

Patient-Related Factors Influencing Kidney Transplantation Uptake among Hemodialysis Patients in Gaborone, Botswana

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Abstract

Chronic kidney disease (CKD) is a growing public health burden globally, with a disproportionately high impact in low- and middle-income countries such as Botswana. Although hemodialysis (HD) remains the most widely used renal replacement therapy, kidney transplantation (KT) is the preferred treatment option due to improved survival, better quality of life, and long-term cost-effectiveness. Despite Botswana's subsidized renal services, KT uptake among HD patients remains low. This study examined patient factors as determinants of KT uptake among HD patients in Gaborone, Botswana. An analytical cross-sectional study was conducted among 163 adult HD patients proportionally sampled from three dialysis centres in Gaborone. Data were collected using structured questionnaires that captured socio-demographic characteristics and patient-related factors, including knowledge, attitudes, comorbidities, and perceptions of KT. Descriptive statistics were used to summarize participant characteristics, while chi-square tests were applied to identify patient-level predictors of KT uptake. Only 17.2% of participants had initiated the KT process, indicating low uptake. Bivariate analysis showed significant associations between KT uptake and selected patient demographic factors, particularly age, gender, and education level. However, most patient-related attributes, including knowledge, attitudes, comorbidities, and cultural or religious beliefs, were not significantly associated with KT uptake. The most commonly reported patient-related barriers were a lack of a suitable donor and inadequate information, suggesting that perceived donor limitations remain a key challenge for patients. Kidney transplantation uptake among HD patients in Gaborone remains low despite the availability of subsidized services. Findings suggest that while demographic characteristics such as age influence uptake, most patient-related factors play a limited role, with donor-related constraints emerging as the dominant barrier from the patient perspective. Strengthening patient counseling, improving access to transplant information, and supporting family-based donor engagement may improve transplantation uptake.

Keywords: *Kidney transplantation, hemodialysis, patient factors, uptake, Botswana.*

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1. Introduction

Chronic kidney disease (CKD) is a progressive condition characterized by persistent kidney dysfunction lasting at least three months and has become a major global non-communicable disease burden (KDIGO, 2024). Worldwide, CKD affects an estimated 9.1–13.4% of the population, contributing significantly to cardiovascular complications, disability, and premature mortality, with a heavier burden experienced in low- and middle-income countries due to limited access to early diagnosis and advanced care (Kovesdy, 2022).

In sub-Saharan Africa, CKD prevalence ranges between 4% and 13%, driven largely by hypertension, diabetes, infections, and environmental risk exposures (Boima et al., 2021; Bello et al., 2023). Botswana reflects this growing burden, with CKD prevalence reported at 13.5% among hospitalized patients and kidney disease ranking among the leading causes of mortality (Rwegerera et al., 2017; WHO, 2020). As CKD progresses to end-stage renal disease (ESRD), patients require renal replacement therapy such as hemodialysis, peritoneal dialysis, or kidney transplantation, yet transplantation rates across Africa remain extremely low compared to dialysis utilization (Bello et al., 2023; Davies et al., 2023).

Although kidney transplantation is the gold-standard treatment for ESRD due to better survival outcomes, improved quality of life, and lower long-term costs, uptake remains limited in many African settings, including Botswana (Garg et al., 2023; Mtingi-Nkonzombi et al., 2022). Despite government support for dialysis services, Botswana continues to record low transplantation uptake, suggesting that patient-related factors, donor limitations, and health system barriers may be constraining access. Therefore, this study examines patient factors as determinants of kidney transplantation uptake among hemodialysis patients in Gaborone, Botswana, to generate evidence to strengthen referral pathways, patient support strategies, and transplant program outcomes.

1.1 Problem statement

Chronic kidney disease (CKD) is an escalating public health concern in Botswana, with a reported prevalence of 8.4% among hospitalized patients and as high as 63.5% among individuals living with diabetes mellitus (Rwegerera, 2017; Radikara, 2017). This growing burden has increased the demand for renal replacement therapy, reflected by the sharp rise in hemodialysis patients in Gaborone (Mosiko, 2021; PMH Facility Register, 2024). Despite kidney transplantation being the most effective and cost-efficient treatment option, with superior survival and quality-of-life outcomes, its uptake remains critically low in Botswana, with very few transplants performed since the establishment of the national transplant programme (Davies et al., 2023; National Transplant Registry, 2024). This is concerning, given that transplantation and dialysis are publicly subsidized, suggesting that non-financial determinants, such as patient knowledge, attitudes, comorbidities, cultural beliefs, and donor-related constraints, may be limiting uptake. The lack of adequate empirical evidence on these patient factors in Botswana constrains policy action and program improvements, underscoring the need to examine patient determinants influencing kidney transplantation uptake among hemodialysis patients in Gaborone.

2. Literature Review

Socio-demographic factors have consistently been linked to disparities in Kidney Transplantation (KT) uptake. Younger patients are more likely to be listed and receive transplants than older patients, due to better clinical eligibility and longer expected survival (Kaur et al., 2019; Farishta et al., 2022). Gender differences have also been reported, with women often underrepresented among transplant recipients, partly due to sociocultural roles, health-seeking behaviors, and reduced access to living donors (Jalali et al., 2021; Farishta et al., 2022). In addition, higher education levels and strong family support enhance KT uptake by improving patient knowledge, decision-making, and ability to navigate the transplant process (Kabinga et al., 2019; Crews et al., 2019).

Awareness and knowledge of KT as a treatment option are major determinants of uptake among ESRD patients. Limited awareness can prevent patients from seeking referral and evaluation, especially in settings where hemodialysis is presented as the primary option. For example, Jalali et al. (2021) found that 78.2% of hemodialysis patients in Iran were not adequately informed about renal replacement therapy options. In contrast, Moshi (2024) reported high awareness (96.5%) in Tanzania, with awareness and physician discussion significantly increasing willingness to consider KT ($p = 0.021$). These findings suggest that informational gaps may significantly contribute to low KT uptake in settings such as Botswana.

Patients' attitudes and perceptions also shape KT acceptance, with positive perceptions often linked to trust in providers and expectations of improved quality of life (Nduati et al., 2021). However, fear of surgery, misconceptions about graft survival, and concerns about lifelong immunosuppression discourage uptake (Moshi, 2023). Cultural and religious beliefs further influence both transplantation acceptance and willingness to donate organs, with misconceptions about body integrity and spiritual consequences commonly reported in sub-Saharan Africa (Mojapelo & Maboe, 2019; Jones, 2024). Evidence also shows that limited understanding of kidney disease and transplantation remains widespread, particularly in rural and resource-constrained contexts (Watters et al., 2023).

Clinical factors such as comorbidities and donor availability further affect KT uptake. Conditions like hypertension, diabetes, cardiovascular disease, and HIV may reduce transplant eligibility and delay referral due to perceived risks (Cha & Han, 2020; Nduati et al., 2022). In Botswana, Mosiko et al. (2021) reported high comorbidity burdens among dialysis patients, including hypertension (90.2%), diabetes (26.2%), and HIV positivity (24.3%), which may narrow the eligible transplant pool. Additionally, donor availability remains a major barrier in sub-Saharan Africa, where cadaveric donation is limited, making transplantation dependent on living-related donors and their willingness, which is often constrained by fear, misconceptions, and cultural beliefs (Boima et al., 2021; Mojapelo & Maboe, 2019; Awuah et al., 2023; Akinyemi et al., 2020).

3. Methodology

This study used an analytical cross-sectional correlational design to assess how patient-related factors influence the uptake of kidney transplantation among adult patients with ESRD receiving maintenance hemodialysis in Gaborone, Botswana. It was conducted in three major dialysis centres: Renal Care Institute, Sir Ketumile Masire Teaching Hospital, and Bokamoso Private Hospital, targeting the largest dialysis population in the country.

A sample of 163 participants was selected through multistage sampling, with centres purposively chosen and patients conveniently sampled using proportional allocation. Data were collected over eight weeks using pretested questionnaires found to be reliable. Analysis was done using SPSS and Stata, applying descriptive statistics and chi-square tests. Ethical approval and informed consent were obtained, and confidentiality and voluntary participation were maintained throughout.

4. Results and Discussion

4.1 Patient-related factors

Among the 163 hemodialysis patients, over half (52.76%) had been on treatment for more than 3 years, reflecting delayed progression along the transplant pathway, a pattern commonly reported across sub-Saharan Africa (Davies et al., 2023). Awareness of KT was moderate (60.12%), yet knowledge was high (83.44%), a pattern consistent with studies showing that patients often understand the concept of transplantation but lack navigation skills along the transplant pathway (Mutai et al., 2022). Attitudes were predominantly positive (87.73%), aligning with evidence that most African patients are receptive to KT when adequately informed (Ahmed et al., 2023). Comorbidities were prevalent (76.69%), with hypertension dominant, mirroring regional ESRD epidemiology (Arogundade, 2023). Donor availability was low (28.22%), with barriers including family reluctance (19.02%) and not approaching relatives (22.09%), consistent with the literature highlighting relational and informational barriers to living donation (Nnaemeka et al., 2022). Cultural beliefs were negligible (1%), suggesting structural rather than cultural factors primarily shape KT uptake.

Table 1: Patient characteristics

Patient characteristics	Categories	Frequency (n)	Percentage (%)
Duration of hemodialysis	Less than 6 months	21	12.88
	6 months-1 Year	13	7.98
	1-3 years	42	25.77
	3 Years	86	52.76
Awareness of KT as an option for treatment	No	62	38.04
	Yes	98	60.12
Knowledge about KT	Poor	2	1.23
	Good	25	15.34
	Very good	136	83.44
Attitude and Perception about KT	Negative	8	4.91
	Neutral	12	7.36
	Positive	143	87.73
Comorbidities	No	38	23.31
	Yes	125	76.69
Types of comorbidities present (n = 125)	Hypertension	82	50.31
	Diabetes	4	2.45
	Hypertension/Diabetes	19	11.66
	HIV	11	6.75
	Anaemia	11	6.75

Donor Availability	No	117	71.78
	Yes	46	28.22
Donor Relation	Parent	5	3.07
	Sibling	15	9.20
	Spouse	9	5.52
	Child	11	6.75
	Other	4	2.45
Reason for no Donor	Unaware KT is an option	20	12.27
	Family not willing to donate	31	19.02
	Have not asked the family	36	22.09
	No medically eligible family member	15	9.20
	Other	14	8.59
Cultural Beliefs	No	162	0.99
	Yes	1	0.01

4.2 Kidney transplant uptake among patients on chronic hemodialysis at dialysis centers in Gaborone, Botswana

The uptake of kidney transplantation was assessed by evaluating the proportion of patients who initiated the transplantation process. The findings indicated that approximately 17% (n = 28) of respondents had initiated the process, whereas the majority, around 83% (n = 135), had not, as depicted in Figure 1.

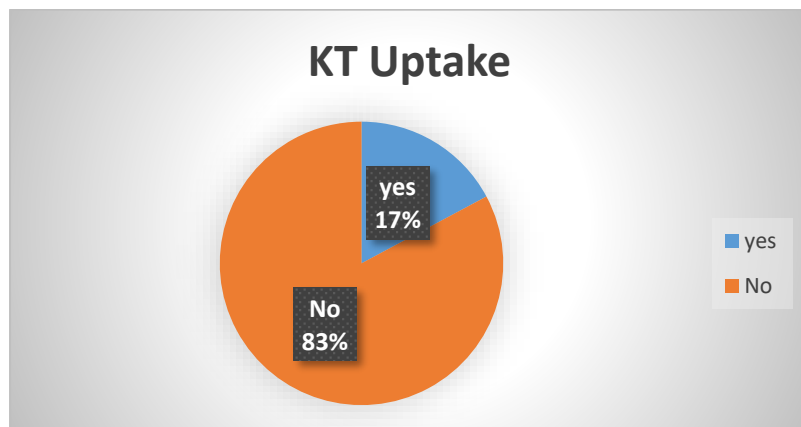


Figure 1: Kidney transplant uptake

4.3 Patient-related factors associated with KT uptake

A Chi-square test was conducted to examine the association between patient-related factors and kidney transplantation (KT) uptake among CKD patients on hemodialysis in Botswana (Table 2). Most patient-related factors, including duration on hemodialysis, awareness, knowledge, attitudes, comorbidities, and cultural beliefs, were not significantly associated with KT uptake. In contrast, donor-related variables were strongly associated with transplantation. Donor availability significantly predicted KT uptake ($p < 0.001$), as did donor relationship,

particularly with siblings and spouses. Barriers such as family reluctance, not asking relatives, and lack of awareness were also strongly associated with the outcome ($p < 0.001$). Overall, donor availability and donor-related constraints were the key determinants of KT uptake, whereas general patient characteristics played no significant role.

Table 2: Patient-related characteristics associated with kidney transplant uptake

Patient characteristics	Category	KT Uptake		χ^2	p-value
		No n (%)	Yes n (%)		
Duration of hemodialysis	≤ 1 year	30 (88.2)	4 (11.8)	1.743	.187
	> 1 year	104 (81.3)	24 (18.8)		
Awareness of KT as a treatment option	No	56 (90.3)	6 (9.7)	4.989	.083
	Yes	76 (77.6)	22 (22.4)		
Knowledge about KT	Poor	29 (85.3)	5 (14.7)	6.842	.009**
	Good & Very Good	133 (82.1)	23 (17.9)		
Attitude and perception toward KT	Negative/Neutral	19 (90.5)	2 (9.5)	3.104	.212
	Positive	116 (81.1)	27 (18.9)		
Comorbidities	Diabetes	41 (73.2)	15 (26.8)	7.388	.117
	Hypertension/Diabetes	50 (90.9)	5 (9.1)		
	HIV	14 (77.8)	4 (22.2)		
	Others	26 (86.7)	4 (13.3)		
Cultural beliefs	No	123 (84.2)	23 (15.8)	1.292	.524
	Yes	7 (58.3)	5 (41.7)		
Donor identified (availability)	No	111 (95.1)	5 (4.9)	48.539	.000***
	Yes	23 (50.0)	23 (50.0)		
Donor relationship	Immediate family (Parent/Child)	13 (81.3)	3 (18.7)	23.031	.000***
	Extended family (Sibling/Spouse)	7 (28.0)	18 (72.0)		
Reason for no donor	Family-related (Not asked/unwilling)	64 (95.5)	3 (4.5)	46.988	.000***
	Structural (Unaware KT option/No eligible donor)	33 (91.7)	3 (8.3)		

These findings show that donor-related factors, not patient characteristics, are the primary determinants of KT uptake. The strong effect of donor availability ($p < 0.001$) aligns with evidence that organ scarcity, limited donor pools, and family dynamics remain major barriers to transplantation in Africa (Olawade et al., 2025). The significance of donor relationships reflects regional reliance on living-related donation and the limited development of deceased-donor programmes (Bamgboye, 2023). Barriers such as family reluctance, not asking relatives, and lack of awareness mirror global reports that social and relational constraints often outweigh clinical eligibility in limiting donation (Min et al., 2022; Mudiayi et al., 2022). Additionally, structural system gaps, especially referral and donor-availability bottlenecks, are increasingly recognized as more influential than patient knowledge or attitudes in low-resource settings

(Viecelli et al., 2024). Collectively, these findings suggest that expanding donor options, strengthening family engagement, and improving relational and system-level pathways may be more effective than focusing solely on patient-level factors.

5. Discussion

The present study found that awareness of kidney transplantation (KT) as a treatment option was generally associated with a more favorable inclination toward transplantation; however, awareness did not demonstrate a statistically significant association with actual uptake. Similarly, higher knowledge scores did not predict uptake, underscoring the distinction between positive inclination (willingness) and initiation of the transplant process (uptake). This finding suggests that knowledge alone may not be sufficient to translate intent into action when structural or systemic barriers persist.

Comparable results have been observed in other sub-Saharan African studies, in which patients demonstrate adequate awareness but low rates of transition to transplantation due to limited access to donor evaluation, referral delays, and institutional constraints (Boima et al., 2021; Moshi, 2024). In contrast, studies in high-income settings have shown that improved awareness and knowledge often lead to higher uptake, largely because enabling systems such as cadaveric donor programs, streamlined referral pathways, and comprehensive insurance coverage facilitate progression from intent to transplantation (Venkataraman & Kendrick, 2020; Farouk, 2020).

In the Botswana context, where transplantation depends primarily on living-related donors and centralized evaluation at referral hospitals, knowledge may improve patients' willingness but not necessarily their access to transplantation. This finding highlights the need for interventions that extend beyond patient education to include strengthened referral mechanisms and family engagement to move from awareness to actual uptake.

In this study, the overall measure of attitudes and perceptions toward KT, assessed using six items, indicated that the majority of patients (116/163; 71.2%) expressed a generally positive orientation. However, when analyzed in aggregate, no significant association was observed between overall attitude/perception and KT uptake. This contrasts with findings from Moshi (2024) in Tanzania and Boima et al. (2021) in Ghana, where aggregate positive attitudes were strongly predictive of transplant acceptance. Interestingly, when the six items were disaggregated in the present study, specific factors, namely the belief that KT improves quality of life, confidence in managing lifelong treatment, and comfort in requesting a kidney from a loved one, were significantly associated with uptake. This suggests that although most patients express general positivity toward KT, only certain belief components meaningfully influence decision-making. In the Botswana context, this highlights the need for targeted health education aimed at strengthening specific perceptions and self-efficacy rather than focusing solely on promoting general positive attitudes.

In the current study, only one respondent (0.61%) reported that kidney transplantation conflicted with their cultural values. This finding indicates that cultural resistance is likely minimal, but it may also highlight the drawbacks of the single-item question employed. The question, "Does organ transplant go against your cultural values?" only captures explicit opposition and overlooks subtler cultural or religious factors that may influence decision-making. Considering Botswana's demographic landscape, where Christianity is predominant,

representing 88% of the population (Statistics Bots, 2022; Haron, 2017), many participants might not have perceived their religious beliefs as a cultural hindrance, especially since the majority of Christian denominations do not explicitly forbid transplantation. However, underlying moral concerns, notions of body integrity, or family-level influence rooted in religion or traditional norms might not have been elicited by the question's wording. This contrasts with findings from South Africa (Mojapelo & Maboe, 2019), where cultural and religious framings revealed stronger associations with negative perceptions of transplantation, including fears of surgery and mistrust of medical interventions. The low endorsement rate, therefore, may represent both a genuine absence of cultural resistance and a methodological limitation in fully capturing the complex intersections of culture, religion, and health behavior in this setting.

Donor availability was the most decisive factor: over 70% of respondents had not identified a donor, and the absence of a donor was strongly associated with non-uptake. Similar findings have been reported in Kenya and Ghana (Nduati et al., 2022; Boima et al., 2021). This highlights that even in subsidized health systems, transplant uptake is structurally constrained by the availability of living donors.

6. Conclusion

The study concludes that patient-related factors, including awareness, knowledge, attitudes, comorbidities, and cultural beliefs, were not major determinants of kidney transplantation uptake among hemodialysis patients in Gaborone, Botswana. Instead, donor-related factors emerged as the primary drivers of transplantation uptake, particularly donor availability and donor relationships. Barriers linked to family reluctance, limited donor awareness, and failure to approach relatives were the main constraints on uptake, suggesting that access to transplantation is more influenced by donor dynamics than by patient characteristics.

7. Recommendations

The study recommends that strategies to improve kidney transplantation uptake in Botswana should focus on strengthening donor availability through structured donor recruitment and family engagement programs. Dialysis centers should integrate routine counseling sessions that encourage patients and families to discuss donation early and address misconceptions or fears. Public sensitization efforts should also target potential donors, especially close relatives, to improve willingness and awareness. Additionally, health authorities should strengthen referral systems and develop supportive transplant policies to improve donor identification and expand transplantation opportunities.

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