

# Quality of Life in Chronic Kidney Disease Patients on Dialysis at the University Teaching Hospital-Adult Hospital, Lusaka, Zambia

Justina Kasonde<sup>1\*</sup>, Majorie Makukula<sup>2</sup> , Emmanuel Musenge<sup>2</sup> 

<sup>1</sup>School of Health, Rusangu University, Monze, Zambia

<sup>2</sup>Department of Basic and Clinical Nursing Sciences, University of Zambia, Lusaka, Zambia

Email: \*jnyirenda@ru.edu.zm, marjorie.kabinga@unza.zm, emmanuel.musenge@unza.zm

**How to cite this paper:** Kasonde, J., Makukula, M. and Musenge, E. (2022) Quality of Life in Chronic Kidney Disease Patients on Dialysis at the University Teaching Hospital-Adult Hospital, Lusaka, Zambia. *Open Journal of Nephrology*, 12, 460-481. <https://doi.org/10.4236/ojneph.2022.124046>

**Received:** October 27, 2022

**Accepted:** December 25, 2022

**Published:** December 28, 2022

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## Abstract

**Introduction:** The importance of determining health related quality of life in Chronic Kidney Disease patients on dialysis is well established. However, research was limited in establishing the health related quality of life for chronic kidney disease patients on dialysis at University Teaching Hospital-Adult Hospital. Further the effects of haemoglobin levels and adequacy of dialysis on their health related quality of life were unknown. Therefore, the study sought to answer a research question: what is the health-related Quality of Life for Chronic Kidney Disease patients on dialysis at University Teaching Hospital? **Method:** The study was an analytical cross-sectional study that used a census sampling method. The study participants comprised of 104 patients who sought dialysis services (2020-2021) from the University Teaching Hospital-Renal Unit in Lusaka, Zambia. A structured Kidney Disease Quality of Life Short form (KDQOL-SF 36) was used to collect data. The Data was analyzed using the Statistics and Data software version 13, Chi-square tests, and logistic regression analysis was employed to analyse the data. A confidence interval of 95% was set with a significant level of 0.05. **Results:** The study included 104 Chronic Kidney Disease patients from the Dialysis Unit at University Teaching Hospital in Lusaka, Zambia. Two-thirds (68%) of the patients had a good overall health-related quality of life with the biological wellbeing having exceptionally high scores. The male gender (66.7%), unemployment (69.4%), and low haemoglobin levels (77.8%) were identified as factors associated with poor health-related quality of life. **Conclusion:** The health related quality of life of Chronic Kidney Disease patients at University Teaching Hospital was good. Low haemoglobin levels, age, male sex and unemployment were found to be factors associated with poor health related quality of life. Integration of health-related quality of life assessment for Chronic Kidney disease patients

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on dialysis in routine care is paramount. Particular focus should be on patients presenting with low haemoglobin levels, age, male sex and unemployment for timely interventions.

### Keywords

Health-Related Quality of Life, Dialysis, Chronic Kidney Disease, Adequacy of Dialysis, Haemoglobin Levels

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## 1. Introduction/Background

Chronic Kidney Disease (CKD) is a condition in which there is decreased kidney function shown by glomerular filtration rate (GFR) of less than 60 millilitres per 1.73 cubic meters or markers of kidney damage or both, of at least 3 months' duration, regardless of the underlying cause [1]. Chronic Kidney Disease is increasingly becoming a serious global health problem, an estimated 1.2 million people died in 2015 from kidney disease [2], further an estimated 2.3 to 7.1 million people with End Stage Kidney Disease (ESKD) died without access to life saving haemodialysis [3]. However, the increase in prevalence of CKD as a significant contributor to the global disease burden remains underappreciated [4]. The focus remains on Cardiovascular disease, Hypertension, Diabetes Mellitus, Acquired Immune Deficiency Syndrome and Malaria [2].

The prevalence of CKD in Africa stands at 15.7%, the occurrence of which is linked to other Non-Communicable Diseases (NCDs) such as Hypertension and Diabetes mellitus [5]. For sub-Saharan Africa specifically statistics are unclear, however best estimates suggest that about 12% - 23% of adults have CKD and are therefore at risk of developing ESKD [6]. Further, a prevalence rate of an estimated 45% has been in HIV-antiretroviral treatment related CKD cases [7]. While the mortality rates of CKD in were found to be 25.7% [8].

In Zambia, the number of patients with CKD has steadily increased, the prevalence rate measured by proteinuria is estimated at 24% [9], and however a registry has not been established to highlight the number of patients categorized according to the five stages. Further, the prevalence of CKD is higher among HIV positive patients a phenomenon that may change to include diverse kinds of patients as the prevalence of Diabetes and Hypertension increase as well [9].

Renal Replacement Therapy (RRT) is the only known permanent solution for a patient with ESKD; RRT includes kidney transplantation and dialysis. A kidney transplant is the treatment of choice, though in the absence of kidney transplant, dialysis is used to increase patient survival and improve the quality of life [10]. On the other hand, in as much as dialysis remains the most common treatment for ESKD in the world, it is a complex process that can greatly alter a patient's normal life in various aspects. While dialysis intends to improve patient outcomes, it significantly alters the health-related quality of life of a patient. Studies have shown that patients on dialysis have poor quality of life physically,

psychologically, and socially [10] [11] [12].

Health-related quality of life is an important parameter that needs to be addressed in chronic diseases like CKD. Unlike in the past, when the sole concern was to prolong survival of patients with CKD, equal importance is now being given toward maintenance of HRQOL [11]. Various Studies have shown that HRQOL is affected by socioeconomic, psychological, biological and health care related factors [13] [14] [15] [16] [17].

The increase in CKD prevalence and non-existing kidney transplant surgery in Zambia means that CKD patients remain on life-long dialysis. Though many studies have been conducted globally to determine the quality of life in patients on dialysis, limited data is found on the HRQOL of patients on dialysis in Africa. A search of the common databases revealed scanty literature on the HRQOL of patients on dialysis in Zambia, as such very little was known about how dialysis affects their HRQOL.

The statistics at University Teaching Hospital-Adult hospital for CKD patient admissions, dialysis initiation and mortalities remain significant. Between 2017 and 2019, the number of patients commenced on dialysis increased from 43 to 131, with mortalities during the same period swelling three-fold from seven to twenty-one deaths. It is against this background that this study embarked on determining the HRQoL among patients at UTH-Adult Hospital. Certainly, the well documented, mortality and hospitalization rate in CKD patients magnifies the importance of assessing HRQOL of CKD patients on dialysis.

## **2. Methodology**

### **2.1. Research Design**

An analytical cross-sectional study design was selected for this study with a quantitative approach that allowed for objectivity and accuracy of findings.

### **2.2. Research Setting**

The study was conducted in 2020 to 2021 at University Teaching Hospitals. The University Teaching Hospital is an 1800-bed capacity specialized hospital and the largest centre for various specialist referrals from across the country whose population stands at 18 million [18].

### **2.3. Study Population**

The population under study was Chronic Kidney Disease patients above 18 years on permanent dialysis at UTH Dialysis Unit.

### **2.4. Sample Selection**

A census sampling technique was used to select CKD patients on dialysis at the Unit. The selected population of 104 patients was grouped into two according to the days they came for dialysis, that is group one (52 patients) attended dialysis on Monday and Wednesday and group two (55) attended dialysis on Tuesday

and Thursday.

The Unit provided dialysis sessions in three (3) blocks per day lasting three to four (3 - 4) hours for each patient, with 19 functioning dialysis machines. Each patient had two (2) sessions per week and a permanent time slot on each given day. Interviews were conducted on Monday and Tuesday at 07 hours and 14 hours; Wednesday and Thursday at 10 hours and 17 hours, approximately 26 patients were being interviewed each day.

## **2.5. Inclusion Criteria**

The inclusion criteria were as follows:

- 1) Patients commenced on dialysis for two months and longer.
- 2) Consenting participants.

## **2.6. Exclusion Criteria**

The exclusion criteria were as follows:

- 1) Patients on dialysis for other conditions other than CKD.
- 2) Critically illness patients on dialysis.

## **2.7. Data Collection Tool**

The tool was adapted from the validated Kidney Disease Quality of Life Short form (KDQOL-SF 36) item score and Quality of Life Questionnaire for Dialysis Patients. These instruments were chosen for this study because they reflected central components of HRQoL that were under study, namely biological, functional, psychological and sociological wellbeing.

## **2.8. Data Collection Technique**

The collection of data was done at the UTH Renal Unit as eligible patients come for dialysis. The interview process commenced by giving a self-introduction after which the purpose of the interaction was elaborated. Consent from the participants and Renal Unit Manager was obtained to collect data on haemoglobin levels done within the last three months. After assurance of confidentiality, written consent was obtained. For those who were unable to write, a thumbprint was obtained. During the interview process, the researcher read out the questions and clarified for those who had difficulties in understanding the questions. At the end of each interview, the researcher thanked each participant. The interviews lasted 15 to 20 minutes with each participant.

## **2.9. Ethical and Cultural Considerations**

Ethical clearance was obtained from the University of Zambia Biomedical Research Ethical Committee (UNZAREC, ref no. 1159-2020) and written permission from University Teaching Hospital and the National Health Research Authority (Ref no. NHRA 00004/15/10/2020). Information sheets explaining the study and expected benefits were given to participants, thereafter-informed written consent was obtained.

Participants were assured that dialysis would not be withheld should they opt-out of the study. It was anticipated that participants would experience distress and embarrassment discussing intimate details of the illness and the impact of the illness on their lives. Participants were assured that they could stop the interview at any point when it becomes too distressful; a counsellor was available in case a participant required one during the interview.

### 2.10. Data Analysis

The collected data coded, entered and analysed using Stata® version 13. Analysis using a Chi-square tests was employed to establish the statistical significance of variables. The multivariate analysis of data was carried out using binary logistic regression and adjusted for confounders to elucidate associations of HRQoL. A confidence interval of 95% was set, and p-value of <0.05.

## 3. Results

The study included 104 Chronic Kidney Disease patients from the Dialysis Unit at University Teaching Hospital in Lusaka, Zambia.

### 3.1. Socio-Demographic Characteristics of the Participants

This study showed that the majority (60.6%) of the patients were male. Three-quarters (68.3%) of the participants were married and 31.7% were single. Almost half (49%) of the patients had secondary education, with 59.6% being unemployed. The mean duration period from dialysis initiation was two years with a standard deviation of 1.9 while the mean age was 43.9 years with a standard deviation of 1.3 (**Table 1**).

### 3.2. Health-Related Quality of Life of Participants

This study found that majority of the patients had low scores in three HRQoL domains that is functional well-being (68.3%), sociological well-being (73.1%), and psychological well-being (64.4%) (**Table 2**). All the patients scored 100% in the biological wellbeing as most patients reported minimal symptoms resulting from CKD and dialysis at the time of data collection. Composite scores revealed above average mean scores (Functional—57.4, Sociological—54.5, Psychological—57.3 and Biological Wellbeing—87) of the HRQoL domains (**Table 3**). As a result of the high biological scores, an aggregation of the composite scores of all four domains found that the majority (65.4%) of the participants had good HRQoL.

### 3.3. Adequacy of Dialysis among Participants

Adequacy of dialysis as measured by Kt/v and URR was optimal with 96.2% and 83.7% respectively of patients achieving acceptable dosing (**Table 4**).

### 3.4. Clinical Characteristics of Participants

Clinical determinants (**Table 5**) of CKD and dialysis that influence HRQoL were

**Table 1.** Socio-demographic characteristics of the participants (n = 104).

Variable	Frequency	Percentage (%)
<b>Sex</b>		
Male	63	60.6
Female	41	39.4
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Marital status</b>		
Single	33	31.7
Married	71	68.3
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Education level</b>		
Primary and below	9	8.7
Secondary	51	49.0
Tertiary	44	42.3
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Employment status</b>		
Unemployed	62	59.6
Employed	42	40.4
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Variable</b>	<b>Mean</b>	<b>SD</b>
Age in years, Mean (SD)	43.9	1.3
Duration on dialysis in years, Mean SD)	2	1.9

\*SD = Standard deviation.

**Table 2.** Health-related quality of life of participants.

Variable	Frequency	Percentage (%)
<b>Functional wellbeing</b>		
Poor	71	68.3
Good	33	31.7
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Sociological wellbeing</b>		
Poor	76	73.1
Good	28	26.9
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Psychological wellbeing</b>		
Poor	67	64.4

## Continued

Good	37	35.6
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Biological wellbeing</b>		
Poor	0	0.0
Good	100	100
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 3.** Mean score for HRQOL domains and overall HRQOL.

Domain	Mean	SD
Functional Wellbeing	57.4	14.086
Sociological Wellbeing	54.5	12.726
Psychological Wellbeing	57.3	11.189
Biological Wellbeing	87	6.695
Variable	Frequency	Percentage (%)
<b>HRQOL</b>		
Poor	36	34.6
Good	68	65.4
<b>Total</b>	<b>104</b>	<b>100.0</b>

**Table 4.** Adequacy of dialysis of participants.

Variable	Category	Frequency (%)
<b>*Kt/V</b>		
Inadequate	4	3.8
Adequate	100	96.2
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Urea reduction ratio</b>		
Inadequate	17	16.3
Adequate	87	83.7
<b>Total</b>	<b>104</b>	<b>100</b>

\*Kt/V = Adequacy of dialysis.

**Table 5.** Clinical characteristics of the participants (n = 104).

Variable	Category	Frequency (%)
<b>Haemoglobin level</b>		
Low	76	73.1

**Continued**

Normal	28	26.9
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Functional category (KFS)</b>		
Average	51	49.0
High	53	51.0
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Comorbidity</b>		
Yes	103	99.0
No	1	1.0
<b>Total</b>	<b>104</b>	<b>100</b>
<b>Dialysis modality</b>		
Peritoneal	5	4.8
Haemodialysis	99	95.2
<b>Total</b>	<b>104</b>	<b>100</b>

evaluated using haemoglobin levels, presence of comorbidity, and Karnofsky function scale. The study found low haemoglobin levels in two-thirds (73.1%) of the patients with a reading below 10 grams per decilitre only about 26.9% of patients exhibited normal HB levels. Almost all (99%) the patients had pre-existing or acquired comorbidities. Hypertension (89.4%) was the most prevalent followed by Diabetes mellitus (7.7%) and cardiovascular disease (2.9%). Karnofsky function scale showed that half (51%) of the patients had some limitation in physical function. The majority (95.2%) of patients were receiving haemodialysis with only 4.8% being on peritoneal dialysis.

### 3.5. Relationships between HRQoL and Study Variables

The relationship between demographic variables and HRQoL (**Table 6**) showed that male patients (66.7%) had poor HRQoL than female patients. Unemployment (69.4%) and having tertiary education (47.2%) were associated with poor HRQoL outcomes. Poor HRQoL (75%) was revealed in married patients than the single patients. Similarly, mature age (SD 11.5) and longer duration on dialysis (SD 2.4) treatment showed an increase the prevalence of poor HRQoL among participants.

Low Haemoglobin levels (77.8%) and comorbid states (100%) were associated with poor HRQoL. Additionally, the study found that with optimal adequacy of dialysis good HRQoL was seen in almost all the patients (97.1% and 85.3%); on the other hand, poor HRQoL was seen in participants who had inadequate urea reduction ratios (13.9%). However, none of the results was statistically significant (**Table 7**).



**Table 6.** Relationships between HRQoL and socio-demographic characteristics of participants (n = 104).

Variable	HRQoL		Total	p-value	
	Poor	Good			
Sex	Male	24 (66.7%)	39 (57.4%)	63 (60.6)	0.355
	Female	12 (33.3%)	29 (42.7%)	41 (39.4)	
Marital status	Not married	9 (25.0%)	24 (35.3%)	33 (31.7%)	0.283
	Married	27 (75.0%)	44 (64.7%)	71 (68.3%)	
Employment	Employed	11 (30.6%)	31 (45.6%)	42 (40.4%)	0.137
	Not employed	25 (69.4%)	37 (54.4%)	62 (59.6%)	
Education status	Primary/below	3 (8.3%)	6 (8.8%)	9 (8.7%)	0.757
	Secondary	16 (44.4%)	35 (51.5%)	51 (49.0%)	
	Tertiary	17 (47.2%)	27 (39.7%)	44 (42.3%)	
Residence	Low density	20 (55.6%)	40 (58.8%)	60 (57.7%)	0.937
	High density	14 (38.9%)	24 (35.3%)	38 (36.5%)	
	Rural	2 (5.6%)	4 (5.9%)	6 (5.8%)	
Age in years, Mean (*SD)		46.1 (11.5)	42.8 (11.1)		0.1500
Duration in years, Mean (*SD)		2.5 (2.4)	2.3 (1.5)		0.7356

\*SD = Standard deviation.

**Table 7.** Relationship between clinical characteristics and HRQOL.

Variable	HRQoL		p-value	
	Poor	Good		
Haemoglobin level	Low	28 (77.8%)	48 (70.6%)	0.432
	Normal	8 (22.2%)	20 (29.4%)	
*Kt/V	Adequate	33 (91.7%)	66 (97.1%)	0.221
	Inadequate	0 (0.0%)	0 (0.0%)	
URR	Adequate	28 (77.8%)	58 (85.3%)	0.434
	Inadequate	5 (13.9%)	8 (11.8%)	
Functional category (KFS)	Average	15 (41.7%)	36 (52.9%)	0.274
	Good	21 (58.3%)	32 (47.1%)	
Comorbidity	Yes	36 (100%)	67 (98.5%)	0.465
	No	0 (0.0%)	1 (1.5%)	

### 3.6. Binary Logistic Regression Determining the Factors Influencing HRQoL among Participants

Performance of logistic regression revealed factors that influenced HRQoL (Table 8). Literature review guided the decision to conduct logistic regression.

**Table 8.** Logistic regression determining factors influencing HRQoL among participants.

Predictor variable	HRQoL		*OR (95% CI)	p-value
	Poor Freq	Good Freq		
<b>Haemoglobin level</b>				
Low	28 (77.8%)	48 (70.6%)	Ref	
Normal	8 (22.2%)	20 (29.4%)	0.69 (0.27 - 1.76)	0.433
<b>Sex</b>				
Male	24 (66.7%)	39 (57.4%)	Ref	
Female	12 (33.3%)	29 (42.7%)	0.67 (0.29 - 1.56)	0.356
<b>Employment status</b>				
Employed	11 (30.6%)	31 (45.6%)	Ref	
Unemployment	25 (69.4%)	37 (54.4%)	1.90 (0.81 - 4.48)	0.140
<b>Marital status</b>				
Not married	9 (25.0%)	24 (35.3%)	Ref	
Married	27 (75.0%)	44 (64.7%)	1.64 (0.66 - 4.04)	0.285
<b>Education level</b>				
Primary and below	3 (8.3%)	6 (8.8%)	Ref	
Secondary	16 (44.4%)	35 (51.5%)	0.91 (0.20 - 4.13)	0.907
Tertiary	17 (47.2%)	27 (39.7%)	1.26 (0.28 - 5.72)	0.765
<b>Functional category (KFS)</b>				
Average	15 (41.7%)	36 (52.9%)	Ref	
Good	21 (58.3%)	32 (47.1%)	1.58 (0.70 - 3.56)	0.275
Age in years (SD)	46.1 (11.5)	42.8 (11.1)	1.03 (0.99 - 1.07)	0.151
Duration – years (SD)	2.5 (2.4)	2.3 (1.5)	1.04 (0.84 - 1.28)	0.733

\*OR = Odds ratio; CI = Confidence interval; Ref = Reference category.

Therefore, the selection of age, sex, educational level, haemoglobin level, employment status, marital status, residence, functional category (KFS), and duration on dialysis was made as these were observed to influence HRQoL. In the analysis, one represented poor HRQoL and zero good HRQoL.

The binary logistic regression model analysis revealed that unemployed patients were 90% less likely to attain good HRQoL. A clinically significant finding showed that low HB levels increased the odds of poor HRQoL by 31%, while the male sex and being married resulted in 33% and 36% respectively, less probability of a good HRQoL. However, regression did not yield any statistical significance.

## 4. Discussion of Findings

### 4.1. Demographic Characteristics

This study (**Table 1**) revealed that the majority (60.3%) of participants were male. Generally, CKD is higher in females than males though this male predominance noted in studies can be attributed to a lack of the protective function that is seen in females due to the presence of oestrogens. Males progress rapidly to end-stage kidney disease and are consequently initiated on renal replacement therapy earlier than females [19]. Further, males tend to have morbid lifestyles, thereby leading to a higher risk for kidney failure.

In addition, this study found a mean age of 43.9 years (SD = 1.3) among participants. These findings reflect those of a study done in Ghana whose patients exhibited a mean age of 46.7 years (SD = 16.2). Contrary to this finding other studies have [20] found the mean age much higher at 80.7 years (SD = 6.8). The findings confirm the notion that disease patterns vary greatly between developing and developed countries. The mean age of patients on dialysis in developing countries is lower than in developed countries perhaps due to the lack of advanced medical interventions that help in reducing the progression of CKD leading to the initiation of dialysis at a much-advanced age.

The present study revealed that 49.0% of the patients had secondary education with 44.3% having tertiary education. This finding reflects that educational levels may influence health-seeking behaviours; populations with minimal education are likely to end up with more chronic diseases than literate population that may have information and access to disease prevent services. The high prevalence of this population among CKD patients on dialysis is due to unhealthy modifiable behaviours such as smoking [21].

The study demonstrated high unemployment rates among patients on dialysis (59.6%); this echoes the finding in South African [22]. From the results, it is clear that patients on dialysis experience barriers to employment, these barriers may result from an inability to cope with occupational stress, time constraints related to dialysis sessions, and limited physical functionality.

### 4.2. Health-Related Quality of Life

In response to determining the HRQoL of patients on dialysis, results revealed that the majority (65.4%) of CKD patients receiving dialysis at UTH-Adult hospital have a good health-related quality of life. This finding is broadly similar to a study in Nepal that reported that CKD patients on dialysis treatments had better QoL than those not on dialysis [23]. The findings of the current study could be attributed to high scores noted in biological wellbeing, as for most patients the absence of serious symptoms and optimal adequacy of dialysis gave a positive perspective of quality of health. However, these findings suggest that patients' perception of the determinants of HRQoL may be related to the presence or absence of signs and symptoms, but also other factors that exist outside variables covered in this study.

The results revealed that scores were generally low across three HRQoL domains that is the psychological, sociological and functional wellbeing. The study found that patients with poor HRQoL (34.6%) particularly had average to low scores in the psychological (70%) and functional (61%) well-being. Similar studies have found that decreased functionality and psychological stress diminishes HRQoL [24] [25]. The physical function of CKD patients is attributed to anaemia and uremic myopathy, further patients may also experience chronic fatigue due to their inactive state, experience loss of self-esteem, and feeling disabled. The effect of poor physical function results in the inability to work and low financial coverage resulting in mental anguish, anxiety, and depression.

### 4.3. Factors Affecting HRQoL

In this study being male increased the incidence (67%) of poor HRQoL than for females (33%). This could be attributed to the fact that men exhibited greater levels of perceived stress related to CKD and dialysis. Moreover, the impact of stress on HRQoL is higher in males than females, as the utilization of adaptive stress coping mechanisms is more effective among females. While males tend to use maladaptive strategies, such as excessive alcohol consumption that can further lower their HRQoL [26]. Contrary to these findings, an Emirati study found females to have poor HRQoL than males a finding attributed to females exhibiting more symptoms and problems [27]. However, the results observed were not statistically significant as p-value was greater than 0.05.

In this study, an increase in age was associated with the incidence of poor outcomes in HRQoL. Although not statistically significant ( $p > 0.05$ ), this finding is important clinically to note when caring for patients that are elderly. Research findings show that younger patients generally have significantly good HRQoL [23]; further findings highlighted that with each one-year increase in age, the risk of poor outcomes increased by 3%. In assenting to this finding, a Chinese study confirmed that higher age was related to low functional scores particularly [28]. Higher age is associated with increased risk of other non-communicable conditions that lead to commodities identified in older patients on dialysis hence poor HRQoL as the outcome.

Educational level is a plausible predictive factor of quality of life, it may have been assumed that higher levels of education should result in better HrQoL, however, this study revealed that the incidence of poor HRQoL was higher (47%) in tertiary education, a finding consistent with research [11]. Even though patients with tertiary education may have a broad understanding of the disease and self-management, the knowledge about probable prognosis and complications of dialysis and CKD may contribute to a poor perception of health. Further, the added stress of maintaining full-time employment and a restrictive dialysis schedule may worsen the situation.

Health-related quality of life was found to be affected by employment status of the patients. The risk of poor HRQoL increased by 69.4% in unemployed participants, while being employed increased the outcome of good HRQoL by 45.6%.

This has been seen as a common occurrence in studies [29] [30], it is reported that an increase in the social-economic gradient promotes good HRQoL, and vice versa poor social-economic situations lead to poor HRQoL [31]. An unanticipated finding was the lack of statistically significant association between unemployment and HRQoL ( $p > 0.137$ ), as a lack of regular income, demanding dialysis and CKD-related costs are burdensome and likely to cause poor HRQoL.

The study revealed that the majority (73.1%) of the participants were found to have low HB levels. Cross-tabulation of HB levels and HRQoL revealed that in patients with low HB, the incidence of poor HRQoL increased from 22.2% to 77.8%, and equally with a normal HB the occurrence of good HRQoL increased from 29.4% to 70.6%. These findings are consistent with previous research showing that reduced HB levels worsen the impact of Chronic Kidney Disease on HRQoL [32]. It is important to highlight the fact that previous studies confirm that low HB levels are prevalent among dialysis patients because CKD causes dysfunctional synthesis of erythropoietin by the kidneys causing a reduction in erythrocyte production [32] [33] [34].

The results of this study showed that adequacy of dialysis was optimal in 90% of the patients, with Kt/V and URR being found to be above 1.2% and 65% respectively. From the cross-tabulation, it was observed that with optimal adequacy of dialysis HRQoL increased from 11.8% to 85.3% when measured by URR, and when measured by Kt/V HRQoL increased from 0% to 97.1%. These findings support the notion that strict adherence to Kidney disease treatment guidelines that are in use at UTH-Adult hospital. Additionally, UTH may have more specialized care providers and newer machines that can provide higher blood flow rates to achieve optimal adequacy of dialysis.

Almost all (99%) of the participants were found to have comorbid states, hypertension (89%) was found to be prominent, increasing the occurrence of poor HRQoL (100%). Other studies have shown that multiple comorbidities produce a tenfold outcome to already existing problems. Comorbidities have been associated with higher degrees of poorer HRQoL such as all-cause mortality, hospitalization, and increased length of hospital admissions [16] [27]. The occurrence of comorbidities in the majority of the patients was found to be present pre-dialysis, which most likely lead to CKD as a complication. However, they may also result from complications related to CKD and dialysis.

#### **4.4. Binary Logistic Regression**

In binary logistic regression analysis of independent variables (adequacy of dialysis and HB levels) and the dependent (HRQoL), the results obtained were not statistically significant with p-values ranging from 0.140 to 1.000. However, clinical significance was noted in that the study highlighted that low HB levels increased the odds of having poor HRQoL by 31%. Age was found to influence the occurrence of poor HRQoL as older patients were 1.03 times more likely to have poor HRQoL than younger patients on dialysis.

Further the study highlighted that unemployment increased the odds of poor HRQoL by 9% than in employed patients or those who were engaged in any occupation [95% CI (0.81 - 4.48) p-value 0.140]. An increase in the duration of dialysis was 1.04 times more likely to cause poor HRQoL in patients, therefore newly initiated patients on dialysis may have a relatively good HRQoL however it has been seen to gradually diminishes over time [35].

## 5. Conclusions

Chronic kidney disease and dialysis pose serious challenges to patients. Establishing the HRQoL is of vital importance for all care providers to maintain good HRQoL. The findings of this study demonstrated that most of the patients have a good health-related quality of life at UTH-Adult. These results must be a starting point for the implementation of routine HRQoL assessment for patients, however, measures to enhance HRQoL must also be considered.

The study identified HB levels, age, male sex, unemployment, and duration on dialysis as significant factors that influenced HRQoL. These variables have clinical significance as they have serious implications in the planning, initiation, and management of care. Monitoring and administration of iron supplements and erythropoietin must be done to promote acceptable HB levels to prevent anaemia. This becomes more important for patients who have been on therapy for longer durations, as results found those to be at risk of poor HRQoL.

The integration of psychosocial support, a feature lacking in the management of medical patients, may help improve HRQoL in male and elder patients. It must be emphasized that CKD patients on dialysis are reliable and valued people who can contribute to the economy. Employers can accommodate re-entry or stay in the workplace of unemployed stable patients. This can be done through policy change and job rearrangement.

## 6. Limitations of the Study

The study captured a limited number of PD patients compared to those on HD. Due to the coronavirus pandemic home visits for PD patients were not possible. As such no comparisons based on dialysis modality were done. The study provided only a snapshot view of HRQoL of patients a longitudinal collection of data may be meaningful in highlighting progressive changes in HRQoL among dialysis patients. The study was conducted on limited population size (n = 104) thus the results should be cautiously used when generalizing to patients in other dialysis centres as it only represented views of patients that accessed medical services from University Teaching Hospital-Adult hospital.

## 7. Recommendations

Based on the findings of this study, the following recommendations have been made:

- 1) The Ministry of health must train care providers, in the assessment of HRQoL

to be used in CKD patients on dialysis.

2) Vigorous restoration and maintenance of optimal haemoglobin levels must be implemented by health care providers, a fund must be created by the ministry of health to serve dialysis patients with economic challenges in meeting the cost of erythropoietin and other dialysis medical supplies.

3) Collaboration between the Ministry of health and non-governmental agencies must be strengthened to assist in empowering unemployed CKD patients. A workplace policy must be considered for patients on dialysis.

4) A wider qualitative study should be undertaken to further explore the quality of life in CKD patients on dialysis.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Appendix

### Part 1—Demographics

1) Gender:

Male

Female

2) Date of birth/Age:

3) Employment status:

Employed

Unemployed

4) Marital Status:

Married

Single

Divorced

5) Level of education:

None/Primary

Secondary school

College/University

6) Does the patient receive assistance in daily living activities in the home?

a) Yes

b) No

7) Source of information

Patient

Relative

8) Comorbidity

a) Diabetes?

b) Hypertension?

c) Heart Disease?

d) Anaemia?

9) Length of time on dialysis.

10) Current dialysis modality (Type of dialysis)

Haemodialysis

Peritoneal

### Part 2—Dialysis

11) Biochemical Markers

a) Haemoglobin (HB)

b) KT/V

c) URR

### Part 3—Functional Wellbeing

12) The Karnofsky Functional Rating Scale

SN	Question	Score
	<b>No, not limited at all</b>	
	Normal; no complaints; no evidence of disease	100
	Able to carry on normal activity; minor signs or symptoms of disease	90

**Continued**

<b>Yes, limited a little</b>	
Normal activity with effort; some signs or symptoms of disease	80
Cares for self; unable to carry on normal activity or to do active work.	70
Requires occasional assistance but is able to care for most of own needs.	60
Requires considerable assistance and frequent medical care	50
<b>Yes, limited a lot</b>	
Disabled; requires special care and assistance	40
Severely disabled; hospitalization indicated although death not imminent	30
Very sick; hospitalization necessary; active supportive treatment necessary	20
Moribund, fatal processes progressing rapidly	10
Dead	0

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?

SN	Question	Yes, limited at all	Yes, imited a little	No, not limited at all
14	Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf			
15	Climbing several flights of stairs			
During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities because of your physical health?				
16	Accomplished less than you would like			
17	Were limited in the kind of work or other activities			

**Part 4—Psychological Wellbeing—27**

13) In general, would you say your health is:

- a) Excellent
- b) Very Good
- c) Good
- d) Fair
- e) Poor

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.

SN	Question	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
19	Have you felt calm and peaceful?						
20	Did you have a lot of energy?						
21	Have you felt downhearted and blue?						
22	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.)?						
	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)?						
23	Accomplished less than you would like						
24	Didn't do work or other activities as carefully as usual						

**Part 5—Sociological Wellbeing**

SN	Question	Not at all bothered	Somewhat bothered	Moderately bothered	Very much bothered	Extremely bothered
25	During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?					
	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?					
26	Fluid restriction?					
27	Dietary restriction?					
28	Your ability to work around the house?					
29	Being dependent on doctors and other medical staff?					
30	Stress or worries caused by kidney disease?					
31	Your sex life?					
32	Your personal appearance?					

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

SN	Question	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33	My kidney disease interferes too much with my life					
34	Too much of my time is spent dealing with my kidney disease					
35	I feel frustrated dealing with my kidney disease					
36	I feel like a burden on my family					

**Part 6—Biological Function**

These questions are about how the symptoms and problems that have been bothering you feel during the past 4 weeks. During the past 4 weeks, to what extent were you bothered by each of the following?

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SN	Question	Not at all bothered	Somewhat bothered	Moderately bothered	Very much bothered	Extremely bothered
37	Soreness in your muscles?					
38	Chest pain?					
39	Cramps?					
40	Itchy skin?					
41	Dry skin?					
42	Shortness of breath?					
43	Faintness or dizziness?					
44	Lack of appetite?					
45	Washed out or drained?					
46	Numbness in hands or feet?					
47	Nausea or upset stomach?					
48	Problems with your access site/catheter?					

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**End of interview/Thank you for your time.**