 ± 16.61 , indicating a moderate level of self-perceived health status.

Table 2 Respondents' findings regarding the case of cancer

Characteristics of respondents	n	%	Mean	SD	t	p
Cancer detection time						
Initial stage	54	39.4	1.80	0.739	28.439	<0.001
3–5 years	57	41.6				
≥6	26	19.0				
Cancer stage						
Stage I	17	12.4	4.10	1.477	32.515	<0.001
Stage II	11	8.0				
Stage III	7	5.1				
Stage IV	8	5.8				
Unknown	94	68.6				
Cancer type						
AML	34	24.8	6.22	3582	20.319	<0.001
MM	20	14.6				
Lymphoma	16	11.7				
ALL	13	9.5				
KLL	10	7.3				
Lung	8	5.8				
MDS	7	5.1				
ITP	6	4.4				
KML	5	3.6				
Breast	5	3.6				
Colon	3	2.2				
Anemia	3	2.2				
Bladder	2	1.5				
Pancreatic	2	1.5				
Prostate	2	1.5				
Stomach	1	0.7				

AML: Acute myeloid leukemia; MM: Multiple myeloma; ALL: Acute lymphoblastic leukemia; KLL: Chronic lymphocytic leukemia; MDS: Myelodysplastic syndrome; ITP: Immune thrombocytopenic purpura; KML: Chronic myeloid leukemia.

Table 4 presents the associations between respondents' socio-demographic and disease-related characteristics and the EQ-5D-3L dimensions and EQ VAS scores. Gender and marital status were not significantly associated with any EQ-5D-3L dimension or the EQ VAS ($p>0.05$). Age was significantly associated only with self-care ($F=2.433$, $p=0.038$), with respondents aged ≥ 60 years reporting greater impairment.

Educational level was significantly associated with self-care ($F=2.633$, $p=0.026$), usual activities ($F=3.784$, $p=0.003$), and pain/discomfort ($F=2.473$, $p=0.035$), indicating poorer QoL among respondents with lower educational attainment. Cancer detection time was significantly associated with self-care ($F=4.895$, $p=0.009$) and usual activities ($F=3.656$, $p=0.028$), with longer disease duration corresponding to greater impairment.

Cancer stage showed the strongest associations with QoL. Significant differences were observed for mobility ($F=3.925$, $p=0.005$), self-care ($F=2.588$, $p=0.040$), usual activities ($F=2.710$, $p=0.033$), and pain/discomfort ($F=6.966$, $p=0.001$), with progressively poorer scores from Stage I to Stage IV. Although anxiety/depression ($p=0.063$) and EQ VAS scores ($p=0.050$) also worsened with advancing stage, these associations did not reach statistical significance. Overall, disease-related characteristics, particularly cancer stage, were more strongly associated with QoL than socio-demographic characteristics. Lower educational attainment, longer cancer detection time, and advanced cancer stage were associated with poorer outcomes across multiple EQ-5D-3L dimensions.

Multiple linear regression analysis was performed to identify factors associated with QoL, as measured

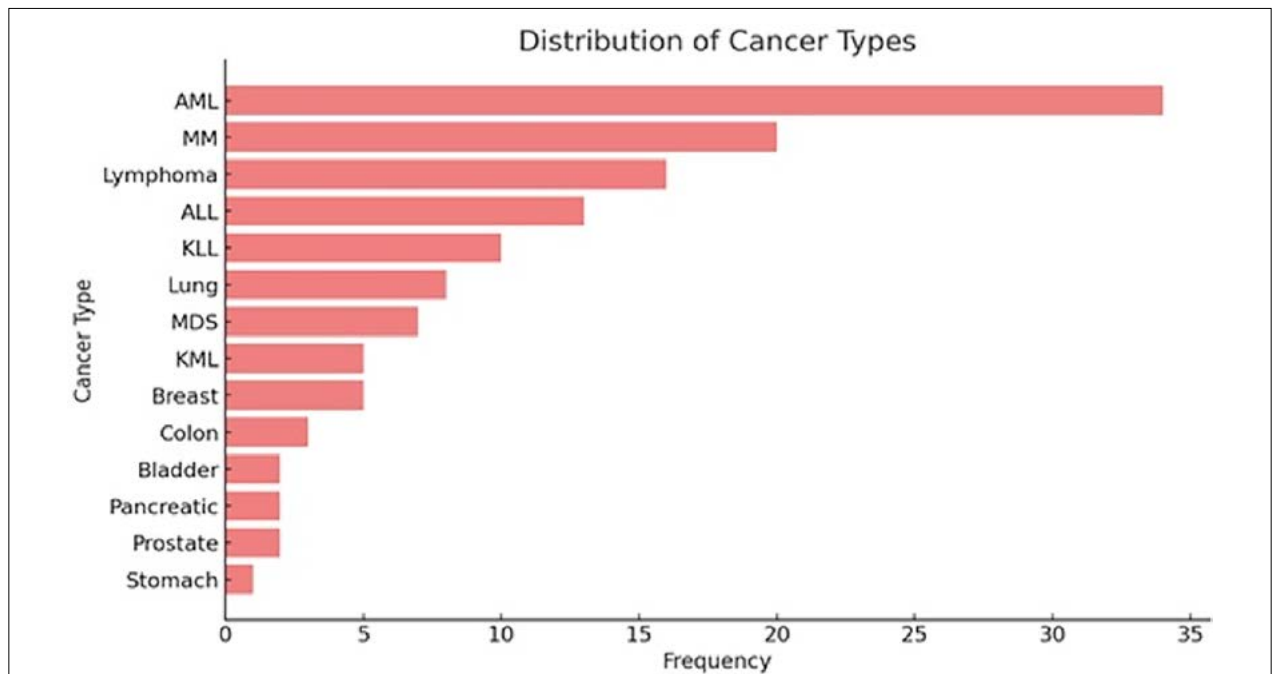


Fig. 1. Cancer types detected in patients.

Table 3 Respondents' quality of life assessment scale (EQ-5D-3L) scores

EQ-5D-3L Sub-dimensions	Statistical tests			
	n	%	Mean	SD
Mobility				
I have no problems in walking about	43	31.4	1.79	0.612
I have some problems in walking about	80	58.4		
I am confined to bed	14	10.2		
Self-care				
I have no problems with self-care	50	36.5	1.80	0.698
I have some problems washing and dressing myself	65	47.4		
I am unable to wash or dress myself	22	16.1		
Usual activities				
I have no problems with performing my usual activities	29	21.2	1.94	0.603
I have some problems with performing my usual activities	87	63.5		
I am unable to perform my usual activities	21	15.3		
Pain-discomfort				
I have no pain or discomfort	21	15.3	1.99	0.549
I have moderate pain or discomfort	96	70.1		
I have extreme pain or discomfort	20	14.6		
Anxiety-depression				
I am not anxious or depressed	24	17.5	2.09	0.663
I am moderately anxious or depressed	76	55.5		
I am extremely anxious or depressed	37	27.0		
Average VAS score	137	100.0	56.28	16.61

SD: Standard deviation; VAS: Visual analogue scale.

Table 4 Association of some socio-demographic variables of respondents with quality of life

Demographic variables	Sub-dimensions of EQ-5D-3L					
	Mobility mean±SD	Self-care mean±SD	Usual activities mean±SD	Pain-discomfort mean±SD	Anxiety-depression mean±SD	VAS score mean±SD
Gender						
Female	1.89±0.72	1.91±0.82	2.06±0.68	2.11±0.68	2.23±0.69	54.86±19.49
Male	1.75±0.57	1.75±0.65	1.90±0.57	1.95±0.50	2.05±0.65	56.76±15.56
Tests	t=1.093	t=1.167	t=1.316	t=1.313	t=1.387	t=-0.574
p	p=0.276	p=0.245	p=0.190	p=0.195	p=0.183	p=0.602
Marital status						
Married	1.76±0.61	1.81±0.69	1.94±0.59	1.99±0.56	2.10±0.64	56.05±15.72
Single	1.88±0.61	1.75±0.72	1.94±0.67	2.00±0.51	2.09±0.74	57.03±19.50
Tests	t=-0.915	t=0.421	t=0.044	t=-0.086	t=0.011	t=-0.292
p	p=0.362	p=0.674	p=0.965	p=0.932	p=0.991	p=0.770
Age						
18–25	1.83±0.58	1.67±0.65	1.83±0.72	1.83±0.58	1.92±0.67	61.67±17.88
26–34	1.91±0.54	1.82±0.75	2.00±0.63	2.00±0.63	2.18±0.87	54.55±18.64
35–43	1.54±0.52	1.54±0.52	1.85±0.56	2.08±0.49	2.23±0.60	61.15±17.34
44–52	1.56±0.71	1.50±0.71	1.72±0.67	1.94±0.42	1.94±0.64	59.17±15.07
53–59	1.81±0.56	1.70±0.54	1.93±0.47	1.96±0.59	2.11±0.64	56.30±16.21
≥60	1.88±0.63	2.02±0.75	2.05±0.62	2.04±0.57	2.13±0.66	53.59±16.46
Tests	F=1.304	F=2.433	F=1.029	F=0.367	F=0.523	F=0.946
p	p=0.266	p=0.038	p=0.403	p=0.870	p=0.759	p=0.454
Education						
Illiterate	2.10±0.57	2.30±0.82	2.50±0.53	2.50±0.53	2.30±0.68	50.50±16.24
Primary school	1.91±0.62	1.97±0.75	2.11±0.63	2.03±0.51	3.20±0.68	50.57±16.62
Secondary school	1.69±0.62	1.72±0.65	1.81±0.57	1.92±0.63	2.04±0.66	56.73±15.55
High school	1.84±0.64	1.73±0.65	1.89±0.62	1.97±0.60	2.22±0.67	58.11±16.76
University	1.56±0.51	1.52±0.58	1.74±0.45	1.89±0.32	1.81±0.56	62.41±15.90
Postgraduate	1.50±0.71	1.50±0.71	1.50±0.71	1.50±0.71	1.50±0.71	62.50±17.68
Tests	F=1.928	F=2.633	F=3.784	F=2.473	F=2.011	F=2.028
p	p=0.094	p=0.026	p=0.003	p=0.035	p=0.081	p=0.079
Cancer detection time						
Initial stage	1.63±0.59	1.57±0.60	1.78±0.54	1.89±0.54	2.04±0.64	58.80±15.78
3–5 years	1.89±0.62	1.91±0.71	2.02±0.64	2.04±0.57	2.09±0.72	54.82±16.96
≥6	1.88±0.59	2.00±0.75	2.12±0.59	2.12±0.52	2.23±0.59	54.23±17.48
Tests	F=3.096	F=4.895	F=3.656	F=1.806	F=0.752	F=1.037
p	p=0.058	p=0.009	p=0.028	p=0.168	p=0.473	p=0.357
Cancer stage						
Stage I	1.47±0.51	1.53±0.72	1.71±0.59	1.53±0.51	1.82±0.81	63.24±18.02
Stage II	1.82±0.41	1.73±0.47	1.91±0.30	2.09±0.54	2.18±0.60	55.45±13.69
Stage III	2.14±0.69	2.14±0.69	2.14±0.54	2.43±0.54	2.29±0.49	49.29±22.07
Stage IV	2.38±0.52	2.38±0.52	2.50±0.54	2.50±0.54	2.63±0.52	43.13±14.13
Unknown	1.77±0.61	1.78±0.71	1.93±0.61	1.99±0.50	2.07±0.64	56.76±15.91
Tests	F=3.925	F=2.588	F=2.710	F=6.966	F=2.289	F=2.436
p	p=0.005	p=0.040	p=0.033	p=0.001	p=0.063	p=0.050

SD: Standard deviation.

Table 5 Factor affecting quality of life of cancerous patients

Variables	B	SE	β	t	p	VIF
(constant)	1.202	0.600		2.005	0.047	
Gender	-0.114	0.101	-0.118	-1.424	0.157	1.052
Marital status	0.136	0.140	0.108	0.967	0.335	1.918
Age	-0.015	0.040	-0.047	-0.369	0.713	2.485
Education	-0.097	0.041	-0.235	-2.379	0.019	1.500
Work status	0.252	0.145	0.212	1.742	0.084	2.281
Income	0.076	0.070	0.140	1.080	0.282	2.576
Insurance	0.135	0.095	0.136	1.424	0.157	1.404
Cancer detection time	0.165	0.062	0.229	2.645	0.009	1.148
Cancer stage	0.040	0.032	0.109	1.222	0.224	1.232
Cancer type	-0.005	0.012	-0.031	-0.370	0.712	1.232

B: Unstandardized Coefficient; SE: Standard error; VIF: Visual analogue scale.

Table 6 Estimated monthly costs incurred by patients due to illness

Cost statements	Status	n	%	Total annual costs (₺/\$)	Average annual cost per patient (₺/\$)
Medications related to the disease but not covered by insurance	Yes	39	28.5	1,230,000 (37,403)	31,538 (959)
	No	98	71.5		
Special nutrition and diet recommended by the doctor for the disease in question	Yes	39	28.5	220,000 (6,690)	5,641.03 (172)
	No	98	71.5		
External food consumption due to illness during health care services	Yes	100	73.0	611,750 (18,603)	6,118 (186)
	No	37	27.0		
Transportation fee commuting to hospital due to disease	Yes	102	74.5	333,450 (10,140)	3,237 (98)
	No	35	25.5		
Compulsory accommodation related to the disease	Yes	12	8.8	67,700 (2,059)	5,270 (160)
	No	125	91.2		
Other disease-related expenses (personal care, etc.)	Yes	63	45.99	520,000 (15,813)	8,253 (251)
	No	74	54.01		
Average income loss in the last one year due to treatment of the disease		137	100.0	10,715,500 (325,819)	77,378 (2,353)

by the EQ-5D-3L index score (Table 5). The model included sociodemographic and clinical variables (gender, age, marital status, education, employment status, income, insurance status, cancer type, cancer stage, and cancer detection time). Among these, only educational level ($\beta=-0.235$, $p=0.019$) and cancer detection time diagnosis ($\beta=0.229$, $p=0.009$) were significant independent predictors of QoL. Collinearity diagnostics indicated no evidence of multicollinearity, with all variance inflation factors (VIF) values ranging from 1.052 to 2.576. In addition, the model was statistically

significant ($F=2.777$, $p<0.004$) and explained 11.6% of the variance in QoL (adjusted $R^2=0.116$). On the other hand, longer cancer detection time was associated with higher EQ-5D-3L index scores, whereas higher educational attainment was associated with lower index scores in this cohort. None of the remaining sociodemographic or clinical variables, including age, sex, cancer stage, and cancer type, showed statistically significant independent associations with QoL.

We calculated the monthly costs for patients who answered 'yes' to the cost statements in Table 6, then

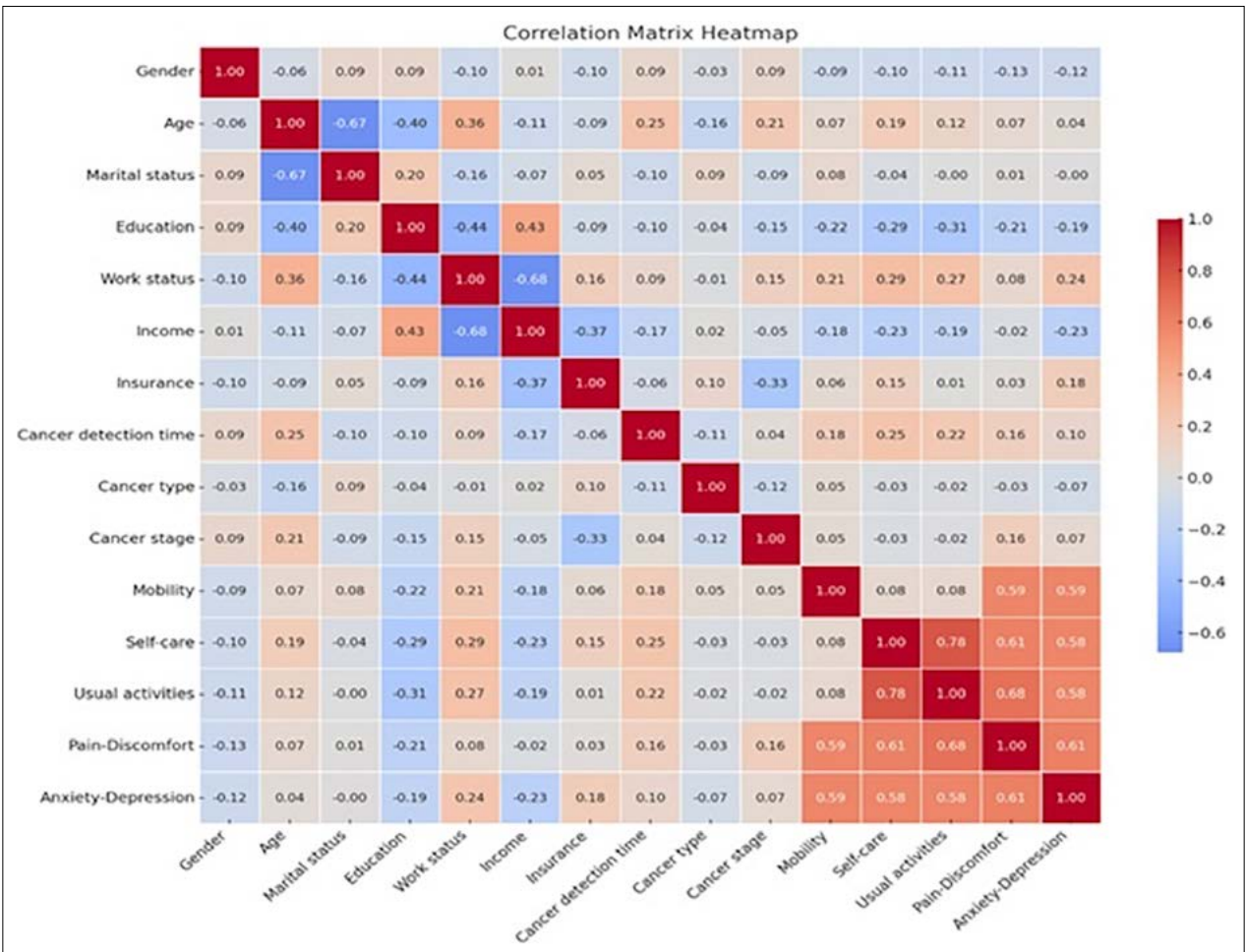


Fig. 2. Correlation matrix head map.

determined their total annual costs. Next, we divided the total annual costs by the number of these patients to find the average annual cost per patient. The table presents the financial burden of disease-related expenses on patients, focusing on various cost factors such as medication, special nutrition, transportation, and income loss. The total annual costs for each category were calculated, and the average annual cost per affected patient was determined. The total income loss amounted to 10.714,500 ₺ (\$325.819). The average income loss per patient was 77.378 ₺ (\$2.353), making it the most significant financial impact among all categories.

The highest financial burden comes from income loss, followed by medications not covered by insurance and other disease-related expenses. A large portion of patients also faced costs related to transportation, external food consumption, and special diets, which add to the overall economic strain of

managing the disease. The data highlights the need for financial support mechanisms, insurance coverage expansions, or policy changes to mitigate these costs for patients.

The heatmap illustrates (Fig. 2) the correlation among the variables. The colors visually represent the strength and direction of the relationships: Dark red indicates a strong positive correlation, whereas dark blue signifies a strong negative correlation. The numerical values in each cell represent the Pearson correlation coefficients. This matrix demonstrates how each variable is related to the others. For example, there is a positive correlation between education level and income ($r=0.428$), indicating that higher levels of education are generally associated with higher income. Additionally, a strong positive correlation is observed between self-care and usual activities ($r=0.783$), suggesting that individuals with better self-care abilities are typically more capable of performing daily activities.

DISCUSSION

Cancer care illustrates that the value of healthcare extends beyond clinical outcomes alone.[18] Traditionally, the quality of cancer care has been assessed using indicators such as morbidity, mortality, and readmission rates. However, comprehensive evaluation also requires consideration of patient-reported outcomes, including QoL, perceived health status, functional impairment, and financial burden.[19] Oncology remains one of the most resource-intensive areas of healthcare because of increasingly complex diagnostic and therapeutic approaches.[18] Accordingly, an estimated 28–48% of cancer survivors experience financial hardship due to direct (e.g., out-of-pocket expenses) and indirect (e.g., income loss) costs, which has consistently been associated with psychological distress and poorer QoL.[20,21] As a multidimensional construct encompassing physical, psychological, and social well-being, QoL has become a key outcome for evaluating cancer care.[22] Consequently, patient characteristics, treatment costs, and patient-reported outcomes should all be considered when assessing the value of cancer care interventions.

Evidence simultaneously examining patient-reported QoL and patient-borne costs across heterogeneous cancer populations remains limited both in Türkiye and internationally. Most previous studies have focused on a single cancer type, restricting the generalizability of their findings. By including patients with both solid tumors and hematological malignancies and assessing both QoL and patient-reported costs, the present study provides a broader perspective on the factors associated with health outcomes in routine oncology practice. The predominance of older adults and hematological malignancies in our cohort distinguishes this study from many population-based investigations. Although 68.6% of respondents had an unknown cancer stage, this primarily reflects the inclusion of hematological malignancies, for which conventional TNM staging is often not applicable. Nevertheless, caution is warranted when interpreting stage-specific findings because incomplete staging information may have reduced statistical precision.

In this study, respondents reported a moderate overall QoL, while anxiety/depression emerged as the most impaired EQ-5D-3L dimension, followed closely by pain/discomfort. This pattern is consistent with studies from Malaysia and Türkiye, which likewise identified psychological distress and pain as the domains most frequently affected among patients with cancer.[22–26] These findings reinforce growing

evidence that psychological well-being remains insufficiently addressed during cancer care despite advances in medical treatment. The strong correlations observed between pain, impaired daily functioning, and anxiety/depression further support the bidirectional relationship between physical symptoms and psychological distress reported in previous studies. [21–29]

Consistent with studies conducted in India and Türkiye, older respondents in our study experienced greater impairment in self-care, suggesting that age-related functional decline compounds the physical effects of cancer and its treatment.[22,23] Similarly, lower educational attainment was associated with poorer QoL across several EQ-5D-3L dimensions, supporting evidence that education influences health literacy, access to health information, self-management skills, and healthcare utilization.[23,26] However, these findings differ from Canadian valuation research and a systematic review reporting no association between education and health-state preferences.[24,25] This discrepancy may reflect methodological differences. Whereas those studies evaluated societal preferences or utility valuations, our study examined patients who lived through health experiences during active cancer care. Educational attainment may therefore exert a greater influence on patient-reported outcomes than on societal health-state valuations.

An unexpected finding was that longer cancer detection time was associated with better self-care, usual activities, and overall QoL. This contrasts with studies[22,26] reporting progressive deterioration over time but may reflect survivor adaptation, improved symptom management, successful completion of intensive treatment, or the exclusion of patients with the poorest prognoses from longer-term follow-up. Similar adaptation effects have been observed in longitudinal studies[26–33] showing that patients often adjust psychologically and functionally following the initial treatment period. Nevertheless, because of the cross-sectional design, this finding should be interpreted cautiously and confirmed in prospective studies.

Cancer stage was strongly associated with physical dimensions of QoL, particularly mobility, self-care, usual activities, and pain/discomfort, which agrees with findings from Türkiye, Malaysia, Spain, and the United Kingdom demonstrating poorer functional outcomes and greater healthcare utilization among patients with advanced disease. [22,26,33–35] Interestingly, cancer stage was not independently associated with anxiety/depression in our study. This may indicate that psychological distress is influenced not only by disease severity but also by uncertainty, coping mecha-

nisms, social support, and financial concerns. Similar observations have been reported in psycho-oncology research, where emotional well-being is only moderately correlated with clinical disease indicators.

The multivariable analysis further demonstrated that educational level and cancer detection time were the only independent predictors of QoL after adjustment for demographic and clinical characteristics. Neither cancer type nor stage remained significant in the adjusted model, suggesting that socioeconomic and adaptive factors may explain more variation in perceived health than disease characteristics alone. These findings complement previous systematic reviews indicating that psychosocial determinants frequently contribute to patient-reported QoL independently of clinical variables.[25,29]

Financial burden emerged as another important finding. Income loss represented the largest patient-reported cost, followed by uninsured medication expenses and other disease-related expenditures. These observations are consistent with evidence from the United States and other countries showing that indirect costs frequently exceed direct medical expenses and continue despite insurance coverage.[30–32] Although Türkiye provides universal health insurance, our findings suggest that substantial financial toxicity persists because of non-medical expenses, productivity losses, and treatments not fully covered by insurance. This highlights the importance of evaluating cancer care from the patient's perspective rather than relying exclusively on healthcare system expenditures.

Overall, the present findings support the growing body of evidence that improving cancer outcomes requires more than advances in diagnosis and treatment. Interventions aimed at early diagnosis, effective symptom control, psychological support, patient education, and reduction of financial burden are likely to improve both health-related quality of life and the overall value of cancer care. Future multicenter longitudinal studies including more representative distributions of cancer types and complete staging information are needed to confirm these findings and better understand changes in QoL over the disease trajectory.

Strengths and Limitations

This study has several strengths. It was conducted at a tertiary medical center serving patients with cancer from multiple provinces, thereby enhancing the heterogeneity of the study population and the potential generalizability of the findings. Unlike many previous studies focusing on a single cancer type, it evalu-

ated patients with diverse cancer diagnoses and disease stages while simultaneously examining health-related quality of life, patient-borne costs, and sociodemographic characteristics. Data was collected through direct patient interviews, with assistance from relatives when respondents were unable to complete the questionnaire independently, thereby minimizing missing data. Furthermore, the analysis of individual EQ-5D-3L dimensions provided a comprehensive understanding of the specific domains of health-related quality of life most affected in this population.

Despite its strengths, this study has several limitations. First, its single-center design and relatively small sample size may limit the generalizability of the findings to the broader population of patients with cancer. Second, the cross-sectional design provides only a snapshot of patients' health status and precludes conclusions regarding causality or changes in health-related quality of life over time. Third, cancer stage information was unavailable for a substantial proportion of respondents (68.6%). This largely reflects the inclusion of both solid tumors and hematological malignancies, for which conventional staging systems are often not applicable, although incomplete clinical documentation may also have contributed. Fourth, the heterogeneous study population, comprising both hematological malignancies (e.g., Acute Myeloid Leukemia [AML] and Multiple Myeloma [MM]) and solid tumors, limited disease-specific analyses because these conditions differ in their clinical course, treatment, and prognosis. Accordingly, the findings should be interpreted with caution. Future multicenter, longitudinal studies with larger samples and more comprehensive clinical data are needed to validate and extend these findings.

CONCLUSION

Cancer care evaluation should extend beyond survival and safety outcomes to include health-related quality of life and patient-borne costs, supporting more patient-centered and value-based care. This study provides evidence on QoL, financial burden, and the sociodemographic and clinical factors associated with patient-reported outcomes among patients with cancer. The findings highlight the need for policies promoting health education, employment support, timely cancer screening and diagnosis, and equitable access to healthcare. Future multicenter longitudinal studies are warranted to further inform evidence-based, patient-centered cancer care.

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