

FACTORS ASSOCIATED WITH QUALITY OF LIFE AMONG MAINTENANCE HEMODIALYSIS PATIENTS AT THAI BINH MEDICAL UNIVERSITY HOSPITAL IN 2025

ABSTRACT

Objective: This study aimed to identify factors associated with quality of life among patients undergoing maintenance hemodialysis at the Hemodialysis Department of Thai Binh Medical University Hospital in 2025.

Subjects and Methods: A cross-sectional study was conducted among 72 patients receiving maintenance hemodialysis at Thai Binh Medical University Hospital. Study participants were recruited using a purposive sampling method. Quality of life was assessed using the Kidney Disease Quality of Life-36 (KDQoL-36) instrument. Multivariable linear regression analysis was applied to determine factors independently associated with quality of life.

Results: The mean quality of life score was 40.9. The burden of kidney disease and physical health domains had the lowest mean scores, while the symptom/problem domain and the effects of kidney disease on daily life had the highest scores. Multivariable analysis showed that age ≥ 60 years ($\beta = -5.364$, $p = 0.033$) and being married ($\beta = -5.862$, $p = 0.039$) were significantly associated with lower quality of life. Patients with one comorbidity and those with two or more other than kidney disease had lower quality of life than those without any (with $\beta = -7.719$, $p = 0.011$ and $\beta = -8.676$, $p = 0.009$, respectively). Each additional year since chronic kidney disease diagnosis was associated with a 0.487-point decrease in quality of life ($p = 0.021$).

Conclusion: Factors including age, marital status, comorbidities, and disease duration were associated with quality of life among maintenance hemodialysis patients. Interventions focusing on comprehensive comorbidity management and long-term supportive care may contribute to improving quality of life in this population.

Keywords: end-stage renal disease, maintenance hemodialysis patients, health-related quality of life.

1. Thai Binh University of Medicine and Pharmacy

*Corresponding author: Tran Thi Thu Ha

Email: hatlyd@gmail.com

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Tran Thi Thu Ha^{1*}, Nguyen Thi Ha Phuong¹

I. INTRODUCTION

Chronic kidney disease (CKD) is a significant global public health issue, with endstage renal disease (ESRD) representing the most severe form of kidney dysfunction. In 2024, an estimated 850 million individuals worldwide were affected by kidney disease, with the majority residing in low- and middle-income countries [1]. Moreover, CKD is projected to increase substantially in global health burden, rising from the 16th leading cause of years of life lost in 2016 to the 5th position by 2024 [2]. Hemodialysis remains the most widely utilized form of renal replacement therapy for patients with ESRD. Although this intervention extends survival, it is associated with considerable physical, psychological, and social challenges that can negatively impact patients' quality of life (QoL). Consequently, QoL has emerged as a critical outcome in the long-term management of individuals undergoing maintenance hemodialysis.

QoL is a construct that includes physical health, psychological well-being, social functioning, and the ability to perform daily activities. Among patients receiving maintenance hemodialysis, these domains are frequently compromised due to factors such as persistent fatigue, strict diet and fluid restrictions, dependence on dialysis equipment, and disruptions to work and social life. These issues underscore the importance of assessing QoL and identifying its associated determinants in this population.

In Vietnam, CKD affects an estimated 11.2 million people in 2023 [3]. CKD has also been identified as one of the leading causes of mortality nationwide [4]. While extending survival remains a primary goal in the management of ESRD, improving QoL is increasingly recognized as an equally important objective [5]. However, existing domestic literature predominantly focuses on major metropolitan tertiary centers, leaving a significant evidence gap regarding the unique socioeconomic and clinical realities of patients in provincial regions like Hung Yen and the wider Red River Delta. Thai Binh Medical University Hospital serves as one of the primary regional healthcare centers,

managing populations with distinct demographic characteristics that differ from those in mega-cities. Investigating this specific group of patients provides a critical baseline for understanding how regional features impact chronic disease management. Therefore, this study aimed to evaluate the QoL and identify factors associated with QoL among patients receiving hemodialysis at the Hemodialysis Department of Thai Binh Medical University Hospital using the Kidney Disease Quality of Life-36 (KDQoL-36) instrument. By identifying these targeted factors, this study seeks to provide actionable, localized evidence necessary to design tailored nursing interventions and optimize regional health resource allocation to address the specific physical and psychosocial vulnerabilities of the region's hemodialysis patients.

II. SUBJECTS AND METHODS

2.1. Subjects, location, and study period

Subjects:

Selection criteria

Patients aged ≥ 18 ;

Diagnosed with ESRD, defined as a glomerular filtration rate (GFR) < 15 mL/min/1.73m² [6];

Receiving maintenance hemodialysis for at least 3 months at the study site;

Provided written informed consent to participate in the study.

Exclusion criteria:

Patients with documented cognitive impairment;

Patients experiencing acute complications during or immediately after the hemodialysis session.

Study location: The Hemodialysis Department of Thai Binh Medical University Hospital.

Study period: Between 03/2025 and 07/2025.

2.2. Research methods

Study design: A cross-sectional study.

Sample size: The sample size of this study was calculated using the formula for estimating a standard deviation value:

$$n = Z_{(1-\frac{\alpha}{2})}^2 \frac{\delta^2}{\epsilon^2 \mu^2}$$

With:

n: is the required sample size;

α : is the significance level (0.05), corresponding to $Z_{(1-\frac{\alpha}{2})} = 1.96$;

ϵ : is the margin of error, set at 0.06;

μ and δ are the mean and standard deviation of population's QoL scores, respectively. We used $\mu = 51.3$ and $\delta = 13.0$ based on findings from a study by Doan et al. [7];

Based on the formula, the estimated sample size was 69 patients. We added 5% to account for nonresponse, therefore the sample size was 72 hemodialysis patients.

Sampling method: A purposive sampling approach was employed. Potential participants were identified from the registry of the Hemodialysis Department at Thai Binh Medical University Hospital. Eligibility was determined through review of medical records and confirmation of diagnosis, dialysis duration, and cognitive status in consultation with the attending nephrologist. Patients who met the inclusion criteria were approached in person, provided with detailed information about the study, and invited to participate. Written informed consent was obtained prior enrollment. Data collection and interviewing concluded once the target sample size was achieved.

Study variables:

Demographic characteristics: age groups, gender, current occupation, etc.

Clinical data: CKD duration, hemodialysis duration, number of comorbidities, etc.

QoL scores: QoL was assessed using the Kidney Disease Quality of Life-36 (KDQoL-36) instrument. This tool comprises five subscales: the Physical Component Summary, Mental Component Summary, Burden of Kidney Disease, Symptoms and Problems of Kidney Disease, and Effects of Kidney Disease. Scores for each subscale range from 0 to 100, with higher scores indicating better QoL. Specifically, a higher score in the burden of kidney disease domain reflects a lower perceived burden on patients. In this study, the overall QoL score was calculated as the mean of the five domain scores with higher overall QoL scores indicating better QoL.

Data collection process:

Data on sociodemographic characteristics and QoL were collected through structured face-to-face interviews using a standardized questionnaire. The questionnaire comprised two sections. The first section included items on demographic characteristics and medical history of the participants, while the second section consisted

of 36 items from the KDQoL-36 instrument. Each interview lasted approximately 15–20 minutes and was conducted by trained research staff. Responses were entered directly into a REDCap database to minimize transcription errors.

Clinical information, including comorbidities and dialysis duration, was extracted from patients' medical records on the same day as the interview. Anthropometric measurements were obtained by trained staff. Height and weight were measured without shoes and with light clothing. Body weight was recorded after the hemodialysis session. In addition, the body mass index (BMI) was calculated using below formula:

$$\text{BMI} = \text{weight (kilograms)} / [\text{height (meters)}]^2$$

Data analysis methods:

Data were exported from REDCap and analyzed using Stata version 18.0. Continuous variables were summarized as means and standard deviations (SD) or medians and interquartile ranges (IQR), as appropriate. Categorical variables were presented as frequencies and percentages. Univariate associations with QoL were evaluated using parametric (-tests, Pearson correlation) or non-parametric (Mann–Whitney U, Kruskal–Wallis

tests, as appropriate for the data distribution. To ensure comprehensive identification of potential associated factors, variables demonstrating a p-value <0.2 in the univariate analysis, alongside clinically relevant variables, were entered into a multivariable linear regression model. A p-value <0.05 was considered statistically significant. The validity of the multivariable linear regression model was evaluated by verifying the assumptions of normality, homoscedasticity, and non-multicollinearity. Residuals were assessed for normality using the Shapiro–Wilk test, while homoscedasticity was examined via the Breusch–Pagan test. Additionally, the Variance Inflation Factor (VIF) was calculated for all independent variables to ensure the absence of problematic multicollinearity.

2.3. Research ethics

The study was approved by the Institutional Scientific Review Board of Thai Binh University of Medicine and Pharmacy (Decision No. 209/QĐ-YDTB, dated February 4, 2025). All participants were provided with detailed information about the study objectives and procedures prior to participation.

III. RESULTS

Table 1: Quality of life scores among study participants (n=72)

Factors	Mean ± SD
Physical component summary	31.2 ± 7.9
Mental component summary	39.0 ± 10.9
Burden of kidney disease	22.0 ± 16.6
Symptoms/problems of kidney disease	59.7 ± 21.6
Effects of kidney disease	52.6 ± 20.1
QoL	40.9 ± 12.1

The mean QoL score of the patients participating in the study was 40.9 points. Among the QoL domains, the burden of disease had the lowest mean score (22.0 ± 16.6), followed by physical health (31.2 ± 7.9). The impact of kidney disease on daily life and the symptom/problem domains had the highest mean QoL scores, at 52.6 ± 20.1 and 59.7 ± 21.6, respectively. The mental health domain had a higher mean QoL score (39.0 ± 10.9) than the physical health domain (31.2 ± 7.9).

Table 2. Quality of life scores according to demographic characteristics of participants

Demographic characteristics		n	%	QoL scores (Mean ± SD)	p
Age group (yrs)	<60	42	58.3	44.1 ± 12.4	0.006
	≥60	30	41.7	36.4 ± 10.2	
Gender	Female	33	45.8	42.1 ± 11.7	0.451
	Male	39	54.2	39.9 ± 12.5	

Demographic characteristics		n	%	QoL scores (Mean ± SD)	p
Education level	Secondary school or lower	44	61.1	38.1 ± 11.0	0.014
	High school or higher	28	38.9	45.2 ± 12.7	
Current occupation	Unemployed	24	33.3	40.5 ± 10.2	0.002
	Retired	21	29.2	34.1 ± 9.4	
	Others	27	37.5	46.6 ± 13.0	
Monthly income (millions)	<3	54	75.0	38.8 ± 11.2	0.008
	≥3	18	25.0	47.3 ± 12.8	
Marriage status	Single/Divorced/ Widowed	24	33.3	48.1 ± 12.9	<0.001
	Married	48	66.7	37.3 ± 10.0	
Living with	Alone	3	4.2	37.8 ± 8.9	0.650
	Family or caretaker	69	95.8	41.0 ± 12.2	
Distance to hospital	<5 km	19	26.4	39.4 ± 14.2	0.386
	5-10 km	10	13.9	38.4 ± 12.8	
	>10 km	43	59.7	42.1 ± 11.0	
Living area	Rural	55	76.4	41.2 ± 11.7	0.700
	Urban	17	23.6	39.9 ± 13.6	

Study participants younger than 60 years had a higher mean QoL score (44.1 ± 12.4) compared with those aged 60 years and older (36.4 ± 10.2). The mean QoL score among female participants (42.1 ± 11.7) was higher than that of male participants (39.9 ± 12.5). Study participants with an educational level of high school or higher had a higher mean QoL score (45.2 ± 12.7) than those with a lower secondary education or below (38.1 ± 11.0). Retired study participants had the lowest mean QoL score among the occupational groups (34.1 ± 9.4), whereas participants with other occupations had the highest mean score (46.6 ± 13.0). Patients with monthly income of 3 million VND or more than had a higher QoL (47.3 ± 12.8) compared with those earning less than 3 million VND (38.8 ± 11.2). The mean QoL score of single divorced, or widowed participants (48.1 ± 12.9) was higher than that of married participants (37.3 ± 10.0). Participants living alone had a lower mean QoL score (37.8 ± 8.9) than those living with family members or having caregivers (41.0 ± 12.2).

The QoL score of participants living in urban areas (39.9 ± 13.6) was lower than that of those living in rural areas (41.2 ± 11.7). Participants living more than 10 km from Thai Binh Medical University Hospital had the highest mean QoL score (42.1 ± 11.0), while those living within 5 km and 5–10 km had mean QoL scores of 39.4 ± 14.2 and 38.4 ± 12.8 , respectively.

Table 3. Quality of life scores according to medical characteristics of study participants

Medical characteristics		n	%	QoL scores (Mean ± SD)	p
BMI classification	Underweight	30	42.3	40.1 ± 10.9	0.665
	Normal	38	53.5	42.1 ± 12.8	
	Overweight	3	4.2	38.5 ± 17.9	
CKD's causes	Hypertension	19	26.4	38.6 ± 10.9	0.333
	Diabetes	7	9.7	38.3 ± 14.9	
	Kidney disease	25	34.7	39.9 ± 10.9	
	Others	21	29.2	45.0 ± 13.3	

Medical characteristics		n	%	QoL scores (Mean ± SD)	p
Number of comorbidities	0	18	25.0	49.5 ± 12.8	0.003
	1	30	41.7	39.5 ± 11.4	
	≥2	24	33.3	36.2 ± 9.0	
Duration of CKD (years) (mean ± SD)		9.5 ± 5.9			0.032
Duration of hemodialysis (years) (mean ± SD)		6.3 ± 4.5			0.396

The study results showed that patients with a normal BMI had the highest QoL score (42.1 ± 12.8), while those classified as overweight had the lowest QoL score (38.5 ± 17.9). The lowest QoL scores was observed among patients whose CKD was caused by diabetes (38.3 ± 14.9), whereas the highest QoL score was found among those with different causes of CKD instead of hypertension, diabetes or kidney disease (45.0 ± 13.3). Hemodialysis patients participating in the study who did not have chronic comorbidities other than CKD had the highest QoL score (49.5 ± 12.8). Participants with two or more comorbidities had the lowest QoL (36.2 ± 9.0).

Table 4: Factors associated with quality of life among study participants

Characteristics	Univariate linear regression model		Multivariate linear regression model	
	β	p (95% CI)	β	p (95% CI)
Age group (yrs)				
<60	1.0		1.0	
≥60	-7.764	0.006 (-13.270 – -2.259)	-5.364	0.033 (-10.285 – -0.442)
Education level				
Secondary school or lower	1.0		1.0	
High school or higher	7.090	0.014 (1.465 – 12.716)	2.942	0.260 (-2.231 – 8.114)
Marital status				
Single/Divorced/Widowed	1.0		1.0	
Married	-10.745	<0.001 (-16.253 – -5.237)	-5.862	0.039 (-11.408 – -0.315)
Monthly income (millions)				
<3	1.0		1.0	
≥3	8.571	0.008 (2.281 – 14.860)	2.694	0.366 (-3.218 – 8.605)
Number of comorbidities				
0	1.0		1.0	
1	-10.064	0.003 (-16.650 – -3.478)	-7.719	0.011 (-13.622 – -1.815)
2	-13.315	<0.001 (-20.203 – -6.428)	-8.676	0.009 (-15.067 – -2.285)
Duration of CKD	-0.518	0.032 (-0.991 – -0.045)	-0.487	0.021 (-0.899 – -0.075)

In the multivariable linear regression analysis, several factors were independently associated with QoL. Patients aged 60 years and older had QoL scores that were 5.364 points lower than those of patients younger than 60 years ($\beta = -5.364$; $p = 0.033 < 0.05$; 95% CI: -10.285 - -0.442). Married patients also had significantly lower QoL scores compared with those who were single, divorced, or widowed

($\beta = -5.862$; $p = 0.039 < 0.05$; 95% CI: $-11.408 - -0.315$). Compared with patients without comorbidity, those with one comorbidity had QoL scores lower by 7.719 point ($\beta = -7.719$; $p = 0.011 < 0.05$; 95% CI: $-13.622 - -1.815$). Also, QoL among patients with two or more comorbidities was lower by -8.676 points as compared with those were only diagnosed with CKD ($\beta = -8.676$; $p = 0.009 < 0.05$; 95% CI: $-15.067 - -2.285$). Additionally, each additional year since the diagnosis of chronic kidney disease was associated with a 0.487-point decrease in QoL score ($\beta = -0.487$; $p = 0.021$; 95% CI: -0.899 to -0.075).

Diagnostic assessments confirmed that the multivariable linear regression model met all necessary statistical assumptions. The Variance Inflation Factor (VIF) for all predictors ranged from 1.11 to 1.73 (mean VIF = 1.34), indicating no evidence of multicollinearity. Furthermore, the Breusch–Pagan test for heteroscedasticity was non-significant ($p = 0.463$), and the Shapiro–Wilk test confirmed the normal distribution of residuals ($p = 0.371$). These results indicate that the model is robust and suitable for identifying independent determinants of QoL.

IV. DISCUSSION

This study collected data from 72 hemodialysis patients with 41.7% aging 60 years and older. Slightly more than half were male (54.2%), and the majority had completed secondary school or lower (61.1%). Most participants were married (66.7%) and lived with family members or a caretaker (95.8%). A significant proportion (59.7%) lived more than 10 kilometers from the hospital. The majority (75.0%) reported having one or two comorbidities. The duration of CKD and hemodialysis among study population were 9.5 and 6.3 years, respectively.

Among the five subscales assessed using the KDQoL-36, the Symptoms and Problems domain had the highest mean score (59.7 ± 21.6), indicating that patients perceived this aspect of their condition as less impaired compared with other dimensions of QoL. This finding is consistent with the results reported by Ngo Hoang Anh et al., who conducted a study among 78 hemodialysis patients at Binh Phuoc Hoan My Hospital in 2023. Using the KDQoL-SF instrument, they reported a symptom/problem list score of 57.4 ± 20.3 [8]. In contrast, the burden of kidney disease subscale had the lowest score (22.0 ± 16.6), indicating the significant disruption CKD causes in patients' daily life. This finding is further supported by studies conducted by Vo Ngoc Trang Dai et al. and Pham Minh Khue et al., in which the Burden of Kidney Disease domain had the lowest mean scores among the five domains (29.71 ± 22.65 and 29.55 ± 26.79 , respectively) [9,10]. The Mental Component Summary and Physical Component Summary scores were 51.5 ± 15.8 and 46.4 ± 12.2 , respectively, reflecting ongoing psychological and physical challenges among patients undergoing hemodialysis.

The findings of our study indicate that several factors were significantly associated with the QoL of

the study participants, including age, marital status, the number of comorbidities, and the duration since diagnosis of CKD. Specifically, patients aged 60 years and older had QoL scores that were 5.364 points lower than those younger than 60 years. This finding is consistent with results from previous studies. For example, a study conducted by Dao Anh Dung et al. among 68 patients receiving maintenance hemodialysis at Van Cao Chi Private General Hospital in 2019 reported that each additional year of age was associated with a 0.601-point decrease in QoL, with the difference being statistically significant ($p < 0.001$) [11]. The decline in QoL with increasing age is not unique to patients undergoing hemodialysis but is also commonly observed in the general elderly population. Aging is associated with progressive physical deterioration, psychological changes, and an increased burden of chronic health conditions. These age-related changes may partly explain the observed association between age and QoL among patients with CKD receiving regular hemodialysis. In addition to physiological and psychological aging processes, hemodialysis patients also experience substantial disease-related burdens, which may further exacerbate the decline in QoL.

Marital status was also found to be significantly associated with the QoL of the study participants. In our study, married patients had QoL scores that were 5.862 points lower than those who were single, divorced, or widowed, with a statistically significant difference ($p < 0.001$; 95% CI: $-11.408 - -0.315$). Although marriage and cohabitation with family members can provide emotional support, care, and shared responsibility, patients undergoing long-term hemodialysis may also experience negative perceptions related to declining physical health and

reduced functional capacity. These limitations can lead to feelings of inadequacy and concerns about financial and daily life burdens placed on family members, which may adversely affect QoL despite the presence of social support.

Our study demonstrated a significant association between the number of comorbidities and the QoL of the study participants. Specifically, compared with patients without comorbidity, those with one comorbidity had QoL scores lower by 7.719 point ($p = 0.011 < 0.05$; 95% CI: $-13.622 - -1.815$). Also, QoL among patients with two or more comorbidities was lower by -8.676 points as compared with those were only diagnosed with CKD ($p = 0.009 < 0.05$; 95% CI: $-15.067 - -2.285$), with statistically significant differences. These findings are consistent with results from previous studies [12,13]. Patients with multiple chronic conditions tend to experience poorer QoL due to an increased symptom burden, more complex treatment regimens, and greater limitations in daily activities. Each chronic disease may present with distinct symptoms, and the coexistence of multiple conditions can accelerate physical decline. For instance, the presence of both CKD and hypertension may exacerbate fatigue and restrict physical mobility, thereby causing negatively relationship with QoL. In addition, managing multiple chronic diseases often requires the use of several medications, frequent medical visits, and adherence to concurrent treatment protocols, which may increase psychological stress, time demands, and financial burden. Potential adverse effects arising from drug–drug interactions may further contribute to QoL deterioration.

Our study also identified a significant association between quality of life (QoL) and the duration since diagnosis of chronic kidney disease (CKD). Specifically, each additional year following CKD diagnosis was associated with a 0.487-point decrease in QoL score ($\beta = -0.487$; $p = 0.021$; 95% CI: $-0.899 - -0.075$). This finding is consistent with previous studies reporting an inverse relationship between disease duration and QoL [14,15]. For example, Kussmiran et al. conducted a study among 80 hemodialysis patients at Regional General Hospital, Bandung Regency, Indonesia, in May 2024 and found that longer CKD duration was significantly associated with poorer QoL [15]. The observed decline in QoL over time may be explained by several factors, including cumulative symptom burden, increased psychological distress,

and progressive limitations in physical and social functioning. In addition, prolonged dependence on hemodialysis may contribute to treatment fatigue and emotional exhaustion, further compromising patients' overall well-being.

This study establishes a critical baseline for understanding how localized socioeconomic and regional characteristics influence the QoL among patients undergoing maintenance hemodialysis at a primary regional medical center. By identifying these specific determinants, our findings provide essential, localized evidence to guide targeted clinical management and optimize patient care protocols. Nevertheless, several limitations must be acknowledged. First, because this was a single-center study, the findings may lack generalizability to other provincial or national contexts. Second, the cross-sectional design precludes the ability to establish causal relationships between the identified demographic and clinical characteristics and the patients' overall quality of life.

V. CONCLUSION

Quality of life among hemodialysis patients at Thai Binh Medical University Hospital was significantly associated with age, marital status, comorbidity burden, and chronic kidney disease duration. Interventions focusing on comprehensive comorbidity management and long-term supportive care may contribute to improving quality of life in this population.

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