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Original Article

Knowledge of Kidney Health and its Effect on Kidney Health Practices among Christians of Magumu Catholic Church, Nyandarua County - Kenya

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Kidneys, Knowledge, Kidney Health, Kidney Disease, Kidney Health Practices.

ABSTRACT

Kidney disease affects various parts of the kidneys, rendering them unable to filter blood off wastes and toxins. Approximately 700 million people suffer from kidney disease, with the highest burden occurring in impoverished, vulnerable and marginalized communities in low- and middle-income countries. Several factors including age, sex, occupation, religion, level of education and knowledge of kidney health and disease predispose individuals to kidney disease. This cross-sectional study was carried out among Christians of Magumu Catholic Church; Nyandarua County in Kenya to a) determine the extent of knowledge on kidney health and disease and its determinants, b) establish the practices towards kidney health and disease and c) investigate if there is a correlation between the level of knowledge on kidney health and disease and kidney health practices. Results of the study show that 341(89.2%) of the participants knew about kidney function, 270(79.2) knew about kidney location in the body and 228(63.9%) could list at least one correct sign or symptom of kidney disease, with having a swollen body being mentioned the most 172(32.0%). The majority of the participants had below-average knowledge 242(64.3%) of the signs and symptoms of kidney disease. Of the 341 participants who knew about kidney disease (92.3%) correctly listed at least one of its causes, with drug and alcohol abuse 160(50.9) and excessive salt intake and poor diet 84(26.8) being the most listed. Hypertension 189(57.6%), diabetes 103(31.4%) and obesity 36(11.0%) were listed as predisposing conditions to kidney disease. 205(62.1%) knew that kidney disease could run in families. Being male [(AOR=0.54, 95% CI [0.32-0.93], P=0.025)], having a tertiary education [(AOR= 2.96, 95% CI [1.25-6.98], P=0.013)] and age ≥27 years promoted good knowledge of kidney health and disease. For the kidney health practices, 193(50.5%) added raw salt to their food, 7.2% were actively smoking, 15.8% were taking alcohol, 52.3% used herbal medicine, 42(11.1%) took 8 glasses of water daily and 342(89.6%) were involved in physical exercise. Being male [(AOR=0.47, 95% CI [0.28-0.79], p=0.016)], having secondary or tertiary education [AOR=0.56(0.31-1.43) and [AOR=0.48(0.14-0.97)] respectively and being a student [AOR=0.36(0.24-1.04)] hindered engagement in practices that promote kidney health whereas being more than 58 years greatly promoted it. Finally, having average or above-average

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knowledge of good KHP promotes good KHPs. We conclude that in addition to other factors, health literacy, but not the level of education promotes good KHPs and that educating the masses about signs and symptoms of KD and good KHPs could be a game changer in achieving the set targets towards the prevention and early detection of KD.

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INTRODUCTION

Kidney disease (KD) is a condition that damages different parts of the kidneys, thereby diminishing their major role in the removal of wastes and toxins from the body (Hamrahian & Falkner, 2017; Wang & Kestenbaum, 2018). The damage may be acute or occur gradually and progressively, becoming chronic (Kalantar-Zadeh et al., 2021; Ronco et al., 2019). Approximately 700 million of the world's population suffer from KD, the prevalence of which increased by 33% between 1990 and 2017 (Ying et al., 2024). The highest burden in terms of morbidity, mortality, cost and adjusted quality of life occurs in low- and medium-income countries, (LMICs) (Xie et al., 2018). KD disproportionately affects impoverished, vulnerable and marginalized populations of the world. For example, the prevalence of chronic kidney disease (CKD) in Sub-Saharan Africa of 12.5% is above the global average of 6.8% (Muiru et al., 2020). In Kenya, the estimated prevalence of CKD among medical inpatients is 38.6%, which is extremely high (Mwenda et al., 2019). CKD is considered a global health priority since it increases the risk of non-communicable diseases (Hamrahian & Falkner, 2017) and infections, which significantly decreases an individual's life expectancy and increases the costs of care (Romagnani et al., 2017).

KD can occur in any individual at any one time. However, biomedical risk factors including diabetes, hypertension, obesity, heart disease and infections as well as prolonged over-the-counter use of non-steroidal anti-inflammatory drugs (Oluyombo et al., 2016) predispose individuals to KD (Pavkov et al., 2018). Moreover, behavioural factors like drug and alcohol abuse, smoking, unhealthy diet including high salt intake, and low physical activity (Jones et al., 2021) plus non-modifiable factors like advancement in age, family and individual history of KD increase the risk of KD (Romagnani et al., 2017).

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Today, the prevalence of many of these predisposing conditions has increased globally. For example in Kenya, the prevalence of diabetes was 3.1% (Mohamed et al., 2018) but this is expected to increase (Manyara et al., 2024). On the other hand, controlling blood pressure and glucose levels, being physically active, staying hydrated, minimizing alcohol consumption and smoking, maintaining a healthy body weight and having a well-balanced diet with fewer quantities of salt promotes kidney health and decreases the risk of KD (Jones et al., 2021).

The signs and symptoms of KD depend on whether it is acute or chronic. CKD progresses very slowly over time and the signs and symptoms are only noticeable when kidney damage is severe (Romagnani et al., 2017; Webster et al., 2017). These include nausea and vomiting, loss of appetite, fatigue and body weakness (Kalantar-Zadeh et al., 2021), sleep problems, muscle cramps, decreased mental abilities, a decrease or increase in urine output, swelling of feet and ankles, dry and itchy skin, high blood pressure that is difficult to control, shortness of breath and chest pain (Kalantar-Zadeh et al., 2021). General body malaise, diarrhoea, dehydration, oliguria and muscle twitching may also manifest clinically in KD (Imajo et al., 2016).

Several strategies have been proposed to decrease the burden of KD. However, primary health care remains the best alternative since it encourages practices and interventions that limit the chances of the development of KD and the timely discovery of its signs and symptoms (Kalantar-Zadeh et al., 2021; Paula et al., 2016). Community education leads to improved knowledge and promotes public awareness of KD which ensures that individuals seek health care long before the disease progresses. This limits unnecessary healthcare expenditure and long hospital stays and decreases the disability-adjusted life years. For example, knowledge of the signs and symptoms of kidney health and disease (KHD) and its risk factors could promote the uptake of screening programs and timely seeking of healthcare by affected individuals (Okoro et al., 2020). In LMICs like Kenya, delayed management of KD due to several factors including poor community knowledge of KD is a significant contributor to time-associated morbidity and mortality. Populations with high knowledge and levels of awareness about KD have better rates of early identification and intervention (Lewington et al., 2013; Webster et al., 2017). This subsequently leads to a significant decrease in the economic and public health burden of KD, especially in LMICs where the cost of its care is far beyond the financial abilities of an average patient (Xie et al., 2018).

Objectives

To determine the extent of knowledge of KHD and its determinants among Christians of Magumu Catholic Church, Nyandarua County- Kenya.

- To establish the practices towards KHD carried out by Christians of Magumu Catholic Church, Nyandarua County- Kenya.
- To assess the correlation between the level of knowledge of KHD and KHPs undertaken by Christians of Magumu Catholic Church, Nyandarua County- Kenya.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted in Magumu Catholic Church, situated in Magumu Location, South Kinangop Sub-County; Nyandarua County, Kenya between 1st August and 31st October 2021.

Inclusion and Exclusion criteria

All participants aged 18 years and above attending Magumu Catholic church during the study period and consented to the study were included. Medical personnel and those with known KD were excluded.

Sampling and sample size calculation

The sample size was calculated using Fischer's formula as described by (Gupta et al., 2016) to determine the appropriate sample size.

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$$n = \frac{z^2(p)(q)}{d^2}$$

Where **n** is the desired sample size

Z is 1.96 at a 95% confidence interval

p is 0.5 (50%)

q = $1 - p$

d = 0.05

Therefore; n=384

Systematic sampling was used to recruit participants. The first individual to consent was included in the study. After that, every third individual was included after consenting to participate in the study.

DATA COLLECTION AND ANALYSIS

Semi-structured interview-guided pretested questionnaires were used for data collection. The questionnaire was pretested on ten individuals attending church at the next Parish a few weeks before the commencement of the study and adjustments were made accordingly. Eight signs and symptoms of KD were used to partly determine the level of knowledge on KD. These included swelling of the body, changes in urine frequency and colour, fatigue, pain, nausea and vomiting, paleness of the body, confusion, and loss of appetite.

After administration of the questionnaires to the study participants, the data was scrutinized for completeness and entered into Microsoft Excel for cleaning. Cleaned data was then exported into GraphPad Prism version 5.00 for analysis and visualization. Descriptive statistics were conducted and presented in the form of tables and graphs. Bi-variable and multivariable analysis was also done to ascertain the level of association between various demographic factors, knowledge of kidney health and KHPs. Logistic regression was used to determine the level of interactions between factors. Those that were statistically significant in the bivariate analysis were analyzed further using multivariate analysis. A p-value that was less than 0.05 was considered to be statistically significant.

Ethical Approval

All principles of research ethics for human participants were followed. Ethical approval was obtained from the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH-UoN ERC license number UP582/10/2020) and a certificate to carry out the research was issued by NACOSTI (certificate number NACOSTI/P/21/3901). Consent was also obtained from the Head of Magumu Catholic Parish. Additionally, written informed consent was obtained from all the participants before administration of the questionnaire.

RESULTS

A total of 384 participants were included in the study. However, 2 participants opted out. Therefore, 382 participants completed their questionnaires and their data was available for cleaning and analysis.

Demographic characteristics of the participants

Table 1 details the demographic characteristics of the study participants. In terms of gender, females (n=203(53.1%)) were more than males (n=179(46.9%)). Most participants were 28-37 years old (n=117(30.6%)). Most of the participants' highest level of education was secondary school (n=175(45.8%)). Participants were mostly peasant farmers (n=172(45.1%)). The prevalence of diabetes and hypertension for those participants who knew their health conditions was 3.7% (n=14) and 11.5% (n=44) respectively.

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Table 1: Demographic characteristics of study participants

Variable	Frequency N=382 n (%)
Gender	
Male	179(46.9)
Female	203(53.1)
Age (years)	
18-27	58(15.2)
28-37	117(30.6)
38-47	83(21.7)
48-58	72(18.8)
>58	52(13.7)
Level of education	
None	10(2.6)
Primary	80(20.9)
Secondary	175(45.8)
Tertiary	117(30.6)
Occupation	
Farmer	172(45.1)
Self-employed	52(13.6)
White collar job	53(13.8)
Student	105(27.5)
Diabetic condition	
No	316(82.7)
Yes	14(3.7)
Don't know	52(13.6)
Hypertensive condition	
No	297(77.8)
Yes	44(11.5)
Don't know	41(10.7)

Knowledge of KHD among the study participants

Knowledge of the kidneys and their normal functions

Before determining participants' knowledge of KD, we sought to determine if they knew what kidneys are and their functions in a normal body. For example, participants were asked to touch the part of the body where they thought the kidneys were located and also list the major functions they perform in a normal human body. The majority of participants 341(89.2%) correctly mentioned the major function of kidneys whereas only 270(79.2%) correctly pointed to the right location of at least one of the kidneys.

Knowledge of signs and symptoms of KD

To confirm participants' knowledge of KD, they were asked to list as many signs and symptoms of the disease as they could. Of the 382 participants, 124 (35.1%) could either not list any or listed wrong signs and symptoms, whereas 228 (63.9%) listed at least one correct sign or symptom of KD. Having a swollen body was the most mentioned sign, 172(32.0%). This was followed by changes in urine frequency and colour (124(23.0%), symptoms of fatigue 114(21.2%), nausea and vomiting 43(8.0%), paleness of the body 41(7.6%), loss of appetite 22(4.1%), confusion 17(3.2%) and pain 5(0.9%).

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Table 2: Number of times particular signs and symptoms were mentioned

Sign or symptom	Frequency (%) N = 538
Swollen body	172(32.0)
Change in urine frequency and colour	124(23.0)
Fatigue	114(21.2)
Nausea and vomiting	43(8.0)
Paleness of the body	41(7.6)
Loss of appetite	22(4.1)
Confusion	17(3.2)
Pain	5(0.9)

To further determine the extent (level) of knowledge on KD, study participants were classified into six categories depending on how many signs or symptoms they could correctly list out of 8 above (Table 3). Most participants had below-average knowledge 242(63.4%), 75(19.6%) had average and 65(17%) having above average knowledge.

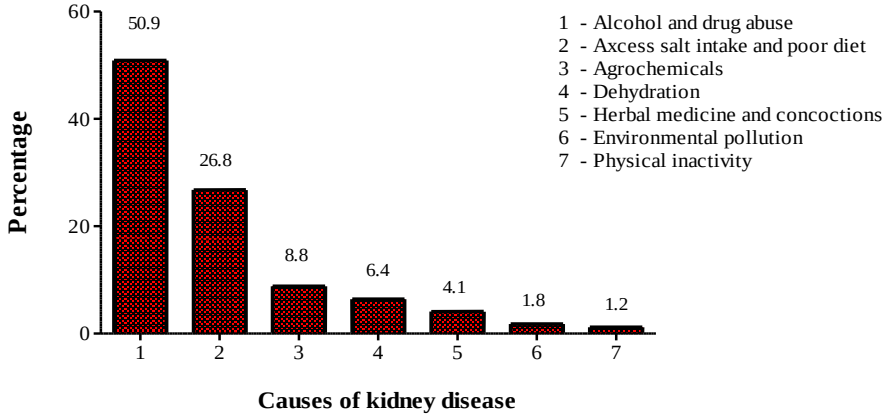
Table 3: Level of knowledge on signs and symptoms of KD

Number	Level of knowledge	Frequency (%)
None	Very poor	124(32.5)
1-2	Poor	118(30.9)
3-4	Average	75(19.6)
5-6	Good	21(5.5)
7	Very good	39(10.2)
8	Excellent	5(1.3)

Knowledge of causes of KD

To further confirm the level of knowledge participants had concerning KD, we sought to investigate if the 341 participants who knew about KD could correctly list probable causes. Of these, 315(92.3%) correctly listed at least one cause of KD, with the remaining failing to correctly list any. Participants who knew about the causes of KD were asked to list as many as possible. Drug and alcohol abuse 160(50.9), excessive salt intake and poor diet 84(26.8), agrochemicals 28(8.8), dehydration 20(6.4), herbal medicine and concoctions 13(4.1), environmental pollution 6(1.8) and physical inactivity 4(1.2) were listed.

Figure 1: Causes of KD as mentioned by study participants



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Furthermore, when participants were asked if any pre-existing conditions could lead to KD, 199(56.5%) confirmed their knowledge. Hypertension, diabetes and obesity were correctly mentioned at 189(57.6%), 103(31.4%) and 36(11.0%) respectively. Most participants knew KD could run in families 205(62.1%).

Table 4: Knowledge of various variables about KHD

Variable	Frequency (%)
Do you know any one function of kidneys in our bodies? (n=382)	
Don't know	41(10.7)
Yes, I know	341(89.3)
Have you ever heard of KD? (n=382)	
No	30(7.9)
Yes	352(92.1)
Do you know of any one symptom of KD? (n=352)	
None	124(35.1)
Yes	228(63.9)
Do you know of any disease that can lead to KD? (n=352)	
No	150(42.7)
Yes	199(56.5)
Not sure	3(0.8)
List any diseases that can lead to KD	
Hypertension	189(57.6)
Diabetes mellitus	103(31.4)
Obesity	36(11.0)
Do you think KD runs in families? (n=330)	
No	125(37.9)
Yes	205(62.1)

Determinants of knowledge of kidney health and KD

Male participants were 0.54 times less likely to have good knowledge of kidney health as compared to females (AOR=0.54, 95% CI [0.32-0.93], P=0.025). Participants who have tertiary education were 2.96 more likely to have good knowledge of kidney health (AOR= 2.96, 95% CI [1.25-6.98], P=0.013). Students who participated in the study were 0.21 less likely to have good knowledge of kidney health (AOR= 0.21, 95% CI [0.07-0.62], P=0.004). Participants aged above 27 years were more likely to achieve good knowledge of kidney health (Table 5). However, the occupation of the study participants did not have any effect on their knowledge of KD in multivariate analysis.

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Table 5: Bi-variable and multi-variable analysis of the various factors determining the level of knowledge of KHD

Study variables	Knowledge		Bi-variate Analysis			Multi-variate Analysis		
	Poor n (%)	Good n (%)	COR	95% CI	p-value	AOR	95% CI	p-value
Gender								
Female	93(45.7)	110(54.3)	REF					
Male	92(51.4)	87(48.6)	0.71	0.44-1.13	0.148	0.54	0.32-0.93	**0.025**
Education level								
None	6(60)	4(40)	0.89	0.35-1.24				
Primary	41(51.2)	39(48.8)	REF					
Secondary	96(54.7)	79(45.4)	0.91	0.50-1.67	0.765	1.93	0.95-3.93	0.069
Tertiary	52(44.2)	65(55.8)	1.64	0.85-3.17	0.144	2.96	1.25-6.98	**0.013**
Occupation								
Farmer	78(45.6)	94(54.4)	0.35	0.15-0.82	**0.016**	0.41	0.15-1.16	0.093
Self-employed	25(49)	27(51)	0.32	0.12-0.87	**0.026**	0.34	0.11-1.04	0.059
White Collar job	23(42.5)	30(47.5)	REF					
Student	66(62.6)	39(37.4)	0.11	0.04-0.28	**<0.001**	0.21	0.07-0.62	**0.004**
Age (years)								
18-27	37(63.3)	21(36.7)	REF					
28-37	42(36)	75(64)	3.71	2.17-6.35	**<0.001**	3.53	1.65-7.57	**0.001**
38-47	20(24)	63(76)	2.58	1.94-3.89	**<0.001**	2.01	0.88-6.08	**0.001**
48-57	21(29.2)	51(70.8)	3.13	1.02-4.32	**<0.001**	3.39	1.54-4.89	**0.001**
>58	35(49.3)	37(50.7)	1.06	0.99-4.28	0.153	1.32	1.09-1.59	

COR-crude odds ratio, AOR-adjusted odds ratio, CI-confidence interval, and variables with a p-value<0.2 in the bi-variable were included in the multivariable analysis. P-values <0.05 were bolded to indicate their significance.

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Practices undertaken by study participants that promote or hinder kidney health

Of most participants, 193(50.5%) added raw salt to already cooked food sometimes, 7.2% were actively smoking and 15.8% were taking alcohol. Regarding herbal medication use, 52.3% acknowledged to have used herbal medicine and 214(55.9%) used NSAIDs without a medical prescription. Taking enough water and participating in physical activities were the only positive KHPs mentioned. Only 75(45.9%) of the participants took more than 8 glasses of water daily and 42(11.1%) took 8 glasses. A majority (193(50.5%) drank less than 8 glasses per day and 71(18.7%) drank water only when they felt thirsty. Almost all participants, 342(89.6%) were involved in physical exercise.

Table 6: Promoters or inhibitors of kidney health practised by study participants

Variable	Frequency (%) N=382
Have you ever smoked or are you currently smocking?	
No	354(92.8)
Yes	28(7.2)
Have you ever taken or currently taking alcohol?	
No	322(84.2)
Yes	60(15.8)
Do you engage in any form of physical activity?	
No	40(10.4)
Yes	342(89.6)
Have you ever used or currently using herbal medication?	
No	182(47.7)
Yes	200(52.3)
How much water do you take in 24 hours?	
8 glasses	42(11.1)
<8 glasses	193(50.5)
>8 glasses	75(19.7)
Only when required	71(18.7)
Do you add salt to already prepared food?	
Always	14(3.6)
Not at all	175(45.9)
Sometimes	193(50.5)
Do you use NSAIDs without a medical prescription?	
No	168(44.1)
Yes	214(55.9)

Effect of various factors on KHPs undertaken by participants

Male participants significantly engaged in poor KHPs compared to their female counterparts (AOR=0.47, 95% CI [0.28-0.79], p=0.016). Participants above 28 years were significantly associated with good practices towards kidney health compared to their younger counterparts

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(Table 7). Those with secondary and tertiary education were 0.43 times less likely to be involved in good KHPs.

Table 7: Bi-variable and multi-variable analysis of determinants of KHPs among study participants

	Kidney Health Practice		Bi-variate analysis			Multi-variate analysis		
Study Variables	**Good n (%)**	**Poor n (%)**	**COR**	**95% CI**	**P value**	**AOR**	**95% CI**	**P value**
Gender								
Female	76(42.5)	103(57.5)	REF					
Male	116(57.4)	87(42.7)	0.55	0.34-0.89	**0.016**	0.47	0.28-0.79	**0.004**
Education level								
None	7(70)	3(30)						
Primary	35(43.3)	45(56.8)	REF					
Secondary	94(54.0)	81(46.1)	0.43	0.22-0.84	**0.013**	0.56	0.31-1.43	
Tertiary	62(52.8)	55(47.2)	0.43	0.21-0.87	**0.019**	0.48	0.14-0.97	
Occupation								
Farmer	69(40.1)	103(59.8)	1.43	0.68-3.03	0.349			
Self-employed	25(48.2)	27(51.8)	1.20	0.47-3.05	0.698			
white collar job	29(54.4)	24(45.6)	REF					
Student	65(61.8)	40(38.2)	0.40	0.18-0.88	**0.023**	0.36	0.24-1.04	
Age								
18-27	36(62.1)	22(37.9)	REF					
28-37	40(34.2)	77(65.8)	2.29	1.36-3.86	**0.002**	2.07	1.18-3.60	**0.011**
38-47	37(44.6)	46(55.4)	1.76	1.54-2.01	**0.037**	1.51	1.43-1.98	
48-57	23(44.2)	29(55.8)	1.43	0.98-1.87	0.105	1.23	1.02-1.53	
>58	3(4.2)	69(95.8)	10.26	3.44-30.6	**<0.001**	11.67	3.81-35.69	**<0.001**
Knowledge								
Below average (n=242)	139(57.4)	103(42.6)	REF					
Average (n=75)	29(38.7)	46(61.3)	1.48	1.15-2.48	0.085			
Above average (n=65)	23(35.4)	42(64.6)	2.00	1.23-3.25	**0.005**	1.60	0.94-2.73	0.086
Total	191(50)	191(50)						

COR-crude odds ratio, AOR-adjusted odds ratio, CI-confidence interval, and variables with a p-value<0.2 in the bi-variable analysis were included in the multivariable analysis. P-values <0.05 were bolded to indicate their significance.

Effect of knowledge of KHD on KHPs (table 7)

Participants with either average or above-average knowledge of practices that promote or hinder kidney health were 1.48 and 2.00 times more likely to engage in good KHPs respectively compared to the below-average group. 191(50%) of the study participants were engaged in poor KHPs. Of these 191 participants, 139(72.7%), 29(15.3%) and 23(12.0%) had below-average, average or above-average knowledge respectively. The same number of participants, 191(50%) were neither engaged in practices that hinder good kidney health nor practised those that promoted proper kidney health. These included 103(54%) with below-average knowledge, 46(24%) with average knowledge and 42(22%) with above-average knowledge.

More participants with below-average knowledge were engaged in poor KHPs (139, 57.4%) compared to good ones (103, 42.6%). For the average knowledge group, more participants (46, 61.3%) engaged in good KHPs compared to those who engaged in poor ones (29, 38.7%). Similarly, of the

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participants in the above-average knowledge group, 42(64.6%) engaged in practices that promoted good kidney health whereas 23(35.4%) engaged in those that hindered good kidney health.

DISCUSSION

This study has revealed that various factors contribute to a person's knowledge of kidney health and KHPs. 89.3% of the participants knew the location of the kidneys in the body and correctly mentioned the major functions of kidneys in the human body. This implies that participants have a good general knowledge of kidney location and function which could be attributed to the Kenya Primary and Secondary school curricula that include the basic study of human body systems (Kenya Institute of Curriculum Development, 2017). This number is slightly higher than the one obtained by Okwuonu et al. (2015), who found that 82.1% of adults in a Nigerian population knew about kidney function, while according to a study done in Tanzanian by Stanifer et al. (2016), only a modest number of people were conversant with the function performed by the kidneys in the body.

However, in terms of knowledge of signs and symptoms of KD, this study found that only 36.6% of participants had either average or above-average knowledge of KD, which is regarded as poor. These findings are closely similar to those of another study conducted in Tanzania (Stanifer et al., 2016), but lower than those obtained in Uyo by Akpan et al. (2016) which determined that 95.1% of the population studied knew KD. This implies that sensitization about KD in our study population is comparatively low. In another study conducted in Gondar Town, Ethiopia, a good knowledge of score was obtained by Tegegne et al. (2020) and this was attributed to the institution-based characteristics of the study participants. However, since our study was carried out in a random general population, the difference was expected.

Our study further determined that a number of both modifiable and non-modifiable factors determine the extent of knowledge participants have about KHD. For example, males were 0.54 times less likely to attain a good knowledge of kidney health and also engaged in poor KHPs as compared to their female counterparts. This could be due to the unwillingness of men to seek healthcare and healthcare-related information. Additionally, women have a higher chance of receiving informal healthcare-related information as compared to men, increasing their knowledge concerning various health conditions (Ek, 2015). This is in contrast to the findings of a study carried out on 777 members of the general population in Al Medina Al-Munawara in Saudi Arabia in which females were less likely to have good knowledge of CKD compared to males (Mahmoud et al., 2023). A similar study in Nigeria also determined that more males had better knowledge of KD compared to their female counterparts (Oluyombo et al., 2016).

Males were also more likely to engage in poor KHPs like alcohol and drug abuse and smoking as compared to females. This is because such behaviour is more accepted in males than females in most cultures and societies (Cui et al., 2018), including African society (Boua et al., 2021). As almost expected, participants with tertiary education had better knowledge of KD but notably, having secondary school education and being a college student was associated with significantly less knowledge of KD. Loo et al. found that knowledge of CKD was low in undergraduate and postgraduate students in Malaysia (Loo et al., 2022). In another Malaysian study, (Sowtali et al., 2020) also got similar results which could be attributed to poor health literacy and limited exposure to non-communicable diseases among young people (Chu-Ko et al., 2021); which is again noticeably common in persons aged 60 years and above (Syed et al., 2019). A decrease in prevalence has also been seen in younger people according to a study conducted by (Armocida et al., 2022). For the same reasons, there were significant differences in knowledge of KD among younger people (18-27) as compared to their older counterparts.

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Knowledge of the practices that increase the risk of KD was high among the participants who knew about KD. Drug and alcohol abuse and poor diet, including excessive salt intake, were more mentioned with other factors having a score of less than 27%. Hypertension, diabetes and obesity were also identified as comorbidities and/or risk factors for KD in that order. In a similar study, 79.3% of the participants mentioned low water intake as the major risk factor for KD, yet this was at 6.4% in our study. The percentages mentioned for hypertension and diabetes were 15.1% and 13.2% (Albuquerque et al., 2023), lower than the results of this study (57.6% and 31.4% respectively). This difference could have been due to differences in study methodologies employed. While Albuquerque et al. (2023) study focused on determining the percentages from the whole sample size, our calculation concentrated only on the participants who had previously heard about KD. However, while hypertension and diabetes were mostly mentioned as non-communicable disease risk factors for KD by the general populace (Okwuonu et al., 2015), obesity was rarely mentioned (Oluyombo et al., 2016), even in this study 36(11.0%). KHPs play a significant role in determining an individual's risk of KD. In this study, physical exercise and keeping hydrated were the only two practices known to improve kidney health since they were frequently mentioned by the participants. Physical exercise was the most mentioned practice (89.6%). Physical exercise leads to alterations in kidney hemodynamics and electrolytes and improves the Glomerular Filtration Rate (GFR), subsequently leading to improved kidney function (Arazi et al., 2022). Moderate to vigorous exercise lowers the risk of KD even in people with hypertension and diabetes (Seidu et al., 2021). Only 57% of the participants took eight glasses of water or more, with the rest only taking water when required. Taking more than eight glasses is recommended to preserve kidney health (Kidney Research UK, 2024), and CKD is associated with a low water intake (Sontrop et al., 2013). High water intake decreases albuminuria, improves the estimated Glomerular Filtration rate and slows the progression of CKD (Wang & Jiang, 2021).

Various factors promoted or hindered the actual engagement in good or bad KHPs among the study participants. Males undertook poor kidney practices compared to females, especially concerning drug and substance abuse and smoking. This is however almost expected because smoking and substance abuse are acceptable for males in the African Society and Cultural settings compared to females. Our results are in agreement with those of studies reviewed by Boua and others undertaken in four Sub-Saharan African Countries (Boua et al., 2021). Surprisingly, even with better KHPs, CKD is more prevalent in women than men on the continent and globally (Hariparshad et al., 2023), implying that other factors make a significant contribution. Students were less likely to engage in good KHPs. With poor health literacy (Chu-Ko et al., 2021) coupled with drug and substance abuse among Kenyan youths (Musyoka et al., 2023), this result was expected. Additionally, attaining secondary or tertiary education was associated with poor KHPs as compared to participants who only had a primary education or none at all. This was again a surprise finding since adults with better education have been associated with a decreased likeliness to engage in behaviours that put their health at risk like smoking and alcohol abuse (Raghupathi & Raghupathi, 2020). Our study also revealed that having average or above-average knowledge of KD was associated with good KHPs. Indeed, health-literate older adults were found to have better health-promoting behaviours like screening (Fernandez et al., 2016). This is also in agreement with the results of a study that showed a positive correlation between health literacy and health-promoting behaviour in patients with Type 2 Diabetes (Chahardah-Cherik et al., 2018).

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CONCLUSION

This study reports an interplay of various factors in determining an individual's knowledge of kidney disease and KHPs. Participants had poor knowledge of the signs and symptoms of KD. Being male, a farmer, self-employed or a student was associated with poor knowledge of KD signs and symptoms and its risk factors. On the other hand, the age of 18-57 and having attended tertiary education improved participants' knowledge of both KD signs and symptoms and risk factors. Factors associated with poor KHPs included being male, having secondary and tertiary education and being a student, whereas ages of between 28-37 and over 58 years, and having above average knowledge of KD signs and symptoms plus its risk factors improved participants' KHPs. The results of our study also confirm that health literacy is superior to general education in promoting good KHPs, and show the dire need to provide health education to the masses. The poor knowledge of kidney health signs and symptoms and its associated risk factors, coupled with poor KHPs in students is greatly worrying and should be a point to drive action. Health literacy should be emphasized always and strategies to optimize it as an important part of Primary Health Care should be improved. Without it, positive adjustments in behavioural risk factors for KD may be very difficult to achieve.

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