



Assessment of the patient reported health related quality of life and its associated factors among patients with ESKD undergoing hemodialysis in Addis Ababa, Ethiopia

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DECLARATION

I, Dr.Eleni Amissew, do hereby declare that this research is a result of the works of my own making except where due is made in a review of previous literature in the content and by my knowledge, has never been submitted for any prior academic award or qualification in this Institution.

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I. Acronyms/Abbreviations

AOR Adjusted Odds Ratio

cognitive impairment (CI) Confidence Interval

Chronic Kidney Disease (CKD) Chronic Kidney Disease

eGFR Estimated Glomerular Filtration Rate

ESKD End-Stage Kidney Disease

HRQOL_Health-Related Quality of Life

KDQOL-36_Kidney Disease Quality of Life-36

KDQOL-SF_Kidney Disease Quality of Life-Short Form

MCS Mental Component Score

physical and mental component scores (PCS) Physical Component Score

Pmp_Per Million Population

PROMs_Patient-Reported Outcome Measures

PROs Patient-Reported Outcomes

RRT Renal Replacement Therapy

SF-36 Short Form-36

Abstract

Background: Background: ESKD and hemodialysis impose a significant burden on HRQOL, particularly in low-resource settings. Understanding the patient-reported outcomes health related quality of care among ESKD patients on hemodialysis is crucial for improving patient-centered care.

Objective: This study aims to assess the patient reported HRQOL and its associated factors among patients with ESKD undergoing hemodialysis in Addis Ababa, Ethiopia.

Methods: Methods: A multicenter cross-sectional study was conducted from March–April 2025 across five hospitals/clinics, enrolling 276 participants (87% response rate). Validated tools (KDQOL-36, Mini-Mental State Examination (MMSE)) translated into Amharic were used to measure HRQOL and cognitive function. Binary logistic regression identified predictors of poor HRQOL (KDQOL-36 score <50)

Result. A total of 276 patients with ESKD undergoing dialysis were included in the study. The mean age of participants was 49 ± 14.09 years, and the majority were male (67.4%). The prevalence of poor HRQOL was 38.8%, with a high proportion of patients experiencing severe impairments in both the physical (67.4%) and mental (65.2%) health domains. Although patients reported moderate symptoms of kidney disease (mean score: 76.76), the perceived burden of the disease was high (mean score: 45.81). Cognitive impairment affected 13.8% of participants. Unemployment was associated with increased odds of poor HRQOL (AOR = 1.75; 95% CI: 1.02–2.98; P = 0.04). Similarly, lack of formal education (AOR = 4.33; 95% CI: 1.06–17.69; P = 0.03) and the presence of comorbidities (AOR = 3.95; 95% CI: 1.28–12.22; P = 0.01) were also significant predictors.

Conclusion: Poor HRQOL is highly prevalent among Ethiopian hemodialysis patients and appears to be influenced by socioeconomic, clinical, and psychological factors. The findings highlight the need for context-specific strategies to support vulnerable patient groups, improve comorbidity management, and explore approaches to enhance access and continuity of dialysis care.

Keywords: ESKD, Hemodialysis, Patient-reported outcomes, Quality of life, HRQOL Addis Ababa, Ethiopia

1 Introduction

1.1 Background

Patient-centered care is gaining prominence, with patient-reported outcomes emerging as pivotal indicators of treatment efficacy and patient well-being. (1) PROMs are standardized, validated questionnaires used by patients to report on aspects of their health status that matter most to them, such as symptoms, functionality, and quality of life, without interpretation by clinicians or anyone else (1). PROMS offer unique insights into patients' symptoms and experiences that cannot be captured solely through laboratory markers. These measures enable healthcare professionals to understand the subjective aspects of patients' quality of life, direct experiences and perceptions of patients regarding their health status and treatment. Studies suggest that attending to patient feedback on healthcare outcomes and behaviors can lead to improved treatment adherence and overall outcomes, underscoring the significance of PROMs in shaping health care intervention (2) (1) (3).

According to Kidney Disease: Improving Global Outcomes (KDIGO), CKD is characterized by kidney damage or a glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m² for a duration of at least three months. CKD is classified into five stages based on its severity. End-stage renal disease is defined as having a GFR of less than 15 mL/min/1.73 m². when patients progress to stage 5 (GFR <15 mL/min), toxin buildup severely impacts health, leading to uremic syndrome (4).

CKD represents a pervasive global health challenge. Today, it is estimated that 850 million People worldwide suffer from CKD, approximately 0.1% of the world's population has kidney failure, and estimates suggest a higher prevalence in high-income countries (HICs) (0.2%), compared to low-income countries (LICs) (0.05%) or lower-middle income countries (LMICs) (0.07%). The global median prevalence of chronic dialysis is 397 pmp) (5).

PROMs are particularly relevant to the care and health of kidney patients. Studies have shown that patients with ESKD have poorer functional status than those with other chronic conditions, and that providers are largely unaware of the presence and severity of these symptoms (4).

CKD patients on hemodialysis often experience a high burden of symptoms, including pain, fatigue, and stress. These symptoms can significantly impact their quality of life, but they may not always be prioritized by healthcare providers (6).

In this group of patients understanding and incorporating PROMs into clinical interventions are paramount. This underscores the urgent need for comprehensive strategies to address its multifaceted implications, ultimately leading to more patient-centered care and informed decision-making.

1.2 Statement of problem

CKD is associated with a high burden of symptoms, with fatigue being one of the most commonly reported issues among patients. Furthermore, depression and anxiety are significantly more prevalent in patients on dialysis compared to the general population, as demonstrated in global meta-analyses and systematic reviews (17). Evidence also indicates that hemodialysis patients experience impaired cognitive function, which is linked to increased mortality and hospitalization rates.

Despite advances in medical treatment, addressing the psychosocial aspects of care remains a critical challenge. Patient feedback on healthcare outcomes and behaviors, captured through patient-reported outcome measures (PROMs), has been shown to enhance treatment adherence and improve overall outcomes. These findings highlight the importance of PROMs in shaping effective and patient-centered healthcare interventions (3) (1) (2).

In the context of Ethiopia, a study conducted in Addis Ababa reported that a significant proportion of CKD patients on hemodialysis had a lower HRQOL. However, there is a lack of comprehensive evidence on the relationship between PROMs and their associated factors, such as sociodemographic, clinical, and psychological characteristics, among patients with ESKD undergoing hemodialysis in this setting.

Cognitive impairment is a significant yet often overlooked complication among ESKD patients undergoing hemodialysis. Research has also linked cognitive impairment to higher mortality and hospitalization rates, making it a critical aspect of patient care. (25) (26) (27) (28). Despite its profound implications, cognitive impairment remains underdiagnosed and underexplored, especially in resource-limited settings like Ethiopia. To the best of current knowledge, no studies have comprehensively assessed the burden, cognitive impairment among hemodialysis patients in Ethiopia.

Understanding these factors is essential for developing targeted interventions to improve the quality of life of ESKD patients. Therefore, further research is needed to address this gap and provide actionable insights into enhancing patient care in the Ethiopian healthcare context.

1.3 Justification for the study

The study aims to investigate the impact of hemodialysis on patients with CKD focusing on patient reported outcomes. This research is justified by several key factors:

1. **Growing Burden of ESKD:** ESKD is a global health problem with a rising prevalence, particularly in developing countries. Hemodialysis is a common treatment for ESKD, but its long-term impact on patients remains understudied.
2. **Importance of Patient-Centered Care:** Understanding the lived experiences of ESKD patients on hemodialysis is crucial for providing patient-centered care. Patient-reported outcomes (PROs) can offer valuable insights into the challenges and benefits of this treatment.
3. **Knowledge Gaps:** Despite the increasing number of patients undergoing hemodialysis, there are still gaps in our understanding of the long-term consequences and patient reported outcome of this treatment, particularly in developing countries. This study aims to address these knowledge gaps and inform evidence-based practice.
4. **Addressing Unmet Needs:** Patients with CKD often face significant challenges, including physical and mental health issues, financial hardship, and social isolation. This study seeks to identify the specific needs of these patients and inform the development of targeted interventions to improve their quality of life.

1.4 Significance of the study

This study has several significant implications:

- 1. Improved understanding of patient experiences:** The study will provide valuable insights into the experiences and challenges faced by ESKD patients on hemodialysis in Addis Ababa. This information can be used to inform the development of patient-centered care programs and interventions.
- 2. Identification of factors affecting quality of life:** The study will identify factors associated with decreased quality of life among ESKD patients, such as sociodemographic characteristics, clinical factors, and psychological factors. This information can be used to target interventions and improve the overall well-being of ESKD patients.
- 3. Inform policy development:** The findings of the study can inform the development of policies and guidelines related to the care of ESKD patients on hemodialysis in Ethiopia. This could include recommendations for improving access to healthcare, enhancing the quality of care, and addressing the specific needs of ESKD patients.
- 4. Contribution to the global body of knowledge:** The study will contribute to the global body of knowledge on PROs in ESKD patients. The findings can be compared with studies conducted in other regions and settings to identify similarities and differences.
- 5. Advocacy for patient-centered care:** The study can be used to advocate for patient-centered care in nephrology practice. By highlighting the importance of PROs in assessing the impact of treatments and interventions, the study can promote a more patient-focused approach to care.

2 Literature review

According to Kidney Disease: Improving Global Outcomes (KDIGO), CKD is characterized by kidney damage or a GFR of less than 60 mL/min/1.73 m² for a duration of at least three months. CKD is classified into five stages based on its severity. End-stage renal disease (ESRD) is defined as having a GFR of less than 15 mL/min/1.73 m². Currently, about 0.1% of the global population suffers from kidney failure.

Patient-Reported Outcomes (PROs) offer a valuable tool for assessing the impact of clinical interventions from the patient's perspective (7) (8). HRQOL is a patient's self-reported assessment of their well-being. It encompasses both impairments (physical, psychological, or anatomical abnormalities) and disabilities (limitations in performing daily activities) (9) (10). Incorporating PROs into nephrology care can improve patient-centeredness, treatment adherence, and overall outcomes (11) (9).

Hemodialysis, while a life-saving treatment for ESKD, can significantly impact patients' quality of life (QoL). Beyond immediate complications, patients face long-term challenges that include pain, fatigue, and stress (7). These symptoms often go overlooked by healthcare providers, despite their profound impact on patients' well-being (12).

A global systematic review and meta-analysis analyzed the prevalence and severity of 17 symptoms in CKD patients compared to healthy controls (13). Overall, CKD patients experienced a higher prevalence of most symptoms, with fatigue being the most common. However, fatigue prevalence was significantly lower in transplant patients compared to those on RRT or dialysis. Dialysis patients reported significantly higher levels of depression and stress compared to those not on RRT. Additionally, several other symptoms, including weight loss, muscle weakness, hiccups, heartburn, changes in skin, trouble with memory, and dry skin, were more prevalent in dialysis patients. Compared to patients not on RRT and dialysis patients, those who had received a kidney transplant had significantly lower prevalence of muscle weakness, fatigue, poor sleep, itching, decreased appetite, depression, dry mouth, and poor mobility (14) (15).

A study from France using an ePROM questionnaire filled out directly by patients on dialysis found that 72% of CKD patients on hemodialysis reported feeling fatigued, and 39% felt stressed. Fatigue was the most prevalent symptom, with a prevalence of 72%. The prevalence did not vary between different dialysis centers, despite differences in patient characteristics and comorbidities (6).

Several studies also showed that there is significant association between HRQOL and hemoglobin level among patients with ESKD on HD. Anemia contributes to mortality and morbidity, adverse cardiovascular outcomes, and a lower quality of life. (16) (17).

ESKD patients on hemodialysis can experience cognitive impairment (18), the process itself often leads to physical discomfort, fatigue and stress (11). Patients on hemodialysis are more likely to experience depression, stress, and anxiety compared to those not on RRT (12). The constant routine of dialysis, the limitations it places on daily life, and the fear of the unknown can contribute to these mental health challenges (19). The socioeconomic impact routine hemodialysis can be significant on patients' lives and cannot be overlooked as the effects can contribute to a mounting symptom burden. The financial burden of treatment, including medical expenses, transportation costs, and lost income, can be overwhelming for many patients (20). Additionally, the time commitment required for dialysis can limit employment opportunities and social interactions (19). These factors can lead to feelings of isolation, reduced quality of life, and increased stress.

One meta-analysis done including 42 studies of 3,522 participants showed that People treated with hemodialysis have impaired cognitive function compared to the general population, particularly in the domains of orientation and attention and executive function. (21). Few studies have evaluated the impact of cognitive impairment in ESRD. One study found that among 336 hemodialysis (HD) patients, low MMSE scores were independently linked to an increase in hospital days and the need for technician care post-HD. (22). Additionally, lower cognitive function scores have been independently associated with higher mortality and hospitalization rates. In a UK study of 145 HD patients, the 7-year survival rate was 49% for those with CI, compared to 83.2% for those without cognitive impairment (CI). (23) (24).

It is also noted majority of CKD patients are at an increased risk of developing disturbances of bone and mineral metabolism. These disturbances lead to a constellation of bone lesions and biochemical abnormalities with affected patients manifesting with symptoms such as bone pain, muscle-tendon rupture, pruritus and high incidence of fractures. (25). These abnormalities are now recognized as a systemic disorder that affects a wide variety of systems, including cardiovascular (CV) organs, and is referred to as CKD—mineral and bone disorder (MBD). Recently evidences also shown these abnormalities are associated with left ventricular hypertrophy, vascular calcification (VC), infection, anemia, and inflammation in HD patients (26).

A study in Addis Ababa, Ethiopia revealed that a significant proportion of CKD patients on hemodialysis experienced lower HRQOL. Factors associated with decreased QoL included rural residence, smoking, lower education, comorbidities, longer dialysis duration, and lower social support (27).

Similarly, a cross-sectional study done in Addis Ababa on patients attending hemodialysis sessions in Zewditu Memorial Hospital and Tikus Anbessa Specialized Hospital found that patients with CKD who lived in urban areas had better PCS and MCS) than those who lived in rural areas. This may be due to differences in access to medical care and health literacy levels. Patients with higher education levels also had better PCS than those with lower education levels. Regarding MCS, low hemoglobin levels were associated with poor MCS, likely due to complications that can impair physical and mental HRQOL. Patients with three or more comorbidities were more likely to have poor MCS than those with fewer comorbidities. The presence of CKD-associated complications was also associated with lower MCS scores, as patients with multiple complications are more likely to progress to advanced stages of the disease, affecting their HRQoL (28).

In the same vein, another study done in Addis Ababa, Ethiopia in 2019 with total number of patients included 125, with a similar study design agreed that a significant proportion of patients with ESKD on hemodialysis experienced lower HRQOL. This finding has important clinical implications, as HRQOL is a key indicator of patient outcomes. Lower scores may signal poor prognosis and compromised quality of care, underscoring the need for regular assessment and interventions to support patients. Additionally, this study found that despite the worsening of physical health, the mental health of dialysis patients appeared relatively preserved, suggesting their ability to adapt psychologically over time. HRQOL was also found to be associated with

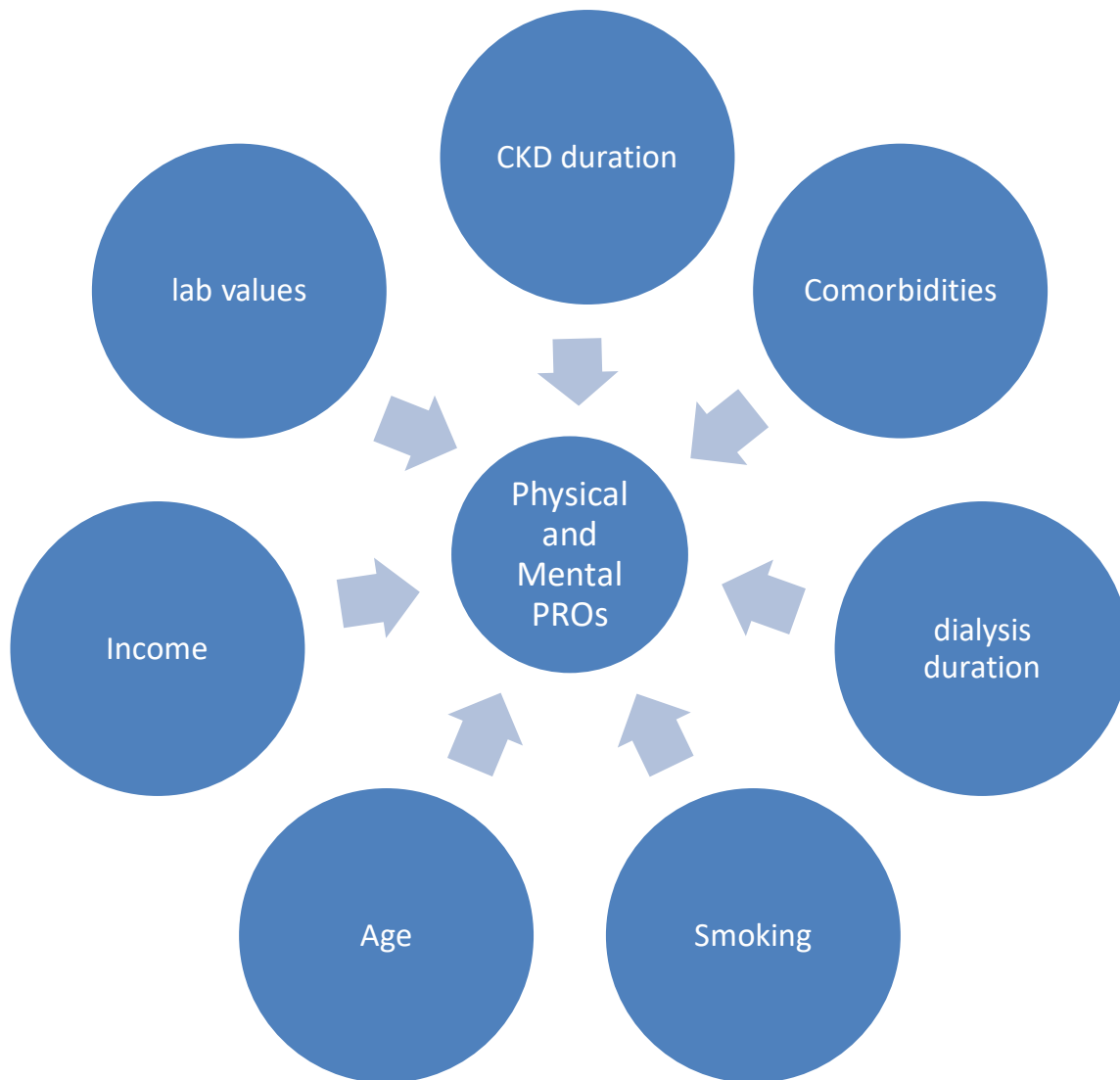
employment status and frequency of hemodialysis in this study, indicating that the burden of kidney disease is more significant for older patients on maintenance dialysis compared to younger patients (29).

Several validated PROs exist for CKD patients, including generic measures like the Short Form-36 (SF-36) and kidney-specific measure (30) (31). The Kidney Disease Quality of Life-36 (KDQOL-36) is particularly recommended for clinical practice due to its brevity and effectiveness in assessing the impact of CKD on patients' lives (11). Implementing PROs in CKD care can be challenging due to factors like response rates, patient ability to complete measures, and measure limitations (32). Ensuring high response rates and providing support to patients may be necessary to overcome these challenges.

Hemodialysis presents a complex burden on patients, affecting both physical and mental health. By incorporating PROs into clinical practice, healthcare providers can gain valuable insights into the patient experience and tailor treatment plans to improve QoL for ESKD patients

3 Conceptual Framework

Figure 1: conceptual framework



3. Objectives

General objectives:

To assess patients reported health-related quality and associated factors among ESKD patients on hemodialysis in a selected hospital in Addis Ababa, Ethiopia, 2025

Specific objectives:

1. To estimate the prevalence of patients reported health-related quality among ESKD patients on hemodialysis.
2. To identify factors affecting patients HRQOL among ESKD patients on hemodialysis.

4 Methodology

4.1 Study Setting and Period

This study was conducted at Zewditu Memorial Hospital, Menilik Comprehensive Specialized Hospital, Yarer General Hospital, Meqrez General Hospital, and Tom Dialysis Specialty Clinic, in Addis Ababa, Ethiopia. It was conducted from March 2025 to April 2025.

4.2 Study Design

A cross-sectional study design was employed for this research.

4.3 Source Population

All individuals with ESKD undergoing hemodialysis in the selected hospitals in Addis Ababa, Ethiopia, were considered the source population.

4.4 Study Population

All ESKD patients undergoing hemodialysis who fulfilled the inclusion criteria and volunteered to participate in the study from the selected hospitals were considered the study population.

4.4 Inclusion and Exclusion Criteria

4.5.1 Inclusion Criteria

- ESKD patients on hemodialysis for at least 3 months
- Age 18 years or older
- Able to provide informed consent

4.5.1 Exclusion Criteria

- Acute or unstable medical conditions that may interfere with study participation

4.6 Sample Size

The sample size was determined by using a single population proportion formula. A study done in Addis Ababa, at 5 dialysis centers showed that showed 48% of patients had low HRQOL (29).

$$n = \frac{z^2 * p * q}{d^2} = \frac{z^2 * p(1-p)}{d^2} = 387$$

Where n is the sample size, Z is the area under the acceptance region in a normal distribution (1- α) which is equal to 1.96, d is the preferred level of precision=5%, p is the estimated proportion

of HRQOL in the population, and q is $1-p$, the desired level of precision which is set at 95% confidence and a margin of error (d).

As the population is small ($<10,100$), the sample size was recalculated by utilizing a modified Cochran formula for small populations.

The sample size (n_0) was adjusted as

$$n = \frac{n_0}{1 + \left[\frac{n_0 - 1}{N}\right]} = 288$$

Where n is the sample size and N is the population size (the estimated population of ESKD patients on hemodialysis in Addis Ababa which is 1132). (33)

The sample size considering 10% non-respondent rate will be =317

4.7 Sampling Method

Initially, a proportional sample size was allocated to each study site to ensure an appropriate number of study participants from the selected sites. A convenience sampling strategy was used to include participants in this study. This involved selecting patients who were readily available and accessible at the participating healthcare facilities in Addis Ababa. This approach was chosen to minimize logistical challenges and reduce the costs associated with data collection.

4.8 Study Variables

Dependent variables:

- Patients reported HRQOL

Independent variables:

- Sociodemographic factors (age, gender, education level, income, employment)
- Clinical factors (comorbidities, duration of dialysis).
- Frequency of Dialysis, and other lab values)
- Lifestyle factors (smoking, physical activity)

4.9 Data Collection:

4.9.1 Questionnaire Development

The development of the questionnaire involved several key steps. First, a thorough literature review was conducted to identify existing PRO methods relevant to CKD patients, which informed the questionnaire's design. To ensure content validity, the Kidney Disease Quality of Life-36 (KDQOL-36) was selected because it comprehensively covers relevant domains such as physical function, mental health, social function, and general health. Additionally, cognitive function was assessed using the MMSE, a simple and quick interview that evaluates orientation, memory, attention, language comprehension, and visual construction.

5.9.2 Questionnaire Administration and Data Collection Procedures

The questionnaire was administered through face-to-face interviews by trained research staff at the participating healthcare facilities. Before data collection, all research staff received standardized training to ensure the questionnaire was administered effectively and consistently. Informed consent was obtained from all participants before their inclusion in the study. For patients unable to complete the questionnaire independently, proxy-reported measures were used as an alternative. The MMSE was administered by trained data collectors to assess cognitive function. Data, including MMSE results, were entered into a secure electronic database, and data-cleaning procedures were carried out to ensure accuracy and consistency throughout the dataset. The questionnaire was translated into Amharic to ensure clarity and cultural appropriateness for the study population.

4.10 Data Analysis:

Data were entered and analyzed using SPSS version 27.1. Descriptive statistics were employed to summarize the characteristics of the study population and the distribution of patient-reported HRQOL (HRQL). For categorical variables (*e.g.*, gender, education level, employment status), frequency distributions and percentages were calculated. For continuous variables, measures of central tendency (mean, median) and measures of dispersion (standard deviation, interquartile range) were computed.

Binary logistic regression analysis was used to test study hypotheses and examine the associations between overall patient-reported HRQL and potential predictor variables. Variables with a p-value less than 0.25 in the univariate analysis were included in the multivariable binary logistic regression model for further evaluation. Statistical significance in the multivariable analysis was determined at a p-value threshold of 0.05 with 95% CI reported for the odds ratios. The results were presented clearly and systematically using tables, graphs, and figures, followed by detailed interpretation.

4.11 Expected Outcomes of the study

This study was expected to reveal the significant burden of ESKD on patients undergoing hemodialysis. It was expected to identify high rates of physical symptoms, such as fatigue, pain, and cognitive impairment, that affect the quality of life among these patients. Additionally, the study may uncover a higher prevalence of mental health disorders, including depression, anxiety, and stress, in this population.

5.11 Operational Definitions

- **HRQOL:** As measured by a validated instrument—the Kidney Disease Quality of Life-36 (KDQOL-36).
 - Poor HRQOL KDQOL 36 score < 50
 - Good HRQOL KDQOL 36 score > 50
- **Cognitive impairment definitions**
 - Normal cognition MMSE score ≥ 24
 - Mild cognitive impairment MMSE score 19-23;
 - moderate cognitive impairment MMSE score 10-18;
 - severe cognitive impairment MMSE score ≤ 9
- **CKD:** A diagnosis of CKD based on the Kidney Disease Improving Global Outcomes (KDIGO) 2023 guidelines, determined by functional definition;
- **Hemodialysis:** it is a process of removing waste products, toxins, and excess water and correcting electrolyte imbalances;
- **Comorbidities:** The presence of one or more additional medical conditions (*e.g.*, diabetes, hypertension, cardiovascular disease);
- **Duration of Dialysis:** The length of time the patient has been undergoing hemodialysis.

- **Physical Symptoms:** Self-reported symptoms as measured by KDQOL–36
- **Mental Health Outcomes:** Self-reported symptoms as measured by KDQOL–36

5.12 Ethical Consideration

The study was conducted after obtaining ethical clearance from the Department of Internal Medicine Research and Ethics Committee and IRB of the College of Health Sciences, Addis Ababa University, and from the Addis Ababa Health Bureau Ethics Committee. Consent was obtained before data collection. Access to the information collected was limited to the principal investigator and confidentiality will be maintained throughout the project.

6 Result

5.1 Socio-demographic characteristics

A total of 317 patients with ESKD undergoing hemodialysis were estimated for the study, of whom 276 (response rate, 87%) completed the questionnaire. The majority of participants were male 67.4%(203/276) and the mean age was 49 ± 14.09 years. Most participants were married,73.6%(203/276). Regarding educational attainment, 40.6% (112/276) had completed formal schooling up to grade 12. Unemployment was reported by 42.4% (117/276) of the participants. More than half 56.5% (156/276) reported a monthly income below 4000 Ethiopian Birr, and the vast majority 95.3% (263/276) resided in urban areas. More than two-thirds, 65.6% had family support and 13 were living alone (**Table 1**)

Table 1 Socio-demographic characteristics of patients with ESRD undergoing hemodialysis in Addis Ababa, Ethiopia (n = 276)

Variables	Category	Frequency	Percentage
Age(yrs)	Less than 60	201	72.8
	60 and above	75	27.2
Sex	Male	186	67.4
	Female	90	32.6
Marital status	Single	55	19.9
	Married	203	73.6
	Divorced	18	6.5
Educational status	No formal education	53	19.2
	Up to grade 12	112	40.6
	Diploma/degree	94	34.1
	Masters	17	6.2
Job	Unemployed	117	42.4
	Employed	159	57.6
Monthly income	<4,000	156	56.5
	\geq 4,000	120	43.5
Residential status	Urban	263	95.3
	Rural	13	4.7

5.2 Clinical characteristics

In this study, most patients had comorbidities, 90.6% (250/276), with hypertension being the most common, 48.2% (121/250). The mean duration of ESRD was 4.8 years. Over half were diagnosed within the past 1 to 5 years, 53.3% (147/276), and the majority underwent dialysis fewer than three times per week, 76.1% (210/276).

Among 276 patients with ESRD on hemodialysis, the prevalence of cognitive impairment was 13.8% (38/276), with 13.4% (37/276) having mild impairment. Serum PTH levels exceeded nine times the upper limit of normal in 33.0% (91/276) of patients. Hemoglobin assessment showed that 73.2% (202/276) had levels above 9 g/dL, while 3.3% (9/276) had levels below 7 g/dL. Cigarette smoking was reported by 5.4% (15/276) of patients, with a mean duration of six months (Table 2).

Table 2 Clinical characteristics of patients with ESRD undergoing hemodialysis in Addis Ababa, Ethiopia (n = 276)

Variables	Category	Frequency	Percentage
Comorbidities			
	Hypertension	121	48.2
	Diabetes	66	26.4
	Both Diabetes mellitus (DM) and HTN	64	25.4
Renal disease duration	Less than 1 year	35	12.7
	1-5 years	147	53.3
	Greater than 5 years	94	34.1
Dialysis Duration	Less than 1 year	69	25
	1-5 years	132	47.8
	Greater than 5 years	75	27.2
PTH	< 2x ULN	24	8.7
	2-9X ULN	161	58.3
	> 9X ULN	91	33.0
Hemoglobin	Less than 7g/dl	9	3.3
	7-9g/dl	65	23.6
	Normal	202	73.2
MMSE	No impairment	238	86.2
	Mild impairment	37	13.4
	Severe impairment	1	0.4

MMSE: Mini Mental Status Examination, PTH: Parathyroid Hormone

5.3 Overall and subscales Health-related quality of life scores

The overall mean of HRQOL was 55.4 (95% CI: 53.4–57.8). The study showed that patients reported moderate symptoms and effects of kidney disease, with mean scores of 76.76 (SD 17.01) and 69.15 (SD 17.63), respectively. However, the perceived burden of kidney disease was notably high, with a lower mean score of 45.81 (SD 22.74). Physical health was substantially impaired (mean SF-12 physical score 40.57, SD 29.33), while mental health was somewhat better but still affected (mean SF-12 mental score 44.65, SD 25.53).

Table 3 Mean scores of the domains of the KDQOL-36 rated by patients undergoing hemodialysis in Addis Ababa, Ethiopia (n = 276)

Subscales	Mean (SD)	95% CI
Symptoms and Problems of Kidney Disease	76.76(17.01)	74.81-78.81
Effects of kidney disease	69.15(17.63)	67.22-71.21
Burden of kidney disease	45.81(22.74)	43.44-48.43
SF-12 Physical Component Summary	40.57 (29.33)	37.27-48.88
SF-12 Mental Component Summary	44.65(25.53)	43.34-48.43

5.4 Health-Related Quality of Life Levels

Overall, 38.8% of patients were classified as having poor HRQL. In the Physical Component Summary, 67.4% of patients had poor HRQL, while in the Mental Component Summary, 65.2% fell under the poor HRQL category. Only 8% of patients with poor HRQL scored positively in the Symptoms and Problems of Kidney Disease domain. In the Effects of Kidney Disease domain, 16.7% of patients were classified as having poor HRQL.

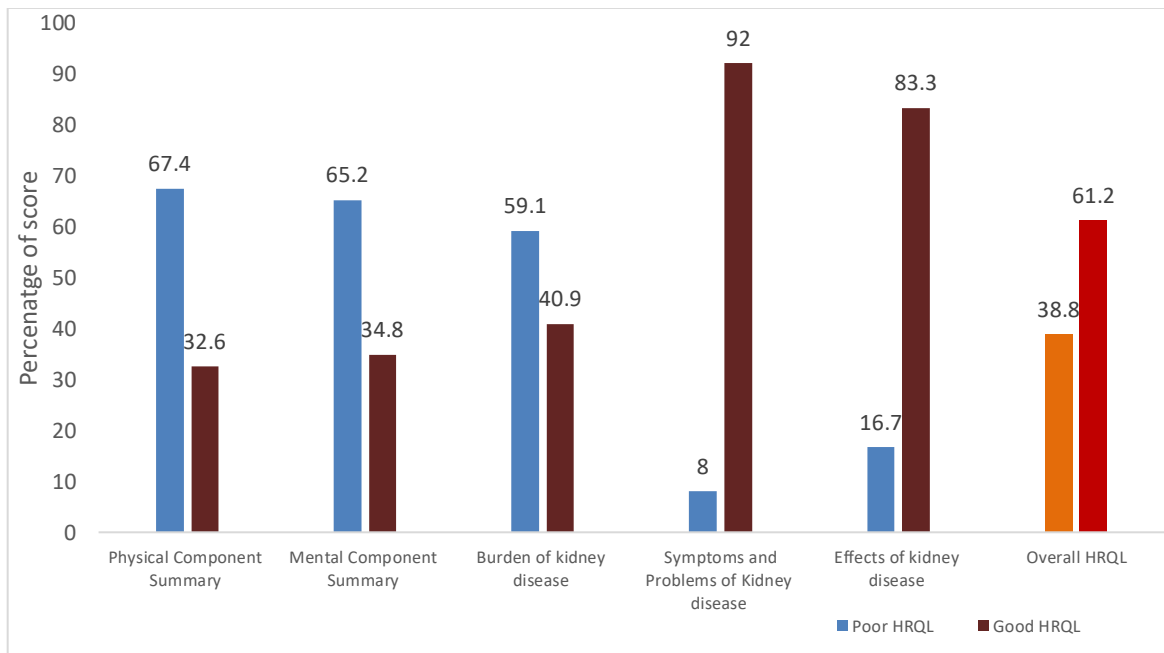


Figure 2: overall and subscales HRQOL Levels of ESKD patients

5.5 Factors Affecting HRQOL

In the bivariable logistic regression analysis, variables with a p-value of ≤ 0.25 were considered for inclusion in the multivariable logistic regression model to identify independent predictors of health-related quality of life among patients with ESKD. Based on this criterion, age ≥ 60 years ($p = 0.12$), education status including no formal education ($p = 0.01$), up to grade 12 ($p = 0.14$), and diploma/first degree ($p = 0.19$), employment status (unemployed, $p = 0.004$), frequency of dialysis > 3 times per week ($p = 0.09$), and presence of comorbidities ($p = 0.02$) were selected for further multivariable analysis.

After adjusting for potential confounders, several factors were found to be significantly associated with poor HRQOL among patients with ESKD. Patients with no formal education had more than four times higher odds of poor HRQL compared to those with a second degree (AOR = 4.33; 95% CI: 1.06–17.69; $p = 0.03$). Unemployed patients had 75% higher odds of poor quality of life compared to employed individuals (AOR = 1.75; 95% CI: 1.02–2.98; $p = 0.04$). Additionally, the presence of comorbidities was associated with nearly four times the odds of poor HRQL compared to patients without comorbid conditions (AOR = 3.95; 95% CI: 1.28–12.22; $p = 0.01$).

Table 4 Factors Associated with Poor Health-Related Quality of Life Among Patients ESKD

Variables	COR (95%CI)	P-value	AOR (95%CI)	P-value
Age				
<60	1			
>60	1.52(0.88,2.60)	0.12	1.20(0.68,2.13)	0.53
Education status				
No formal education	5.64(1.45, 21.95)	0.01	4.33(1.06,17.69)	0.03
Upto grade 12	2.67(0.73,9.94)	0.14	2.28(0.60,8.71)	0.22
Diploma /first	2.41(0.64,8.99)	0.19	2.31(0.61,8.81)	0.22
Second degree	1		1	
Employment				
Unemployed	2.06(1.27, 3.38)	0.004	1.75(1.02, 2.98)	0.04
Employed	1			
Frequency of dialysis				
Above 3x/weeks	1.63(0.93,2.85)	0.09	1.57(0.82,2.84)	0.13
Less than 2x/week	1		1	
Comorbidities				
No	1		1	
Yes	3.73(1.25,11.14)	0.02	3.95(1.28,12.22)	0.01

6 Discussion

This study assessed HRQOL (HRQL) among ESKD patients on hemodialysis in Addis Ababa, Ethiopia. Overall, 38.8% of patients had poor HRQL. Poor HRQL was reported in 67.4% of patients in the Physical Component Summary and 65.2% in the Mental Component Summary. Only 8% of those with poor overall HRQL scored well in the Symptoms and Problems of Kidney Disease domain, where 16.7% were classified as having poor HRQL. In the multivariate regression, no formal education, unemployment, and presence of comorbidities were significantly associated with poor HRQL among ESKD patients.

Overall, the findings reveal a substantial burden of poor HRQOL among ESKD patients on hemodialysis, with 38.8% reporting poor overall HRQOL. This aligns with global trends observed in studies from France (6), Ethiopia (27, 28, 29), and the UK (23, 24), where dialysis patients consistently report worse HRQOL compared to non-dialysis CKD populations and transplant recipients (13, 14). However, the subscale analysis in this study uncovers critical nuances: 67.4% reported poor physical health (Physical Component Summary) and 65.2% poor mental health (Mental Component Summary), suggesting both domains are severely impacted. Strikingly, the Symptoms and Problems of Kidney Disease domain showed a paradoxically lower prevalence of poor HRQOL (16.7%), with only 8% of patients with poor overall HRQOL scoring well in this domain. This disconnect mirrors findings from Ethiopia (29), where mental health remained stable despite worsening physical health, possibly due to psychological adaptation.

Risk factors for poor HRQOL in this study—no formal education, unemployment, and comorbidities—resonate strongly with findings from Ethiopia, a low-income country where rural residence, limited education, and financial strain exacerbate HRQOL declines (27, 28). For instance, a 2019 Ethiopian study (29) in Addis Ababa similarly linked unemployment and lower education to reduced HRQOL, while rural patients faced additional barriers like inadequate healthcare access. In contrast, high-income countries like France prioritize symptom management (*e.g.*, fatigue, stress) in HRQOL assessments (6), with socioeconomic factors like unemployment rarely analyzed due to robust social safety nets. UK studies (23, 24) further highlight universal clinical risks, such as cognitive impairment's association with higher mortality in dialysis patients, but overlook region-specific socioeconomic drivers.

Comorbidities, such as anemia and cardiovascular disease, worsened HRQOL universally, consistent with global evidence (25, 26) and studies from Ethiopia (28) and France (6). For example, anemia—a modifiable risk factor—impairs both PCS and MCS scores in ESKD patients (16, 17), while CKD-mineral and bone disorder (CKD-MBD) drives systemic complications like fractures and cardiovascular calcification (25, 26). However, Ethiopian studies (28) uniquely emphasize comorbidities in low-resource contexts, where limited access to erythropoietin or calcium binders exacerbates these issues.

7. Limitation and strengths

This study has several limitations. Its cross-sectional design limits causal inference between variables. Convenience sampling may introduce selection bias by excluding critically ill or non-compliant patients. Self-reported and proxy data risk recall and social desirability bias, and the MMSE may miss subtle cognitive deficits. Dichotomizing HRQOL oversimplifies its complexity, while the short data collection period may overlook seasonal variations. Despite these, the study offers important strengths. This multicenter study, conducted across five hospitals in Addis Ababa, enhances representativeness and reduces selection bias among urban Ethiopian patients with ESKD. The use of validated, culturally adapted tools like the KDQOL-36 and MMSE ensures reliable and comparable data. Comprehensive collection of sociodemographic, clinical, lifestyle, and cognitive information allows for a well-rounded analysis of factors affecting quality of life. Standardized face-to-face interviews by trained staff and proxy responses for cognitively impaired patients improve data accuracy and consistency.

8. Conclusion and recommendations

This study highlights the substantial burden of poor HRQOL among ESKD patients undergoing hemodialysis in Addis Ababa, Ethiopia. Over one-third (38.8%) reported poor overall HRQOL, with significant impairments in physical (67.4%) and mental (65.2%) health domains. The low physical health scores (mean SF-12 physical: 40.57) and high burden of kidney disease (mean score: 45.81) reflect the severe impact of ESKD and treatment. Key predictors of poor HRQOL included low educational level, unemployment, and the presence of comorbidities

To address the high burden of poor HRQOL among hemodialysis patients in Addis Ababa, Ethiopia, comprehensive interventions are essential. Strengthening patient support through improved access to health education materials adapted for low-literacy individuals and exploring opportunities for social assistance may help mitigate socioeconomic challenges. Clinically, routine management of comorbidities such as hypertension, diabetes, secondary hyperparathyroidism, and anemia is vital. Integrating mental health screening and counseling into dialysis care is critical, given the high prevalence of poor mental HRQOL. Patient-centered approaches, including multidisciplinary teams and family support services, may reduce the psychosocial burden. Further longitudinal and mixed-methods research is needed to explore causal links and inform culturally relevant interventions in low-resource settings.

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7 Annex

7.1 Amharic questionnaire

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Lab investigation	Result	Interpretation
Serum Creatinine		High Normal Low
Blood Urea Nitrogen (BUN)		High Normal Low
Sodium		High Normal Low
Potassium		High Normal Low
Chloride		High Normal Low
Bicarbonate		High Normal Low
Hemoglobin		High Normal Low
Calcium		High Normal Low
Phosphorus		High Normal Low
Parathyroid Hormone (PTH)		High Normal Low
Urine Albumin-to-Creatinine Ratio (UACR)		High Normal Low
Imaging Tests (<i>e.g.</i> , Ultrasound, CT scan, MRI)		

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Your Health *– and –* **Well-Being**

Kidney Disease and Quality of Life (KDQOL™-36)

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.



Thank you for completing these questions!

Study of Quality of Life For Patients on Dialysis

What is the purpose of the study?

This study is being carried out in cooperation with physicians and their patients. The purpose is to assess the quality of life of patients with kidney disease.

What will I be asked to do?

For this study, we want you to complete a survey today about your health, how you feel and your background.

Confidentiality of information?

We do not ask for your name. Your answers will be combined with those of other participants in reporting the findings of the study. Any information that would permit identification of you will be regarded as strictly confidential. In addition, all information collected will be used only for purposes of the study, and will not be disclosed or released for any other purpose without your prior consent.

How will participation benefit me?

The information you provide will tell us how you feel about your care and further understanding about the effects of medical care on the health of patients. This information will help to evaluate the care delivered.

Do I have to take part?

You do not have to fill out the survey and you can refuse to answer any question. Your decision to participate will not affect your opportunity to receive care.

Your Health

This survey includes a wide variety of questions about your health and your life. We are interested in how you feel about each of these issues.

1. In general, would you say your health is: [Mark an in the one box that best describes your answer.]

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much? [Mark an in a box on each line.]

Yes, limited a lot	Yes, limited a little	No, not limited at all
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2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf 1..... 2..... 3
3. Climbing several flights of stairs 1..... 2..... 3

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Yes	No
▼	▼

4. Accomplished less than you would like..... ₁..... ₂

5. Were limited in the kind of work or other activities ₁..... ₂

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Yes	No
▼	▼

6. Accomplished less than you would like..... ₁..... ₂

7. Didn't do work or other activities as carefully as usual..... ₁..... ₂

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the past 4 weeks...

			A good			
All	Most	bit	Some	A little	None	
of the	of the	of the	of the	of the	of the	of the
time	time	time	time	time	time	time
▼	▼	▼	▼	▼	▼	▼

9. Have you felt calm and peaceful? 1..... 2..... 3..... 4..... 5..... 6
10. Did you have a lot of energy? 1..... 2..... 3..... 4..... 5..... 6
11. Have you felt downhearted and blue? . 1..... 2..... 3..... 4..... 5..... 6

12. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All	Most	Some	A little	None
of the	of the	of the	of the	of the
time	time	time	time	time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

Your Kidney Disease

How true or false is each of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
13. My kidney disease interferes too much with my life	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14. Too much of my time is spent dealing with my kidney disease	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. I feel frustrated dealing with my kidney disease	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16. I feel like a burden on my family	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

During the past 4 weeks, to what extent were you bothered by each of the following?

	Not at all bothered ▼	Somewhat bothered ▼	Moderately bothered ▼	Very much bothered ▼	Extremely bothered ▼
17. Soreness in your muscles?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
18. Chest pain?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
19. Cramps?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
20. Itchy skin?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
21. Dry skin?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
22. Shortness of breath?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
23. Faintness or dizziness?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
24. Lack of appetite? ...	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
25. Washed out or drained?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
26. Numbness in hands or feet?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
27. Nausea or upset stomach?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
28^a. (Hemodialysis patient only) Problems with your access site? ...	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
28^b. (Peritoneal dialysis patient only) Problems with your catheter site?..	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

Effects of Kidney Disease on Your Daily Life

Some people are bothered by the effects of kidney disease on their daily life, while others are not. How much does kidney disease bother you in each of the following areas?


	Not at all bothered ▼	Somewhat bothered ▼	Moderately bothered ▼	Very much bothered ▼	Extremely bothered ▼
29. Fluid restriction?....	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
30. Dietary restriction?.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
31. Your ability to work around the house?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
32. Your ability to travel?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
33. Being dependent on doctors and other medical staff?.....	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
34. Stress or worries caused by kidney disease?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
35. Your sex life?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
36. Your personal appearance?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

Thank you for completing these questions!

Mini-Mental State Examination (MMSE)

Patient's Name: _____ Date: _____

Instructions: Ask the questions in the order listed. Score one point for each correct response within each question or activity.

Maximum Score	Patient's Score	Questions
5		"What is the year? Season? Date? Day of the week? Month?"
5		"Where are we now: State? County? Town/city? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly, then asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible. Number of trials: _____
5		"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65, ...) Stop after five answers. Alternative: "Spell WORLD backwards." (D-L-R-O-W)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.
1		"Repeat the phrase: 'No ifs, ands, or buts.'"
3		"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1		"Please read this and do what it says." (Written instruction is "Close your eyes.")
1		"Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)
1		"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 
30		TOTAL

(Adapted from Rovner & Folstein, 1987)

Interpretation of the MMSE

Method	Score	Interpretation
Single Cutoff	<24	Abnormal
Range	<21	Increased odds of dementia
	>25	Decreased odds of dementia
Education	21	Abnormal for 8 th grade education
	<23	Abnormal for high school education
	<24	Abnormal for college education
Severity	24-30	No cognitive impairment
	18-23	Mild cognitive impairment
	0-17	Severe cognitive impairment