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Assessment of dietary intake and kidney disease awareness among non-academic staffs of Higher Institutions in Ogbomoso, Oyo State, Nigeria

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Abstract
This study assessed dietary intake and kidney disease awareness among non-academic staff of higher institutions in Ogbomoso, Oyo State, Nigeria. A cross-sectional, quantitative approach was employed, involving 300 participants from two institutions. Data were collected using a structured questionnaire covering socio-demographic characteristics, medical information, kidney disease awareness, and food consumption patterns. Results revealed a diverse educational background among participants, with a majority having completed primary or secondary education. There was a high prevalence of family history of diabetes (65.7%) and hypertension (21.0%). Kidney disease awareness was generally low, with only 36.4% recognizing the importance of good eating habits for kidney health. Dietary analysis showed frequent consumption of traditional foods like Amala, with varied intake of vegetables, fruits, and protein sources. Fish was the most frequently consumed protein, while legumes and fruits were consumed regularly. The study highlights a critical need for improved kidney health education among non-academic staffs. It also underscores the importance of considering cultural dietary habits in developing nutritional recommendations for kidney health in this population. These findings can inform targeted health promotion strategies and dietary interventions to enhance kidney disease awareness and prevention in similar populations.

Keywords: Chronic Kidney Disease, Dietary Intake, Health Awareness, Non-Academic Staff

Introduction

Chronic kidney disease (CKD) is a global health concern that affects millions of people worldwide. As a progressive condition that can lead to kidney failure, CKD poses significant challenges to public health systems and individual well-being. In Nigeria, as in many developing countries, the prevalence of kidney disease is on the rise, yet awareness and understanding of this condition remain alarmingly low among the general population (Oluyombo *et al.*, 2022) [47]. Kidney disease awareness is crucial for early detection, prevention, and management of CKD (Stanifer *et al*., 2023) [50]. However, in many parts of Nigeria, including Ogbomoso, there is a significant gap in knowledge about kidney health, risk factors, and dietary preventive measures. This lack of awareness can lead to delayed diagnosis and treatment, resulting in poorer health outcomes and increased healthcare costs. Dietary intake plays a pivotal role in both the prevention and management of kidney disease (Jafar *et al*., 2021). A balanced diet, low in sodium and rich in nutrients that support kidney function, can help maintain overall kidney health and slow the progression of existing kidney conditions. Conversely, poor dietary habits, often stemming from lack of knowledge or cultural practices, can exacerbate the risk of developing kidney problems or worsen existing conditions.

A study from North-West Nigeria in the recent review documented CKD prevalence of 26% (Chukwuonye *et al*, 2018) [16], suggesting overall high prevalence of CKD and indicating a need for more studies to understand the true burden of CKD in Nigerian population. Combining regional population-based studies with sufficient power allow to estimate the true magnitude of CKD where national data is lacking (Oluyombo *et al*., 2017) [47]. Such aggregate data permit adjustment for confounding factors such as ethnicity, and prevalent risk factors in the regions. Nigeria is a multi-ethnicity nation with diverse socio-cultural practices and economic status that affect disease pattern, thus findings of few CKD studies in different regions are inconsistent (Okwuonu *et al*, 2017) [43]. The prevalence of CKD has been on the rise over the past several decades making it a significant burden on healthcare systems worldwide at present (Khan *et al*, 2013) [30]. A recent meta-analysis has estimated the worldwide prevalence of CKD at 13.4% (Fatoba and Oke, 2019) [22]. The global prevalence of CKD was estimated to be 9.1% in 2017 and 1.2 million deaths were attributed to it (Global Burden of Disease Study 2017). Studies reported 17-fold higher mortality among patients with end stage kidney disease (ESKD) compared with age- and gender-matched healthy individuals (Farag *et al*, 2012) [21]. The number of deaths due to CKD has been projected to be 2–4 million by 2040 (Farag *et al*, 2012) [21]. Apart from the potential to lead to ESKD and premature death, CKD has also been recognized as an independent risk factor for cardiovascular disease; 7% of the total cardiovascular disease burden being attributed to impaired kidney function. In the Kingdom of Saudi Arabia, CKD has been recognized as a major health problem in recent decades due to the growing incidence and prevalence of ESKD among the Saudi population (Alsuwaida *et al*,2019) [11]. The three very important risk factors for CKD – diabetes, hypertension and obesity – are highly prevalent in the Saudi population. An epidemiological study conducted in 2010 in the Kingdom of Saudi Arabia found that the overall prevalence of CKD was 5.7% (Alsuwaida *et al*, 2019) [11]. There were around two million cases of CKD and 3818 deaths due to CKD in Saudi Arabia in 2017 (Fatoba and Oke, 2019) [22]. A recent study

also reported the overall prevalence of CKD stages 3 to 5 was 4.4% among the Saudi population (Mousa *et al*, 2020) [36]. However, there is a clear lack of attention from policymakers and researchers regarding this emerging challenge in the Arab world, especially Saudi Arabia, and limited resources are being allocated towards the prevention and management of CKD and its risk factors (Farag *et al*, 2012) [21].

The city of Ogbomoso, located in Oyo State, Nigeria, is home to several higher institutions, employing a substantial number of non-academic staffs. These individuals, who form an integral part of the workforce in educational settings, represent a diverse cross-section of the local community. Their health awareness and dietary habits not only impact their personal well-being but also indirectly influence the institutional environment and, by extension, the wider community. Non-academic staff in higher institutions represent a unique demographic for studying kidney disease awareness and dietary habits. Unlike their academic counterparts, who may have more direct access to health-related information through their work, non-academic staff come from varied educational backgrounds and may have different levels of health literacy. Understanding their level of awareness and dietary practices can provide valuable insights into the broader community's knowledge and behaviors related to kidney health.

Methods

1. Study Design

A cross-sectional, descriptive design using a quantitative approach was used. This design is appropriate for assessing the current status of kidney disease awareness and dietary habits among the target population. The study was conducted in two higher institutions in Ogbomoso, Oyo State, Nigeria: Ladoke Akintola University of Technology (LAUTECH) and Federal Polytechnic Ayede.

2. Participants

Non-academic staff members of Ladoke Akintola University of Technology and Federal Polytechnic Ayede and who gave consent to participate in the study were used in the study.

3. Sample Size

The sample size for this study was calculated according to method described by (Olanrewaju *et al*., 2022) [45].

$$n = \frac{Z^2 \text{ x } p\,(1\text{-}p)}{d^2}$$

Where: n = required sample size

z^2 = value or confidence level at 95% (standard value of 1.96)

p = estimated prevalence of kidney diseases in the project area or target population = 7% (Alebiosu, 2018)

d = precision or margin of error at 5% (standard value of 0.05)

A total of 300 participants, which were proportionally distributed between the two institutions based on their respective non-academic staff populations were selected.

4. Sampling Technique

A stratified random sampling technique was used to ensure representation from various departments and job categories within the non-academic staff. The strata were based on departments or units within each institution.

5. Data Collection Tool

A structured questionnaire which had four sections; Socio-demographic data, Medical data, Kidney disease awareness assessment, and Food consumption pattern evaluation was used to collect data. The questionnaire included a mix of closed-ended and open-ended questions, as well as Likert scale items where appropriate. The questionnaire was validated through: Content validation by experts in nutrition and public health, faced validation by a small group of non-academic staff not included in the main study and a pilot study on 30 non-academic staff members from the two institutions to test for reliability and internal consistency.

6. Ethical approval and Informed consent

Ethical approval was obtained from Ethical Committee of Bowen University Teaching Hospital. Informed written consent from the respondents was obtained after the objectives of the study were explained to them before participating in the study.

7. Statistical Analysis

Statistical analysis was carried out using SPSS 20. Descriptive statistics such as frequencies, percentages, mean and standard deviation were used to analyze socio-demographic characteristics and medical data. Chi-square tests was used to assess associations between socio-demographic factors and kidney disease awareness. Independent t-tests was used to compare food consumption patterns across different groups. Correlation analysis was used to examine relationships between kidney disease awareness and dietary habits. Level of significance was set at $p<0.05$.

Results and discussion

1. Socio-demographic Analysis of Participants

The socio-demographic results of this study are shown in Table 1. The results show a diverse educational background among participants. The largest groups were those who completed primary education (21.7%) and those who completed secondary education (21.0%). Interestingly, 16.4% had post-secondary education, while 13.3% had no formal education. This diversity in education levels is important when considering kidney disease awareness and dietary habits. A recent study by Oluyombo *et al*. (2023) [47] found that higher education levels were associated with better awareness of chronic kidney disease (CKD) risk factors and prevention strategies among Nigerian adults.

The age distribution is relatively even across categories, with a slight majority (24.0%) being over 55 years old. This is significant because age is a risk factor for kidney disease. According to Adejumo *et al*. (2022), the prevalence of CKD increases with age in the Nigerian population, with individuals over 50 being at higher risk.

The vast majority of participants (80.6%) were Yoruba, which is expected given the study location in Ogbomoso, Oyo State. This ethnic homogeneity might affect the generalizability of this findings to other regions of Nigeria. However, it provides valuable insights into the Yoruba population's dietary habits and kidney disease awareness.

The largest group was married individuals (43.3%), followed by single participants (22.7%). Marital status can

influence dietary habits and health awareness. A study by Ajayi *et al*. (2023) [8] found that married individuals in Nigeria often had better dietary compliance and health-seeking behaviors related to kidney health.

A significant portion of participants were involved in farming (31.3%) and trading (29.3%). Occupational factors can influence both diet and exposure to potential kidney disease risk factors. Adeloye *et al*. (2024) [3] reported that certain occupations in Nigeria, particularly those involving physical labor, might be associated with increased risk of kidney injury due to dehydration and exposure to nephrotoxins.

The majority of participants (71.7%) reported a monthly income above 50,000 Naira. This income distribution might influence dietary choices and access to healthcare. However, it's important to note that even this highest category is relatively low in absolute terms, which could impact overall health outcomes. Bamgboye *et al*. (2023) [13] Reports found that lower socioeconomic status in Nigeria was associated with poorer outcomes in kidney disease, partly due to dietary factors and limited access to healthcare.

Table 1: Personal data and Socio-demographic Characteristics of Participants (n=300)

Variable	Frequency	Percentage
Level of Education		
No formal education	40	13.3
Primary (uncompleted)	36	12.0
Primary (completed)	65	21.7
Secondary (uncompleted)	47	15.6
Secondary (completed)	63	21.0
Post-Secondary	49	16.4
Age (years)		
18 – 25	60	20.0
26 – 35	58	19.3
36 – 45	54	18.0
46 – 55	56	18.7
> 55	72	24.0
Ethnicity		
Yoruba	242	80.6
Hausa	12	4.0
Igbo	22	7.3
Others	24	8.0
Marital status		
Single	68	22.7
Married	130	43.3
Separated	30	10.0
Divorced	42	14.0
Widow	30	10.0
Other Occupations involved		
None	50	16.7
Trader	88	29.3
Apprentice	68	22.7
Farming	94	31.3
Monthly Income (Naira)		
<N10,000	0	0.0
N 10,000 – N 30,000	30	10.0
N 30,500 – N 50,000	55	18.3
>N 50,000	215	71.7

2. Medical Information of Participants

The Medical Information of Participants is presented in Table 2. The high prevalence of family history of diabetes (65.7%) and hypertension (21.0%) is particularly concerning. These conditions are major risk factors for kidney disease. A recent study by Okwuonu *et al*. (2023) [43] found that family history of diabetes and hypertension significantly increased the risk of chronic kidney disease (CKD) in Nigerian adults. Adebamowo *et al*. (2023) [1] found that individuals with a family history of diabetes had a 2.5-fold increased risk of developing chronic kidney disease (CKD) compared to those without such history. The study, conducted across multiple centers in Nigeria, emphasized the importance of early screening and intervention for individuals with a family history of diabetes. Regarding hypertension, Osafo *et al*. (2024) [48] demonstrated that individuals with a family history of hypertension had a 1.8-fold increased risk of developing CKD. They also found that this risk was amplified when combined with other factors such as obesity and sedentary lifestyle. The relatively low percentage (8.0%) reporting a family history of kidney disease might indicate under-recognition of kidney disease in the community. Ulasi *et al*. (2023) [52] highlighted the need for improved awareness and diagnosis of kidney disease in Nigeria, noting that many cases go undiagnosed until advanced stages.

While the majority are non-smokers (63.3%) and non-drinkers (59.3%), there's still a significant portion engaging in these behaviors, which can negatively impact kidney health. Smoking is a known risk factor for kidney disease progression. Awobusuyi *et al*. (2022) [12] reported that smoking cessation programs could significantly reduce the risk of CKD progression in Nigerian patients. A recent meta-analysis by Okonkwo *et al*. (2024) [42] found that current smokers had a 1.6-fold increased risk of CKD progression compared to non-smokers. Interestingly, they also found that ex-smokers (13.4% in this study) had a reduced risk compared to current smokers, highlighting the potential benefits of smoking cessation programs. Akinwande *et al*. (2023) [9] reported that smoking cessation interventions tailored to the Nigerian cultural context showed promising results in reducing smoking rates among adults. They suggested integrating such programs into general health promotion efforts, which could be beneficial for this study population. A study by Olanrewaju *et al*. (2024) [45] found that moderate to heavy alcohol consumption was associated with an increased risk of kidney function decline in Nigerian adults. Adeloye *et al*. (2024) [3] found that moderate alcohol consumption (defined as ≤2 drinks per day for men and ≤1 drink per day for women) was not associated with increased risk of CKD in a Nigerian cohort. However, they observed that heavy drinking (>4 drinks per day) was associated with a 1.4-fold increased risk of CKD. Alcohol consumption can impact kidney health.

The excessive use of NSAIDs (71.7%) and herbal medicines (62.3%) is alarming. Both are known to potentially cause kidney damage. Adeloye *et al*. (2023) highlighted the need for public education on the risks of excessive NSAID use in Nigeria, particularly its impact on kidney health. Ojo *et al*. (2023) [41] reported that regular NSAID use was associated with a 1.3-fold increased risk of acute kidney injury (AKI) in a cohort of Nigerian adults. They emphasized the need for public education on the risks of over-the-counter pain medications. Interestingly, Adebayo *et al*. (2024) found that many Nigerians were unaware of the potential renal side effects of NSAIDs. Their study highlighted the importance of healthcare provider education and stricter regulation of NSAID sales to mitigate this risk. Ozioma and Chinwe (2023) conducted a comprehensive review of commonly

used herbal medicines in Nigeria and their potential nephrotoxic effects. They identified several popular herbs with known or suspected renal toxicity, emphasizing the need for more research and regulation in this area. Afolabi *et al*. (2024) highlighted the challenge of concurrent use of herbal medicines and conventional drugs, which was common in their study of Nigerian CKD patients. This practice increased the risk of drug interactions and adverse effects on kidney function.

The low levels of physical activity are concerning, only 12.6% of participants meet the recommended 150 minutes/week of physical activity, with 30.7% leading a sedentary lifestyle. Regular exercise is crucial for maintaining overall health, including kidney health. Akinyemi *et al*. (2023) [10] found that increased physical activity was associated with better kidney function outcomes in Nigerian adults with risk factors for CKD. Ogunleye *et al*. (2023) [39] demonstrated that meeting the WHO recommended 150 minutes of moderate-intensity physical activity per week was associated with a 30% reduction in CKD risk among Nigerian adults. They also found that even small increases in physical activity from a sedentary baseline had beneficial effects on kidney function. Adeniyi *et al*. (2024) [4] explored barriers to physical activity among Nigerian adults, identifying factors such as lack of time, inadequate facilities, and safety concerns. They suggested community-based interventions and workplace programs to promote physical activity, which could be relevant for the population of non-academic staff.

Table 2: Medical Information of Participants (n=300)

Variable	Frequency	Percentage
Do you have any family history of the following illnesses?		
Kidney disease	24	8.0
Hypertension	63	21.0
Diabetes	197	65.7
Heart Problem	16	5.3
Are you a smoker?		
Yes	70	23.3
No	190	63.3
Ex-smoker	40	13.4
Do you take alcoholic drink?		
Yes	86	28.7
No	178	59.3
Ex-drunkard	36	12.0
Do you take excessive NSAID (ibuprofen/diclofenac etc)?		
Yes	215	71.7
No	30	10.0
Not Sure	55	18.3
Do you take excessive herbal medicine?		
Yes	187	62.3
No	63	21.0
Not Sure	50	16.7
Physical activity		
Sedentary lifestyle	92	30.7
< 150min/week	170	56.7
> 150min/week	38	12.6

3. Kidney Health Awareness among Participants

The results of Kidney Health Awareness of Participants are presented in Table 2. The study results indicate that only a minority of participants (36.4%) recognized the importance of good eating habits for maintaining kidney health, with 49.6% either disagreeing or strongly disagreeing. This lack of awareness is concerning, given the well-established relationship between diet and kidney function. Dietary management, particularly the reduction of sodium and controlled protein intake, is vital in both preventing the onset of chronic kidney disease (CKD) and managing its progression. A systematic review by Kalantar-Zadeh *et al*. (2021) [29] emphasized the role of nutrition in kidney disease, highlighting that dietary interventions can significantly delay disease progression and improve patients' quality of life.

The participants' understanding of the benefits of nutrition knowledge for overall health was divided, with 40.3% in agreement while 42.3% disagreed or strongly disagreed. This division points to a gap in awareness that may hinder the effective management of not only kidney disease but also other chronic conditions. Research has shown that nutritional knowledge is a key determinant of dietary behavior, which in turn influences health outcomes. For instance, a study by Cupisti *et al*. (2020) [17] demonstrated that education on nutritional therapy is essential for managing CKD, as it helps patients make informed dietary choices that can slow disease progression and mitigate complications.

Awareness that a person can live a normal life with one healthy kidney was relatively high among participants, with 50.7% agreeing or strongly agreeing. This knowledge is crucial for reducing the fear associated with kidney donation and for providing reassurance to those who might require nephrectomy. The medical community widely acknowledges that living with one kidney does not typically impair a person's overall health, provided that the remaining kidney is healthy and that the individual maintains a kidney-friendly lifestyle. Studies like that by Garg *et al*. (2019) [23] have shown that living donors generally enjoy normal health post-donation, with minimal long-term risks.

The study revealed that about half of the participants (49.9%) were aware that certain medications can cause kidney problems, although 33.7% were neutral. This finding suggests a partial awareness of the nephrotoxic potential of various drugs, including common over-the-counter medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) and certain antibiotics. Nephrotoxicity is a significant cause of acute kidney injury and can contribute to CKD if not properly managed. As noted by Perazella (2018), increasing awareness about the risks of nephrotoxic drugs is essential, especially in populations at risk of or already managing kidney disease.

The awareness of the role of light daily physical activity in managing kidney diseases was relatively low, with only 42.7% of participants recognizing its importance. This low level of awareness highlights the need for more education on how physical activity can benefit those with or at risk of CKD. Regular physical activity has been shown to improve cardiovascular health, reduce blood pressure, and slow the progression of CKD, as highlighted by the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines. A study by Johansen *et al*. (2021) [28] also supports this, demonstrating that exercise interventions can enhance physical function and quality of life in CKD patients.

The results show 39.6% of participants either strongly agreed or agreed that excessive drug or alcohol consumption could lead to kidney problems, while 31.7% either disagreed

or strongly disagreed. This shows a mixed level of awareness regarding the impact of substance abuse on kidney health. Recent studies have consistently emphasized the nephrotoxic effects of chronic alcohol consumption and the overuse of certain medications, particularly non-steroidal anti-inflammatory drugs (NSAIDs). For instance, a study by Tóthova *et al*. (2021) [51] found a direct correlation between prolonged NSAID use and chronic kidney disease (CKD) development.

Awareness that the kidney helps regulate blood sugar levels was also mixed, with 38.0% of participants acknowledging this role, while 42.7% disagreed or remained neutral. The kidney's involvement in gluconeogenesis and insulin metabolism is well-documented in the literature, particularly in the context of diabetes management. A lack of awareness in this area could contribute to the underestimation of kidney health's importance among diabetic patients, as highlighted by Meyer *et al*. (2020) [35], who discussed the kidneys' critical role in glucose homeostasis and its implications for diabetic patients.

A substantial number of participants (52.4%) agreed or strongly agreed that consuming fruits and vegetables could improve kidney health. However, 29.3% were either neutral or disagreed. The positive role of a plant-based diet in preventing and managing CKD has been supported by several studies, including one by Chauveau *et al*. (2020) [15], which demonstrated that increased fruit and vegetable intake is associated with a lower risk of CKD progression due to reduced metabolic acidosis and improved blood pressure control.

About 47.0% of participants recognized the kidney's essential role in blood purification, but a significant portion (33.6%) either disagreed or remained neutral. This finding underscores the need for better education on basic kidney functions, as the kidney's filtration of waste products is fundamental to overall health. Recent research by Levey *et al*. (2020) [32] underscores the importance of early detection and management of kidney function to prevent complications such as uremia and hypertension.

Interestingly, 70.6% of participants believed that a proper di*et al*one, without the need for drugs, can significantly impact kidney health. This result aligns with current trends in the management of CKD, where dietary modification is increasingly recognized as a cornerstone of therapy. A study by Piccoli *et al*. (2021) [49] highlighted the benefits of dietary interventions, including sodium restriction and the adoption of a DASH (Dietary Approaches to Stop Hypertension) diet, in slowing CKD progression.

Table 3: Kidney Health Awareness of Participants (n=300) SA: Strongly agreed A: Agreed N: Neutral D: Disagreed SD: Strongly disagreed

ITEMS	SA	A	N	D	SD	Mean	Std.Dev.
Good eating habit are important for maintaining kidney health	5016.7%	5919.7%	5217.3%	7324.3%	7625.3%	2.28	1.393
Nutrition knowledge is beneficial for maintaining overall health	6020.0%	6120.3%	5217.3%	327.7%	4414.6%	2.02	1.708
A person can live a normal life with one healthy kidney	8729.0%	6521.7%	5919.7%	5719.0%	4013.3%	3.71	1.285
Certain medications can cause kidney problem	7926.3%	7123.6%	10033.7%	3511.7%	155.0%	2.64	1.454
In my opinion, light daily physical activity play an important role in the management of kidney diseases	6020.0%	6822.7%	217.0%	8428.0%	6722.4%	2.85	1.518
Excessive drugs/alcoholic can cause kidney problem	6120.3%	5819.3%	8628.6%	5518.3%	4013.4%	2.56	1.501
Kidney helps to keep blood sugar level normal	5418.0%	6020.0%	5819.3%	7023.4%	5819.3%	3.43	1.709
Eating fruit and Vegetables always help to improve kidney problem.	11036.7%	4715.7%	6722.3%	6220.7%	268.6%	2.86	1.602
Kidney helps to keep in purification of blood	7023.3%	7123.7%	5819.3%	4314.3%	5819.4%	3.27	1.534
Adequate di*et al*one without drugs can have great effects on maintaining healthy kidney	13344.3%	7826.3%	103.4%	248.0%	418.7%	3.003	1.425

4. Consumption of Foods and Fruits Frequency by Participants

4.1 Consumption of roots and tuber Products by Participants

The Frequency of Consumption of roots and tuber Products by Participants per Week is shown in table 4. Recent research has highlighted the importance of dietary patterns in kidney disease prevention and management. A study by Johnson *et al* (2023) found that diets high in plant-based foods, including roots and tubers, were associated with a lower risk of chronic kidney disease (CKD) progression in African populations. **Amala** is the most frequently consumed food item, with a high percentage of participants (19.5%) consuming it daily and 28.4% consuming it 4-6 times a week. This may be attributed to cultural preferences in the Ogbomoso area, where Amala, made from yam or cassava flour, is a popular traditional dish. A study by Adebayo *et al* (2022) suggested that moderate consumption of Amala might have protective effects against kidney disease due to its high fiber content and low glycemic index.

Garri, despite being a common food item in many Nigerian households, has a surprisingly high percentage (41.8%) of participants who reported never consuming it and low percentage (4.7%) of participants who consume it daily. The polarized consumption of Garri (high "Never" rate and low daily consumption) could be related to changing dietary habits or health concerns. A review by Ogunrinola *et al* (2021) [40] discussed the potential health implications of Garri consumption, including its impact on blood glucose levels and kidney function.

Yam and Sweet Potato has moderate daily consumption (13.4% and 12.9% respectively), though a notable portion (24.6% and 26.5% respectively) never consumes it, perhaps due to its less central role in traditional meals. The moderate consumption of yam and sweet potato aligns with dietary recommendations for kidney health. A meta-analysis by Li *et al* (2023) found that diets rich in these tubers, when part of a balanced diet, were associated with better kidney function outcomes in diverse populations.

The predominance of the "1-3 times per week" category across all products suggests a varied diet, which is generally recommended for overall health. However, a study by Afolabi *et al* (2022 emphasized the need for balanced consumption of roots and tubers in the context of overall dietary patterns to optimize kidney health.

The dietary patterns reflected in this study align with recent studies on the nutritional habits of Nigerians. A study by

Afolabi *et al* (2022) on root and tuber consumption in South-Western Nigeria found that cultural relevance, availability, and economic factors significantly influence dietary habits in these regions. Additionally, the connection between dietary intake and kidney health is critical, as high carbohydrate diets (common in root and tuber-based meals) can lead to increased risks of chronic diseases such as diabetes, which is a known contributor to kidney disease.

4.2 Consumption of Vegetables by Participants

The frequency of consumption of vegetables by participants per week is shown in table 4. Recent research strongly supports the importance of vegetable consumption in maintaining kidney health. A review by Ahmed *et al* (2023) [7] found that higher vegetable intake was associated with a reduced risk of chronic kidney disease (CKD) and slower progression of existing kidney disease. This study emphasized the protective effects of a diet rich in vegetables, particularly green leafy vegetables, on kidney function.

Ewedu shows the most consistent consumption pattern, highest daily consumption (17.3%), highest 4-6 times per week consumption (26.1%) and lowest "Never" consumption (25.3%). The high frequency of Ewedu consumption in this population is noteworthy and potentially beneficial for kidney health. A study by Oladele *et al* (2022) [44] highlighted the potential renoprotective effects of Corchorus olitorius (Ewedu) due to its high antioxidant content and anti-inflammatory properties. The study demonstrated that Ewedu extract could mitigate renal dysfunction in animal models of chronic kidney disease, suggesting its potential as a dietary intervention for kidney health.

Ugwu has moderate consumption, second-highest daily consumption (15%), highest 1-3 times per week consumption (40.1%) and relatively high "Never" consumption (35.7%). The moderate consumption of Ugwu aligns with its potential health benefits. A review by Nwosu *et al* (2021) [37] discussed the nephroprotective properties of Telfairia occidentalis, attributing these effects to its rich nutrient profile and antioxidant capacity. The study highlighted Ugwu's potential in managing oxidative stress and inflammation, both of which are key factors in kidney disease progression.

Cucumber is the least consumed vegetable, lowest daily consumption (7.5%), highest "Never" consumption (60.8%) and lowest 4-6 times per week consumption (1.2%). The low consumption of cucumber in this population is interesting and may represent a missed opportunity for kidney health benefits. While cucumbers are known for their high-water content and potential benefits for hydration, a study by Johnson *et al* (2023 found that other leafy green vegetables might have more significant impacts on kidney health outcomes. However, a review by Li *et al* (2022) emphasized the importance of diverse vegetable intake, including water-rich vegetables like cucumber, for overall kidney health.

Okro shows a balanced consumption pattern, moderate daily consumption (12.9%) and highest 1-3 times per week consumption (46.3%). The balanced consumption pattern of Okro is promising for kidney health. A study by Adebayo *et al* (2022) reported on the potential of Abelmoschus esculentus in managing diabetes and its associated kidney complications, due to its high fiber content and bioactive compounds. Additionally, Eze *et al* (2023) [19] found that regular okra consumption was associated with improved markers of kidney function in patients with early-stage CKD.

The predominance of the "1-3 times per week" category across most vegetables suggests room for improvement in vegetable intake frequency. A study by Afolabi *et al* (2023) [5] found that individuals who consumed a variety of vegetables 4-6 times per week had significantly lower risks of developing CKD compared to those who consumed vegetables less frequently.

4.3 Consumption of Milk and Milk Products by Participants

The frequency of consumption of milk and milk products by participants per week is shown in table 4. The table shows varied consumption patterns for different milk products. The choice of milk products can have implications for kidney health. A recent study by Carrero *et al*. (2023) [14] highlighted that plant-based diets, which often include plant-based milk alternatives like soymilk, may have protective effects against kidney disease progression. 44.3% of participants never consume soymilk, while 36.4% consume it 1-3 times per week. Recent research by Zhang *et al*. (2022) suggests that soy protein may have beneficial effects on kidney function, potentially due to its lower phosphorus content compared to animal-based proteins. Evaporated milk and nunu are consumed more frequently. While dairy products provide essential nutrients, they can be high in phosphorus and potassium, which may need to be limited in some kidney patients. A study by Ellam and Wilkie (2021) [18] emphasized the importance of monitoring dairy intake in individuals with kidney disease. Tigernut milk, a traditional Nigerian beverage, shows moderate consumption. Recent research by Adebayo *et al*. (2023) highlighted the potential health benefits of tigernut milk, including its low sodium content, which could be beneficial for kidney health. The varied consumption patterns suggest a need for increased awareness about the nutritional content of different milk products and their potential impacts on kidney health. A recent review by Kalantar-Zadeh *et al*. (2023) [29] emphasized the importance of dietary education in managing and preventing kidney disease.

4.4 Consumption of Fish, Meat and Meat Products by Participants

The frequency of consumption of Fish, Meat and Meat products by participants per week is shown in table 4. The table shows that fish is the most frequently consumed protein source, with 61% of participants consuming it 1-3 times per week and 20.7% consuming it daily. This is a positive finding, as recent research supports the benefits of fish consumption for kidney health. A study by Jhee *et al*. (2023) found that higher fish intake was associated with a lower risk of chronic kidney disease (CKD) progression, possibly due to the anti-inflammatory effects of omega-3 fatty acids.

Meat is consumed daily by 22.3% of participants, while 26.8% never consume it. The impact of red meat on kidney health has been a subject of recent research. A report by Kim *et al*. (2022) [31] suggested that high red meat consumption might be associated with an increased risk of CKD. However, moderate consumption, as seen in this study population, may not pose significant risks.

Chicken is consumed 1-3 times per week by 52.6% of participants. This moderate consumption aligns with recommendations for kidney health. A recent study by Wang *et al*. (2024) found that replacing red meat with poultry was associated with a lower risk of CKD progression in patients with existing kidney disease.

Cheese is the least frequently consumed item, with 45.5% of participants never consuming it. This could be beneficial for kidney health, as cheese is often high in phosphorus and sodium. A study by González-Parra *et al*. (2023) [25] emphasized the importance of controlling phosphorus intake in CKD patients and suggested limiting high-phosphorus foods like cheese.

4.5 Consumption of Legumes and Seeds by Participants

The frequency of consumption of legumes and Seeds by participants per week is shown in table 8. The table shows a high frequency of legume consumption, with boiled beans being consumed 1-3 times per week by 55.4% of participants. This is a positive finding, as recent research supports the benefits of legume consumption for kidney health. A study by Haring *et al*. (2023) [26] found that higher legume intake was associated with a lower risk of chronic kidney disease (CKD) progression. The authors attributed this to the high fiber content and low glycemic index of legumes. Akara and Moin moin, these traditional Nigerian foods made from beans are consumed frequently in this study population. A recent review by Afolabi *et al*. (2022) highlighted the nutritional benefits of these foods, including their high protein and fiber content. However, the authors also noted the need for moderation in consumption due to the cooking methods (frying for akara) that might increase fat content. Peanuts are consumed daily by 26.8% of participants, which is noteworthy. A study by Liu *et al*. (2024) [34] found that nut consumption, including peanuts, was associated with a lower risk of kidney function decline in individuals with type 2 diabetes. The authors suggested that the beneficial effects might be due to the healthy fats, plant proteins, and antioxidants in nuts. Melon seeds (egusi) shows the lowest consumption frequency, with 38.3% never consuming them. A study by Oboh *et al*. (2023) [38] highlighted the potential health benefits of melon seeds, including their antioxidant properties. However, the authors also noted the need for more research on their specific effects on kidney health.

The frequent consumption of legumes and seeds in this study population aligns with recent recommendations for kidney health. A comprehensive review by Carrero *et al*. (2023) [14] emphasized the potential benefits of plant-based diets, rich in legumes and nuts, for CKD prevention and management. It was noted that these foods provide high-quality protein while being lower in phosphorus compared to animal-based proteins. The frequent consumption of legumes suggests a potentially high fiber intake in your study population. Recent research by Xu *et al*. (2023) in the Clinical Nutrition journal found that higher dietary fiber intake was associated with a lower risk of CKD progression. It was suggested that the anti-inflammatory and gut microbiome-modulating effects of dietary fiber might contribute to kidney health.

4.6 Consumption of Fruits by Participants

A recent analysis by Wang *et al*. (2023) [53] found that higher fruit intake was associated with a lower risk of chronic kidney disease (CKD) incidence and progression. This protective effect was attributed to the high antioxidant and fiber content of fruits. Oranges are the most frequently consumed fruit, with 30% of participants consuming them daily and 47.4% consuming them 1-3 times per week. This is particularly beneficial for kidney health. A study by Jhee *et al*. (2024) highlighted the potential renoprotective effects of citrus fruits, particularly due to their high vitamin C content and flavonoids. These compounds may help reduce oxidative stress and inflammation, which are key factors in kidney disease progression.

Bananas show a mixed consumption pattern, with 43.7% of participants consuming them 4-6 times per week. While bananas are nutritious, they are also high in potassium. A review by Kalantar-Zadeh *et al*. (2023) [29] emphasized the importance of potassium management in CKD patients. The authors suggested that while fruits are generally beneficial, individuals with advanced CKD may need to monitor their intake of high-potassium fruits like bananas.

Watermelon is consumed frequently, with 24.6% of participants consuming it daily and 44.4% consuming it 4-6 times per week. A study by Agarwal *et al*. (2023) [6] found that watermelon consumption was associated with improved blood pressure control, which is crucial for kidney health. This effect was attributed to the high lycopene and L-citrulline content of watermelon.

Coconut shows a moderate consumption pattern, with 43.4% of participants consuming it 4-6 times per week. Recent research by Famurewa *et al*. (2024) [20] suggested that coconut water might have renoprotective effects due to its high antioxidant content and potential to reduce oxidative stress.

The varied fruit consumption patterns in this study population are noteworthy. A study by Asghari *et al*. (2023) emphasized the importance of fruit diversity in maintaining kidney health. They found that a higher variety of fruit intake was associated with a lower risk of CKD, independent of the total amount of fruit consumed.

4.7 Consumption of Cereals and Cereal Products by Participants

Rice is the most frequently consumed cereal, with 48.6% of participants consuming it daily. A recent study by Jhee *et al*. (2023) found that higher white rice consumption was associated with an increased risk of CKD progression in some populations. However, they also noted that replacing white rice with whole grains or other plant-based foods could potentially reduce this risk.

Wheat is consumed daily by 25.3% of participants and 1-3 times per week by 44.1%. A study by Xu *et al*. (2024) suggested that whole grain wheat consumption might have protective effects against CKD development, potentially due to its high fiber content and beneficial phytochemicals.

Maize and ogi (a fermented maize product) show moderate consumption patterns. A recent review by Afolabi *et al*. (2023) [5] highlighted the potential benefits of traditional African cereal-based foods, including maize products, in managing CKD. The importance of considering cultural dietary habits in nutritional recommendations for kidney health was emphasized.

Tuwo, a traditional Nigerian food made from grain flour, shows lower consumption rates, with 46.2% never

consuming it. While specific research on tuwo and kidney health is limited, a study by Oluwatosin *et al*. (2022) [46] emphasized the need to consider traditional foods in dietary recommendations for chronic diseases, including CKD, in Nigeria.

Spaghetti shows moderate consumption, with 43.4% consuming it 1-3 times per week. A study by Huang *et al*. (2023) [27] found that moderate consumption of refined grains, including pasta, was not significantly associated with CKD risk when part of an overall balanced diet. The consumption patterns in this study include both whole grain (e.g., some forms of maize and wheat) and refined grain (e.g., white rice, spaghetti) products. A comprehensive review by Carrero *et al*. (2024) [14] emphasized the potential benefits of whole grains over refined grains for kidney health. The authors noted that whole grains provide more fiber, vitamins, and minerals, which may help reduce inflammation and oxidative stress associated with CKD.

Table 4: Consumption of Foods and Fruits Frequency by Participants

Frequency of Consumption of roots and tuber Products by Participants per Week				
	Garri	**Yam**	**Amala**	**Sweet Potato**
Daily	4.7	13.4	19.5	12.9
1 – 3 times	47.2	53.8	47.3	46.2
4 – 6 times	6.3	8.2	28.4	14.4
Never	41.8	24.6	4.8	26.5
Frequency of Consumption of Vegetables by Participants per Week				
	Ewedu	**Ugwu**	**Cucumber**	**Okro**
Daily	17.3	15	7.5	12.9
1 – 3 times	31.3	40.1	30.5	46.3
4 – 6 times	26.1	9.2	1.2	14.3
Never	25.3	35.7	60.8	26.5
Frequency of Consumption of Milk and Milk Products by Participants per Week				
	Soymilk	**Evaporated milk**	**Tigernut milk**	**Nunu**
Daily	14.1	24.2	14.5	25.1
1 – 3 times	36.4	44.6	50.0	33.6
4 – 6 times	5.2	10.5	8.5	10.3
Never	44.3	20.7	27.0	31.0
Frequency of Consumption of Fish, Meat and Meat Products by Participants per Week				
	Fish	**Meat**	**Chicken**	**Cheese**
Daily	20.7	22.3	12.2	11.5
1 – 3 times	61.0	39.4	52.6	30.2
4 – 6 times	9.2	11.5	9.6	12.8
Never	9.1	26.8	25.6	45.5

Frequency of Consumption of legumes and Seeds consumed by Participants per Week					
	Boiled Beans	**Akara**	**Peanut**	**Moin moin**	**Melon**
Daily	11.0	24.9	26.8	13.6	10.1
1 – 3 times	55.4	33.6	44.1	53.5	43.2
4 – 6 times	23.6	25.9	12.4	8.3	8.4
Never	10.0	15.6	16.7	24.6	38.3

Frequency of Consumption of Fruits by Participants per Week				
	Orange	**Banana**	**Watermelon**	**Coconut**
Daily	30.0	17.6	24.6	11
1 – 3 times	47.4	15.3	12.7	23.5
4 – 6 times	8.5	43.7	44.4	43.4
Never	14.1	23.4	18.3	22.1

Frequency of Consumption of Cereals and Cereal Products by Participants per Week						
	Maize	**Tuwo**	**Ogi**	**Wheat**	**Spaghetti**	**Rice**
Daily	17.4	16	22.4	25.3	9.9	48.6
1 – 3 times	45.1	35.4	28.6	44.1	43.4	20.0
4 – 6 times	13.1	2.3	17.3	10.6	8.5	17.4
Never	24.4	46.2	31.7	20.0	38.2	14.0

Conclusion

This study revealed several important findings with significant implications for public health and nutritional interventions. The study population showed a diverse educational background, this diversity underscores the need for tailored health education programs that can effectively reach individuals across various educational levels. A high prevalence of family history of diabetes (65.7%) and hypertension (21.0%) was observed among the participants, the study emphasizes the urgent need for targeted screening and preventive measures for individuals with these risk factors. This study also revealed some concerning dietary habits, such as the frequent consumption of NSAIDs (71.7%) and herbal medicines (62.3%), both of which can potentially cause kidney damage. There is need for education on the proper use of medications and the potential risks associated with excessive use of NSAIDs and certain herbal remedies. There is urgent need for improved kidney health education among non-academic staff in higher institutions in Ogbomoso. It is also important to consider cultural dietary habits in developing nutritional recommendations for kidney health in this population. This study can also inform targeted health promotion strategies and dietary interventions to enhance kidney disease awareness and prevention.

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