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Determinants of Adherence to Dietary Prescriptions Among Chronic Kidney Disease Patients Undergoing Hemodialysis in Francistown, Botswana

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Abstract

The number of chronic kidney disease (CKD) patients in Botswana has been increasing in recent years. Diet is considered a major intervention approach for improving CKD outcomes. Despite this, low dietary adherence remains a significant concern, necessitating investigation into the factors that influence it. This research study investigated the healthcare system-related factors influencing dietary prescription adherence among CKD patients undergoing hemodialysis at a selected private dialysis center in Francistown, Botswana. The study employed a descriptive cross-sectional design and used a census approach with 94 participants. Data were collected using a modified validated end-stage renal disease adherence questionnaire (ESRD-AQ). The data were analyzed using SPSS version 26.0, descriptive statistics, and chi-square tests to assess for associations between categorical variables. The study found that the adherence to dietary prescriptions was low at 48.9%. Healthcare-system related factors proved to be influential, with frequency of receiving dietary counselling ($\chi^2 = 13.23$, $p = 0.006$), having received any educational material (pamphlets, posters) on diet for dialysis patients ($\chi^2 = 5.16$, $p = 0.023$), the perceived support from healthcare providers ($\chi^2 = 8.20$, $p = 0.017$) and the affordability of the recommended diet ($\chi^2 = 18.13$, $p =< 0.001$) significantly linked to dietary adherence. The insights from this research are pertinent to implementing targeted interventions that address healthcare system gaps to improve dietary prescription adherence among CKD patients receiving hemodialysis.

Keywords: *Adherence, Dietary Prescription, Botswana, Hemodialysis*, *Chronic Kidney Disease*

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1. Introduction

Chronic Kidney Disease (CKD) is on the rise globally, making this a serious public health concern. The global burden of CKD in 2021 was 697.5 million cases, a 29.3% increase since 1990 (Deng et al., 2025; Francis et al., 2024; Rayner et al., 2023). Recent studies estimate that, as of 2024, over 700 million people worldwide have CKD (Francis et al., 2024). The high burden of CKD follows a similar pattern worldwide. However, most of the burden is concentrated in regions with the lowest socio-demographic status, with Sub-Saharan Africa, Latin America, and Oceania experiencing a higher burden than expected given their developmental levels (Rayner et al., 2023). In Africa, the prevalence of CKD is 10.1%, with

the disease accounting for 4 million disability-adjusted life years lost annually on the continent (Jarraya et al., 2023). The Sub-Saharan region has a CKD prevalence of 16%, up from 14% in 2014, with the Eastern African region reporting a prevalence of 14% (Benjamin et al., 2021; Opiyo et al., 2019; Jarraya et al., 2023). Botswana has a high prevalence of CKD of 13.5 % (Rwegerera et al., 2017).

The high global burden of CKD is a significant contributor to the rising morbidity and mortality rates (Deng et al., 2025; Francis et al., 2024; Jarraya et al., 2024; Rayner et al., 2023). Studies show that CKD is among the top 12 leading causes of death globally, with the disease being a significant risk factor for the development of cardiovascular morbidity and mortality and end-stage renal disease (Opiyo et al., 2019; Zhou et al., 2024).

The estimated glomerular filtration rate (eGFR) categorizes CKD, with progression to stage 5 indicating end-stage renal disease (ESRD). The mainstay treatment for ESRD is hemodialysis (Deng et al., 2025; Al Husna et al., 2019). Hemodialysis has been the most commonly used renal replacement therapy for ESRD patients to avoid complications and to improve their quality of life. Approximately 4 million people live on kidney replacement therapy, with 69% of these being on hemodialysis (Bello et al., 2022). While kidney transplants offer better outcomes, Kilonzo et al. (2021) report that most CKD patients are disadvantaged by the shortage of kidney allograft donors and resource constraints, making hemodialysis the preferred treatment modality, especially in Africa. In Botswana, despite government subsidies for dialysis and transplant, only 14 kidney transplants have been performed to date since the establishment of the national kidney transplant program in 2014 (National Transplant Registry, 2024). This highlights the continued predominance of dialysis in the management of CKD. Renal patients on hemodialysis are advised to adhere to other management strategies in addition to dialysis for optimal CKD management (Toroitich et al., 2020).

Notably, dietary recommendations are crucial for the effective management of patients with CKD undergoing hemodialysis. According to current nutritional standards, CKD patients receiving dialysis should have a daily energy intake of 30-35 kcal per ideal body weight and 1.2g of protein per ideal body weight (Lim et al., 2019). Additionally, CKD patients on hemodialysis are required to limit protein, salt, potassium, and phosphorus intake, with this being key to reducing the accumulation of metabolic wastes in the blood that cause CKD complications such as hypertension, proteinuria, pulmonary edema, metabolic disorders, and cardiovascular issues (Benjamin et al., 2021; Opiyo et al., 2019). Adherence to diet significantly influences the patient's outcomes, while poor adherence is often linked to complications such as electrolyte imbalance, fluid edema, and cardiovascular disease, thus reducing survival rates. Despite hemodialysis being the main treatment of CKD in Botswana, there is limited empirical evidence on adherence to dietary prescriptions among these patients.

1.1 Problem Statement

Chronic kidney disease (CKD) is a serious public health issue and requires strict management to prevent worsening and associated complications. It affects over 700 million people globally (Francis et al., 2024). In Botswana, there is an increased prevalence of diabetes mellitus, hypertension, and HIV/AIDS, which has led to an increase in the prevalence of CKD, 13.5 % (Rwegerera et al., 2017). The number of patients undergoing hemodialysis to survive has also increased from 478 in 2021 to 665 in 2025, according to reports from renal unit nurses.

However, patient data recording in the National Renal Register is inconsistent, limiting the availability of reliable data.

Individuals undergoing hemodialysis are particularly vulnerable and require strict adherence to dietary prescriptions to manage their condition effectively. Adherence to diet is vital; it improves quality of life and reduces complications, morbidity, and mortality. Despite the critical role of dietary management in CKD, adherence to dietary prescriptions remains a persistent challenge among these patients.

In Botswana, hemodialysis is provided by private facilities and funded by the government because there are no public dialysis centers. Patients visit the centers solely for hemodialysis, while other aspects of their clinical care, including nutritional services, are provided through public healthcare facilities. This fragmented model of care may limit continuous reinforcement of dietary recommendations.

There is anecdotal evidence suggesting that many CKD patients undergoing hemodialysis in Francistown, Botswana, struggle to adhere to their prescribed dietary guidelines. Based on clinical experience and informal observations, it is indicated that a substantial portion of patients in Francistown frequently experience complications commonly associated with poor dietary adherence, including fluid overload, hyperkalemia, and cardiovascular events. Additionally, some patients often require emergency dialysis, which could be due to non-adherence to diet. This complicates the management of CKD and impacts the quality of life of these patients. Although this is informal evidence based on observation, it highlights a potentially significant issue that warrants further investigation.

However, the extent of adherence to dietary prescriptions and factors influencing adherence in Botswana remains poorly documented. The study examines adherence and healthcare system factors influencing dietary prescription adherence among CKD patients undergoing hemodialysis in Francistown, Botswana, to close this gap. Understanding these factors is important for developing effective interventions to improve dietary adherence, enhance patient outcomes, and optimize CKD management.

1.2 Research Objectives

i. To assess the adherence to dietary prescriptions among CKD patients undergoing hemodialysis at a selected private dialysis center in Francistown, Botswana.
ii. To determine the healthcare system factors associated with adherence to dietary prescriptions among CKD patients undergoing hemodialysis at a selected private dialysis center in Francistown, Botswana.

2. Literature Review

2.1 Adherence to dietary prescription among CKD patients

Nutritional standards indicate that the energy requirement for CKD patients is 30-35 kcal per ideal body weight, and the protein requirement is 1.2 g per ideal body weight (Lim et al., 2019). To meet their energy needs, hemodialysis patients receive dietary prescriptions. While this is the case, dietary adherence is a major challenge for CKD patients receiving hemodialysis, with adherence rates varying across regions. In a 2021 systematic review, the estimated worldwide prevalence of non-adherence to diet among CKD patients on hemodialysis was 60.2%, and adherence was low at 39.8% (Vr & Kang, 2022). A study by Lim et al. (2020) in Klang Valley,

Malaysia, showed a dietary adherence rate of 34.9%, indicating poor adherence. In Kenya, studies report that more than half of the adult patients on hemodialysis at a national referral hospital do not adhere to their dietary prescriptions (Opiyo et al., 2019; Opiyo et al., 2020). In a study conducted in Yemen, Belhemer et al. (2025) found that adherence to dietary recommendations was 61.9%, indicating moderate adherence. Al-Khattabi (2023) reported an adherence rate of 88.4% at HD centers in Makkah, Saudi Arabia, indicating high adherence.

Non-adherence to dietary prescriptions in this patient population is associated with worsening CKD and poor disease outcomes. Evidence further shows that non-compliance with fluid and diet prescriptions leads to significant increases in intradialytic weight gain, cardiovascular morbidity, symptom exacerbation, hospitalization risk, and poor quality of life (Beerappa & Chandrababu, 2019; Ozkan & Taylan, 2022; Vr & Kang, 2021).

2.2 Healthcare system-related factors

Dietary counselling

Empirical evidence indicates that dietary counseling strengthens patients' awareness and perception, thereby promoting better adherence (Sheik et al., 2022). Quirdani et al. (2024) conducted a systematic review and found that nutrition education significantly enhances patients' knowledge of dietary requirements, increasing adherence to the prescribed diets. Patients who received dietary counseling were more likely to adhere to the renal diet than those who did not, leading to improved self-management, reduced interdialytic weight gain, average calorie intake, and normalized phosphorus serum and potassium levels (Quirdani et.al., 2024; Fernandes & Dsilva, 2024; Valente et al., 2021). Reporting similar findings, Clark-Curaia et al. (2018) found that dietary counseling was positively associated with dietary adherence, with individualized dietary counseling having the greatest impact. A quasi–experimental study conducted in Pakistan showed that after nutritional counseling, patients' potassium levels decreased and albumin levels increased. This indicates that patients gained knowledge from counseling, leading to improved nutritional status (Altaf et al., 2025). According to Belhmer et al. (2025), the lack of nutritional counseling was significantly associated with poor compliance, emphasizing the need for education to enhance adherence and improve patients' outcomes.

Frequency of information provision

The use of dietary management as an intervention to improve outcomes among CKD patients on hemodialysis is a long-term management approach. This highlights the need for long-term nutritional support, which entails frequent dietary counselling sessions for CKD patients. Toroitich et al. (2020) and Benjamin et al. (2021) found that patients who had frequent conversations with a nutritionist about diet adhered to dietary prescriptions more often than those who did not have frequent dietary counseling. Vijaya et al. (2019) conducted a quasi-experimental study in Nellore, Andhra Pradesh, South India, comparing two groups of patients on hemodialysis. The experimental group received dietary counselling on multiple occasions. At the end of the study, the experimental group showed a significant reduction in subjective global assessment scores compared to the control group, indicating a substantial improvement in CKD patients. While this is the case, there is a paucity of research examining the impact of the frequency of dietary counselling on dietary prescription compliance among CKD patients.

Affordability of The Recommended Diet

Affordability of the recommended diet is an important factor influencing adherence to it. Evidence shows that, with limited resources, CKD patients are unable not only to access high-quality care but also to obtain the resources needed to adhere to recommended medications and diets (Alshraifeen et al., 2020). Consistent with this, Toroitich et al. (2020) found that patients who perceived treatment and dietary recommendations as expensive were more likely to be non-adherent than those who could afford them. Similarly, Opiyo et al. (2020) found that the costs of prescribed renal diets were a major factor limiting dietary options for CKD patients, thereby increasing the risk of non-adherence. CKD patients and their caregivers raise concerns about the affordability of preparing multiple meals per day and the costs associated with ensuring a balanced diet, including fruits and recommended dietary supplements (Opiyo et al., 2020).

3. Methodology

The study employed a descriptive cross-sectional design with a sample of 94 via census sampling. The study was conducted in a selected private dialysis center located in Francistown. Botswana. The study included patients with CKD who had been undergoing hemodialysis for at least 3 months. Critically ill patients and those with cognitive impairments were excluded from the study. Data was collected using modified ESRD-AQ (Kim et al., 2010). Adherence to dietary prescriptions was the dependent variable and was measured using the original five-level variable from the validated ESRD-AQ, which assessed the frequency of following the recommended diet in the past week.

Data was managed using SPSS version 26.0. Descriptive statistics were used to describe socio-demographics, adherence to dietary prescriptions, and healthcare system-related factors, and the results were presented in tables, graphs, and pie charts. A Chi-Square test was performed at a 95% confidence interval and a 0.05 margin of error to determine associations. Ethical approval was obtained from relevant bodies. Participation was voluntary, and informed consent was obtained from those who expressed interest in participating in the study.

4. Results and Discussion

4.1 Demographic Characteristics

Of the 97 questionnaires distributed, 94 were successfully filled, yielding a response rate of 96.9%. The results revealed that among the respondents, 28 (29.8%) were over the age of 60, 60 (63.8%) were male patients, 37 (39.4%) had a higher tertiary educational level, 48 (51.1%) were unemployed, and 52 (55.3%) of the participants did not earn any income. Over half of respondents (52, 55.3%) were single, and 71 (75.5%) acknowledged receiving emotional or practical support. Table 1 describes these variables.

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Table 1: Demographic Characteristics of the Study Respondents

Variables	Frequency(n)	Percentage (%)
Age		
18–29	8	8.5
30–39	17	18.1
40–49	24	25.5
50–59	17	18.1
60 and above	28	29.8
Gender		
Female	34	36.2
Male	60	63.8
Educational level		
No Formal Education	6	6.4
Primary	16	17
Secondary	35	37.2
Tertiary (College/University)	37	39.4
Employment status		
Employed	12	12.8
Retired	19	20.2
Self-Employed	15	16
Unemployed	48	51.1
Monthly income		
1 to 1000	5	5.3
1001 to 5000	17	18.1
5001 to 10000	6	6.4
above 10000	14	14.9
None	52	55.3
Marital Status		
Divorced/Separated	5	5.3
Married	32	34.0
Single	52	55.3
Widowed	5	5.3
Receives social support		
No	23	24.5
Yes	71	75.5
Co-morbidities		
Diabetes	2	2.1
Hypertension	50	53.2
Diabetes+ Hypertension	15	16
Others	5	5.3
None	22	23.4
Duration of Hemodialysis		
Less than 6 months	12	12.8
6 months- 1 year	17	18.1
1-3 years	26	27.7
More than 3 years	39	41.5

Note: N=94

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4.2 Dietary Adherence

Respondents were asked questions to assess their adherence to dietary prescriptions. The majority of respondents (69, 73.4%) reported difficulty following nutritional recommendations, and 43 (45.7%) reported significant difficulty. Additionally, 37 (39.4%) respondents reported they were unable to avoid certain unrecommended foods, 63 (67%) reported never measuring their urinary output, and 63 (67%) respondents reported never weighing themselves at home. The majority of the respondents, 32 (34%), reported following the fluid restrictions as instructed all of the time, and most of the time. When asked about how often they followed their dietary recommendations last week, 26 (27.7%) respondents reported following them most of the time. This is summarized in Table 2.

Table 2: Adherence to Dietary Restrictions

Variable	Frequency(n)	Percentage (%)
Difficulty following your dietary recommendation		
Yes	69	73.4
No	25	26.6
How much difficulty have you had following your dietary recommendations?		
No difficulty/NA	19	20.2
A little difficulty	15	16
Moderate difficulty	12	12.8
A lot of difficulty	43	45.7
I was unable to follow any recommendation	5	5.3
Types of difficulties		
No difficulties	19	20.1
Not willing to control	2	2.1
Unable to avoid certain foods	37	39.4
Recommendations not understood	17	18.1
Others	19	20.2
Frequency of measuring urinary output		
Daily	16	17
A few times per week	2	2.1
Weekly	3	3.2
Rarely	10	10.6
Never	63	67
Frequency of weighing yourself at home		
Daily	4	4.4
A few times per week	6	6.4
Weekly	6	6.4
Rarely	15	16
Never	63	67
During the past week, how often did you follow fluid restriction as instructed?		
All of the time	32	34
Most of the time	32	34
About 1/2 of the time	13	13.8
Very seldom	10	10.6
None of the time	7	7.4

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During the past week, how often did you follow the diet recommendation?		
All of the time	20	21.3
Most of the time	26	27.7
About 1/2 of the time	17	18.1
Very seldom	14	14.9
None of the time	17	18.1

Note. N=94, *NA-Not applicable*

Respondents were asked why they believed it was important to follow the recommended diet. A common reason cited by 45 (47.9%) respondents was to avoid complications and feel better, followed by 28 (29.8%) respondents who indicated that they understood their kidneys required a strict dietary regimen. This is illustrated in Figure 1.

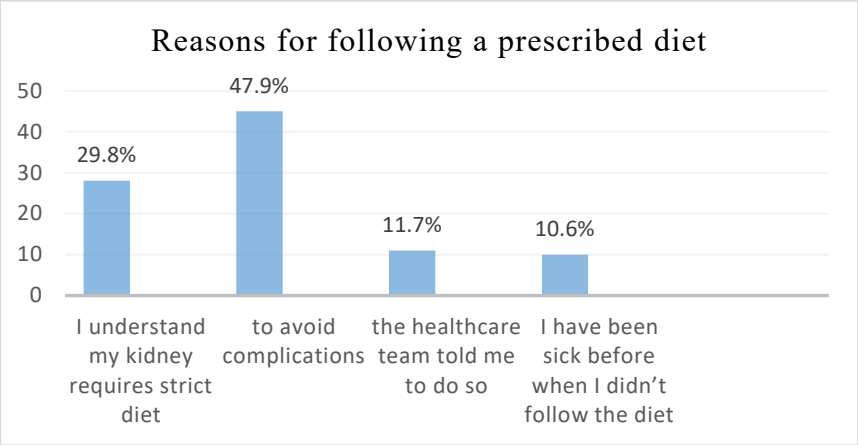

Figure 1: Reasons for following a prescribed diet

4.3 Healthcare System-Related Factors

Healthcare-system-related factors of respondents were assessed. The findings are shown in Table 3. The results showed that among the respondents, 74 (78.7%) received dietary counseling and 51 (54.3%) received counseling once since their diagnosis. The majority of respondents (35, 37.2%) reported that healthcare professionals never emphasize the importance of dietary adherence, and 56 (59.6%) reported receiving educational materials on diet for hemodialysis patients. Most respondents (42, 44.7%) rated support from the healthcare professional as poor. Additionally, 61(64.9%) respondents reported that dietary supplements and food were not affordable.

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Table 3: Respondents' Healthcare System Factors

Category	Frequency(n)	Percentage(%)
Have you received dietary counseling?		
Yes	74	78.7
No	20	21.3
Frequency of receiving dietary counseling		
Once since diagnosis	51	54.3
Monthly	3	3.2
Every 3 months	4	4.3
Occasionally	17	18.1
Never	19	20.2
The last time HCPs discussed dietary restrictions.		
This week	2	2.1
Last week	1	1.1
Within the past week	8	8.5
More than a month ago	15	16
When I began dialysis	51	54.3
Never	17	18.1
How often do HCPs talk to you about the importance of following a kidney-safe diet?		
Every dialysis session	7	7.4
Weekly	1	1.1
Monthly	8	8.5
When I have abnormal blood or other test results	18	19.1
Rarely	25	26.6
Never	35	37.2
Received any educational material on diet for dialysis patients		
Yes	38	40.4
No	56	59.6
Perceived support from HCP regarding diet		
Very Good	17	18.1
Good	8	8.5
Fair	27	28.7
Poor	42	44.7
Affordability of the recommended foods		
Yes	33	35.1
No	61	64.9

Note. N=94, *HCPs- Healthcare professionals*

4.4 Adherence to dietary prescriptions among CKD patients undergoing hemodialysis

The first objective was to assess the adherence to dietary prescription among CKD patients undergoing hemodialysis at a selected private dialysis center in Francistown, Botswana. To create a binary indicator of adherence, the original five-level variable from the validated ESRD-AQ on frequency of following the recommended diet- *During the past week, how often*

did you follow the diet recommendations- was recoded. Responses ranging from *None* to *About half of the time* (categories 1-3) were classified as non-adherent and coded 0, while the two highest categories, *All* and *Most of the time* (categories 4-5) were classified as adherent and coded 1. This adherence classification was adopted from Benjamin et al. (2021). Figure 2 illustrates the adherence status among this population; 46 (48.9%) respondents were adherent to the dietary prescriptions.

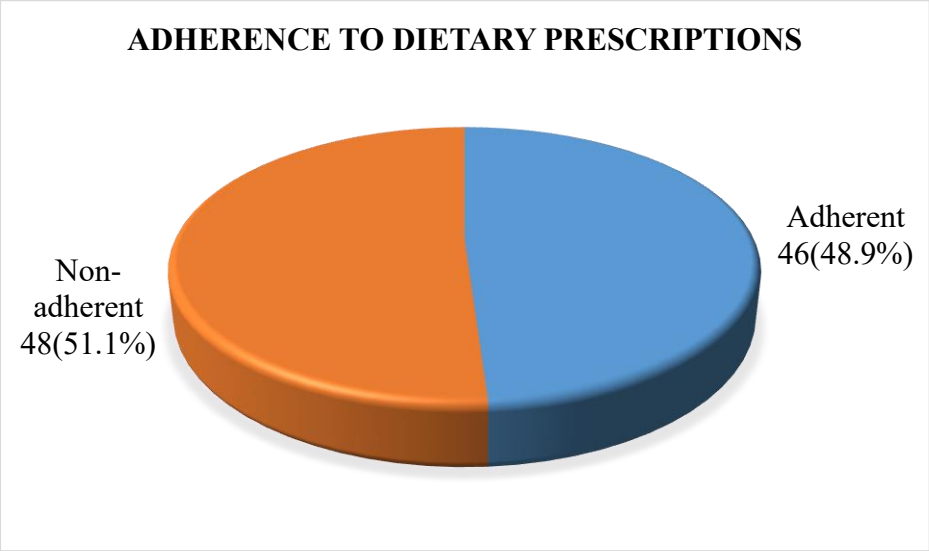

Figure 2: Adherence to dietary prescriptions among CKD patients undergoing hemodialysis (n=94)

4.5 Health System Factors Associated with Adherence to Dietary Prescriptions

Chi-square test analysis shown in Table 4 revealed that frequency of receiving dietary counselling ($\chi^2 = 13.23$, $p = 0.006$), having received educational materials (pamphlets, posted) on diet for dialysis patients ($\chi^2 = 5.16$, $p = 0.023$), how respondents rated the support received from healthcare providers regarding diet ($\chi^2 = 8.20$, $p = 0.017$) and affordability of recommended foods ($\chi^2 = 18.13$, $p = <0.001$) were significantly associated with adherence to dietary prescriptions at 5% level of significance ($p<0.05$).

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Table 4: Association Between Healthcare System-Related Factors and Adherence to Dietary Prescriptions

Variable	Total (n= 94)	Non-Adherent n (%)	Adherent n (%)	(χ^2)	p-value
Received Dietary counselling				1.97	0.160
No	20	13(65)	7(35)		
Yes	74	35(47.3)	39(52.7)		
Frequency of receiving dietary counselling				13.23	0.006*
Every 3 months	4	0	4(100)		
Monthly	3	1(33.3)	2(66.7)		
Never	19	13(68.4)	6(31.6)		
Occasionally	17	4(23.5)	13(76.5)		
Once since Diagnosis	51	30(58.8)	21(41.2)		
Get nutritional information from a Dietitian.				1.34	0.247
No	32	19(59.4)	13(40.6)		
Yes	62	29(46.8)	33(53.2)		
Get nutritional information from a doctor.				0.02	0.893
No	66	34 (51.5)	32(48.5)		
Yes	28	14 (50)	14(50)		
Get nutritional information from the nurse.				3.40	0.065
No	73	41 (56.2)	32 (43.8)		
Yes	21	7 (33.3)	14 (66.7)		
Get nutritional information from the internet.				0.36	0.547
No	71	35 (49.3)	36 (49.3		
Yes	23	13 (56.5)	10 (43.5)		
Get nutritional information from friends and family.				0.01	0.937
No	82	42 (51.2)	40 (48.8)		
Yes	12	6 (50)	6 (50)		
Frequency of HCP discussing the importance of following a kidney-safe diet.				10.47	0.051
Every dialysis session	7	2(28.6)	5(71.4)		
Monthly	8	1(12.5)	7(87.5)		
Never	35	23(65.7)	12(34.3)		
Rarely	25	13(52)	12(48)		
Weekly	1	1 (100)	0(0)		
When blood or other tests are abnormal	18	8(44.4)	10(55.6)		

Received any educational material on diet for dialysis patients?				5.16	0.023*
No	56	34(60.7)	22(39.3)		
Yes	38	14(36.8)	24(63.2)		
Perceived support from healthcare providers regarding diet				8.20	0.017*
Fair	27	12(44.4)	15(55.6)		
Good	25	8(32)	17(68)		
Poor	42	28(66.7)	14 (33.3)		
Affordability of dietary supplements or recommended foods				18.13	<0.001*
No	61	41(67.2)	20(32.8)		
Yes	33	7(21.2)	26(78.8)		

Note. *$p<0.05$, *HCPs- Healthcare Professionals*

4.6 Discussion of the Findings

Adherence to Dietary Prescriptions

The findings of the present study showed that 48.9% of respondents adhered to the renal diet, indicating suboptimal adherence. These findings are consistent with other studies conducted in Egypt and Kenya, which reported lower adherence rates of 44.5% and 35.1%, respectively (Goma et al., 2021; Choge et al., 2020). However, Belhmer et al. (2025) in Yemen and Alatawi et al. (2024) in the Northern Region of Saudi Arabia reported moderate adherence rates of 61.9% and 67.8%, respectively. Although these studies reported slightly higher adherence rates than the present study, they also showed that a substantial proportion of patients struggle to adhere to a renal diet.

Reporting different findings, a study at Makkah, Saudi Arabia, found an 88.4% dietary adherence rate, indicating much higher adherence than in this study (Al-Khattabi, 2023). The variation in adherence rates could be attributed to different approaches dialysis centers use to enforce dietary guidelines and to the integration of multidisciplinary care models, including on-site renal dietitians. In Botswana, hemodialysis treatment is provided at private dialysis centers, whereas other healthcare services, including dietitian services, are offered by the public health institutions. This fragmentation of services may negatively affect dietary adherence, as patients do not receive continuous, dialysis-specific nutritional support at the point of care. Additionally, differences in adherence measurement methods and sample sizes could lead to discrepancies in adherence rates.

Furthermore, the quality of dietary adherence is shaped by many factors. Adherence to dietary prescriptions among CKD patients is crucial for effective CKD management, as it improves quality of life and reduces morbidity and mortality. The low adherence rate observed in the current study highlights the need for healthcare professionals to implement strategies to improve adherence to renal guidelines.

Healthcare System Factors Associated with Adherence to Dietary Prescriptions

The current study revealed that the frequency of receiving dietary counselling, having received any educational material (pamphlets, posters) on diet for dialysis patients, how respondents rated the support received from healthcare providers regarding diet, and the affordability of dietary supplements or the recommended foods were significantly associated with adherence to dietary prescriptions on bivariate analysis.

The study found that merely receiving dietary counselling was not significantly associated with adherence to dietary prescriptions ($\chi^2 = 1.97$, $p = 0.160$). However, the frequency of receiving dietary counselling was significantly associated with adherence to dietary prescriptions ($\chi^2 = 13.23$, $p = 0.006$). Patients who received dietary counselling monthly or every 3 months were more likely to adhere to the diet compared to those who received counselling once when they started dialysis or never. Patients who had frequent conversations with a nutritionist or healthcare professional about their diet adhered to the renal diet more than those who did not receive ongoing support for diet-related sensitization. The findings are comparable to previous studies (Benjamin et al., 2020; Luitel et al., 2020; Vijaya et al., 2019). Despite free dietary counselling in Botswana, sessions are irregular and depend on staff availability. Many patients receive dietary counselling before they begin dialysis treatment, but follow-up sessions are inconsistent. The irregularity could explain why having dietary counseling was not significantly associated with adherence. The significant association between frequent nutritional counselling and adherence highlights the importance of sustained reinforcement. This shows that not only does dietary counselling influence adherence, but the regularity of counselling is also important in enhancing dietary adherence. Frequent dietary counselling provides continuous support, strengthens education, and comes up with solutions to address difficulties on time, making it easier for patients to follow the recommended diet.

The provision of educational materials, such as pamphlets and diet books for dialysis patients, was also statistically associated with adherence to dietary guidelines ($\chi^2 = 5.16$, $p = 0.023$). Patients who received these materials were more likely to adhere to dietary guidelines than those who did not. Similar findings were reported by Başer and Mollaoğlu (2019), who conducted an experimental study and found that after patients received nutrition education booklets for dialysis, they experienced a decrease in blood pressure, intradialytic weight gain, and ultrafiltration volume. This booklet-based training positively influenced adherence. The findings support previous research indicating that printed materials, when used in combination with other educational methods, can improve dietary adherence by providing tangible resources for patients to refer to. Sun et al. (2024) demonstrated that including printed educational materials in a comprehensive educational program significantly increased adherence to the recommended diet among patients with CKD. Educational materials reinforce dietary messages and provide ongoing support, serving as an accessible reference for CKD patients. This suggests that printed material remains an important component of patient education strategies. However, Hunter et al. (2023) noted that despite providing pamphlets and handouts, patients reported that the information on the booklets contradicted what their healthcare providers taught them. This significantly challenged their ability to adhere.

The perceived support from healthcare providers was significantly associated with adherence to dietary prescriptions ($\chi^2 = 8.20$, $p = 0.017$). Respondents who rated healthcare providers' support as good were more likely to follow the diet than those who rated it as poor. The positive

association between perceived support from providers and dietary adherence suggests that supportive interactions, individualized counselling, and clear communication from healthcare practitioners motivate patients and improve their ability to adhere to the recommended dietary guidelines. Echoing these findings, Rivera et al. (2022) identified effective communication, provider accessibility, and attentiveness to patients' concerns as key facilitators of treatment adherence among CKD patients, including dietary adherence. In line with these findings, few studies have shown nurse-led support significantly increased adherence to both diet and fluid restrictions (Arad et al., 2021; Fernandes & Dsilva, 2024; Vr & Kang, 2023). Support from healthcare professionals is crucial as it empowers and motivates patients. Motivation influences behavior change, which can lead to better adherence to the recommended diet.

Additionally, the affordability of dietary prescriptions was significantly linked to dietary adherence ($\chi^2 = 8.47$, $p = 0.004$). Patients who could afford the renal diet adhered to it more than those who found it expensive or out of reach. Those facing financial challenges were negatively affected because they could not afford the diet, leading them to eat anything they could access. Consistent with these results, Opiyo et al. (2020) and Toroitich et al. (2020) conducted a study in Kenya. They found that the costs of renal diets were a major factor limiting dietary options for CKD patients, thereby leading to non-adherence. Similarly, Escudero-Lopez et al. (2024) found that financial challenges, especially for patients from low- or middle-income backgrounds, were among the most consistent barriers to adherence across dialysis populations. In Botswana, although CKD patients receive food baskets and monthly vouchers, these programs may not meet all dietary needs. Patients might still face challenges affording certain foods. This explains why affordability remains strongly associated despite the government's supportive measures. The findings emphasize the importance of strengthening existing support systems to fully address financial barriers.

5. Conclusion

The study examined factors influencing adherence to dietary prescriptions and found that adherence among CKD patients in Francistown, Botswana, was suboptimal, with less than half adhering to the diet. Regarding healthcare system-related factors, the frequency of counselling, the provision of educational materials on renal diet, and perceived social support from healthcare providers were significantly associated with adherence. Affordability of the recommended diet was also associated with dietary adherence.

6. Recommendations

Healthcare professionals should provide patients with clear, understandable education on CKD dietary guidelines to ensure they grasp the importance of dietary management and can easily apply these in their daily lives. The education should include tips for food portioning, meal planning, and recognizing a kidney-friendly diet.

Regular, personalized dietary counseling sessions, including telehealth options, should be scheduled. These sessions must be tailored to the patient's needs and lifestyle, allowing for ongoing support and adjustments as needed.

The Ministry of Health should provide healthcare professionals with adequate, accessible educational materials to help patients adhere to renal diets. These materials should be culturally appropriate and available in multiple languages to reach diverse populations.

Healthcare providers should be trained in the basics of renal nutrition education to ensure consistent support for patients. This training will ensure that every team member provides accurate, uniform information to assist patients with dietary management.

Professionals should also create budget-friendly diet plans that account for food availability and economic constraints. These cost-effective meal plans should focus on nutritious, kidney-friendly foods to improve adherence.

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