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Research Article

Prevalence, Incidence and Perceived Predisposition to Kidney Disease among Nigerian Population Resident in Lagos State, Nigeria: A Community-based Cross-sectional Study

***Akokuwebe M.E. and Idemudia E.S.**

North-West University Faculty of Humanities, Mafikeng Campus, South Africa

ABSTRACT

Kidney disease (KD) development or progression is poorly characterized, and little is known about perceived predisposition to KD in Nigeria. This study aimed to determine the prevalence, incidence and perceived predisposition to KD among Nigerians with/without knowledge of kidney ailments, resident in Lagos State. A cross-sectional study of 1,757 respondents was recruited from the general population in Lagos State, Nigeria. Following informed consent, a questionnaire was used to gather demographic, lifestyle practices, and perceived predisposition to KD. Morbidity details of diagnosed kidney victims were also collected. Data were analyzed using SPSS version 22.0. A total of 1,757 respondents were studied, mean age of 33.83±11.54 (18-85+ years). Males comprised 932 (53.0%) while 825 (47.0%) were females. The frequency of lifestyle risk factors of KD observed were regular use of herbal drink in 816 (46.4%), chronic alcohol ingestion in 584 (33.2%), habitual use of herbal supplement in 471 (26.8%) and frequent consumption of grain foods in 1437 (81.8%) subjects. Respondents with knowledge of KD had lower perceived predisposition (83.2%) than their counterparts without knowledge of KD, while prevalence (1.9%) and incidence (0.3%) of KD was demonstrated respectively. Age group ($p=0.014$), cigarette smoking ($p=0.02$) and food groups (grain and junk foods) ($p<0.05$) were true predictors of respondents' perceived predisposition to KD. Respondents with knowledge of KD as well as its risk factors have low perceived predisposition in this study. There is urgent need for continuous health campaigns to raise awareness for KD prevention strategy, early intervention of lifestyles modification and to promote regular screening for early detection of KD ailments.

Keywords: *Kidney diseases, lifestyle practices, perceived predisposition, prevalence, incidence*.

*Author for correspondence: Email: *me.akokuwebenwupostdoctoral2021@gmail.com; Tel: +27671014444*

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INTRODUCTION

Kidney diseases (KDs) are a growing worldwide epidemic, which has become a major health concern with increasing prevalence and incidence of the disease, especially in developing countries, Nigeria inclusive. In sub-Saharan Africa, it has a marked burden owing to the rising prevalence of risk factors in relation to lifestyles, biomedical and demographics. It has a major impact on healthcare costs and economic productivity mostly in low-income countries where young people are mostly victims of kidney ailments (Odubanjo *et al*., 2011; Ulasi *et al*., 2013; Oluyombo *et al*., 2016). In Nigeria, several hospital-based studies have shown prevalence of chronic kidney disease (CKD) between 1.6–12.4% (Odubanjo *et al*., 2011; Ulasi *et al*., 2013; Oluyombo *et al*., 2016; Nalado *et al*., 2012; Okaka *et al*., 2013; Egbi *et al*., 2014; Afolabi *et al*., 2009), associated with risk factors observed among different groups in various studies (Nalado *et al*., 2012; Okaka *et al*., 2013; Egbi *et al*., 2014). Hypertension and diabetes are the most common risk factors for CKD, with even mild forms of these conditions conferring several-fold increased risks of CKD incidence or progression (Afolabi *et al*., 2009; Ulasi *et al*., 2010; Ogah *et al*., 2012; Wachukwu *et al*., 2015). Intensified awareness of the growing health burden of KD and early detection combined with an adequate management of diagnosed patients are the best strategies to fight this disease. Educational campaigns and awareness will enhance the general population and healthcare givers adequate knowledge of KD as an important medical condition (Boulware *et al*., 2009; Amoako *et al*., 2014; Seek *et al*., 2014). These health campaigns will target persons at greater risk for KD development or progression with risk-inducing lifestyles or biomedical risk factors (Ulasi *et al*., 2013; Okwuonu *et al*., 2017; Bisi-Onyemaechi *et al*., 2019).

Health and awareness campaigns ultimately hope to facilitate the general population's adherence to behavioural

modifications that will help to control and prevent KD risk factors and decrease their risks for KD development or progression. People's perceptions of their risks for KD development or progression relative to their risks of developing other chronic illnesses are poorly characterized, and ignored. However, factors predicting individual's perceived predisposition to KD development or progression have not been well studied in Nigeria (Boulware *et al*., 2009; Akokuwebe, 2017). In addition, little evidence exists to link people's perceived susceptibility to KD with lifestyles practices. Characterizing people's perceived susceptibility to KD and predictors of inaccurate predisposition could aid efforts to thwart KD development or progression in high-risk populace. The aim of this study was to determine the prevalence, incidence and perceived predisposition to KD among Nigerians residing in Lagos State Nigeria, for early intervention in KD risk factors modification for prevention and delay of KD progression.

MATERIALS AND METHODS

Study design: This was a community-based cross-sectional survey in Lagos State (South-west region of Nigeria). All individuals aged 18 years or more and are Nigerians living in Lagos State at least 5 years were eligible to participate in the study.

Sampling procedure: A combination of multi-stage, stratified and equal sampling methods were used to select a representative sample of adults living in urban and rural local government areas of Lagos State. We firstly selected 8 local government areas as clusters (6 urban local government areas and 2 rural local government areas). The 6 urban local government areas include Agege, Ajeromi-Ifelodun, Lagos Island, Lagos Mainland, Kosofe and Shomolu; while the two rural local government areas include Epe and Ikorodu respectively. Then we randomly took a number of households proportionally to population size of each locality from the complete list of the 2006 enumeration areas (EAs) of Lagos State which was obtained in local government areas (data available from the Nigeria – Population and Housing Census 2006). From each household a maximum of two participants who were household heads were recruited. Considering an error of 5% and a power (1-beta) of 80%, a sample size of 39% was used to determine a total of 1800 households to get a final sample of respondents for the community household survey. Sampled participants from the community survey were grouped into three – Group 1 (those who have knowledge of KD); Group 2 (participants who have no knowledge of KD); and Group 3 (participants who have knowledge of KD and reported to have been diagnosed with KD).

Data collection: Data were collected on-site during house-to-house visits that were conducted between 7a.m. and 1p.m or at the nearest available open places where the respondents did not live far away from their homes. A modified version of the KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease and KDIGO 2017 Clinical Practice Guideline on the Prevention, Diagnosis, Evaluation, and Treatment of Hepatitis C in CKD questionnaire was pretested and validated before its use to collect data. Thus, the principal investigators and the assistant researchers assisted by community health workers had to fill the data collection form, to document the socio-demographic status (age, sex, ethnic group, marital status, education, religion, employment and income status), lifestyle practices (physical activity, use of medicines without medics, cigarette smoking, alcohol consumption, sedentary lifestyles, use of pain relievers and nutritional habits), and personal health history (regarding particularly hypertension, diabetes, overweight, obese, heart problems and kidney disease) of each participant.

History of nephrotoxic drinks and medicines (traditional herb drink (agbo) and herbal supplements) was also assessed. Personal health history such as overweight, obesity, hypertension, diabetes, heart problems and kidney disease were self-reported history by the respondents during the survey. Similarly, physical inactivity was self-reported history by respondents owing to their non-engagement in less than 30 minutes of moderate activity per week or less than 20 minutes of vigorous activity three times per week, or the equivalent. Kidney disease ailments were self-reported history by respondents with clinical proof of being diagnosed with the disease by health practitioners (nephrologists).

Variable measurement: This study therefore, adapted Rosenstock *et al*. (1994), Ronis (1992), Unger *et al*. (2001) and Gunther *et al*. (2006) behavioural scale measurements and respondents' perceived predisposition to KD, were assessed via in-person through questionnaire by assessing respondents' perceived predisposition towards developing "kidney ailments" given their present lifestyle practices. To assess respondents' perceived predisposition, we asked the respondents, "Given your present lifestyles, how do you perceive your predisposition to KD and its ailments?" Answers could be "low", "moderate" and "high". Similarly, other perception questions centred on KD were used to assess the respondents' perceived predisposition with a total score of 157 based on the mean score (42) and median score (101) from their responses. Respondents with 1– 42 scores were assigned low perceived predisposition; while those that scored between 43 and the median score (101) were assigned moderate perceived predisposition; and those that scored 102 and 157 were assigned high perceived predisposition. Also, morbidity were measured as prevalence rate (proportion of persons in a population having a disease at a specified point in time) and incidence rate (number of new cases of disease during specified time interval). In this study, incidence and point prevalence were calculated to include new and pre-existing self-reported cases of KD during the time of the survey. Notably, samples can be generalized to be a population because of its representativeness of the sample from the population (National Population Commission, 2014).

Data analysis: Data was entered into Microsoft Excel 2007 and statistical analyses were performed with Statistical Package for the Social Sciences (SPSS) statistics 21.0 (IBM Corp, CHI, USA). We performed descriptive analysis (mean ± standard deviation, median, ratio and percentages) to report respondents' demographic characteristics. Perceived

predisposition regarding KD given their present lifestyles and measures of morbidity rates (point prevalence and incidence) were calculated and presented in bar charts generated with Microsoft excel. We used the logistics regression odds ratio to assess lifestyle practices for respondents with KD knowledge, respondents with no KD knowledge as well as respondents with KD knowledge plus self-reported history of KD diagnosis. We performed multinomial logistic regression to assess the independent relation of each respondent's characteristics (demographic, lifestyle practices and poor eating habits) with low perceived predisposition to KD as the base outcome.

Ethical statement: The study was approved by the University of Ibadan Social Sciences and Humanities Research Ethics Committee (SSHEC). A free consent form had to be signed by participants to give their approval before data collection. Respondents who reported severe or showed signs and symptoms relating to KD or other chronic illnesses were referred to Lagos General Hospitals within their location of residence for medical counselling, examination and treatment.

RESULTS

Demographic characteristics of respondents: A total of 1,757 respondents completed the study; the remaining 43 respondents who took part in the study did not complete either their questionnaire or investigations and were excluded from the analysis. The basic demographic characteristics of the respondents were presented in Table 1. The mean age of the respondents was 33.8±11.54 years with a range of 18 to 85+ years and the median age was 34.0 years. The mean ages of Group 1 respondents who have KD knowledge (33.5±11.1 years) and Group 2 respondents who have no KD knowledge (34.4±12.4 years) were similar. Male gender constitutes 932 (53.0%) with Male: Female ratio of 1:1. Also, majority of the study population 591 (33.6%) were between 30 years and 39 years while 496 (28.2%) were 40 years and more. A large proportion of the respondents were from Yoruba ethnic group (54.6%), were single (56.2%) and of Christian faith (72.6%). One thousand seven hundred and eleven (97.4%) were educated, 74.9% were employed with high income status (42.3%) and residents of urban setting (75.1%).

Table 1:
Characteristics of study respondents (Data are expressed as mean±standard deviation, ratio, number, percentage and Chi-square)

Variable		Respondents with KD knowledge n (%), n = 1171	Respondents without KD knowledge n (%), n = 586	Total population N(%), N = 1757	χ^2	p value
Mean age±SD		33.5±11.1	34.4±12.4	33.8±11.5		
Median age		34.0	34.0	34.0		
Male: Female		1:1.2	1:1.1	1.1.1		
Gender	Male	627(53.5)	305 (52.0)	932(53.0)	0.351	0.554
	Female	544 (46.5)	281 (48.0)	825 (47.0)		
Age (years)	< 20	152 (13.0)	70 (11.9)	222 (12.6)	0.989	0.804
	20-29	296 (25.3)	152 (25.9)	448 (25.5)		
	30-39	399 (34.1)	192 (32.8)	591 (33.6)		
	40^+	324 (27.7)	172 (29.4)	496 (28.2)		
Educational status	Non-educated	11 (0.9)	35 (6.0)	46 (2.6)	36.81	0.000*
	Educated	1160 (99.1)	551 (94.0)	1711(97.4)		
Marital status	Single	694 (59.3)	293 (50.0)	987 (56.2)	20.33	0.000*
	Married	431 (36.8)	247 (42.2)	678 (38.6)		
	Previously married	46 (3.9)	46 (7.8)	92 (5.2)		
Ethnic group	Yoruba	663 (56.6)	296 (50.5)	959 (54.6)	42.59	0.000*
	Igbo	315 (26.9)	168 (32.1)	503 (28.6)		
	Hausa	54 (4.6)	65 (11.1)	119 (6.8)		
	Others	139 (11.9)	37 (6.3)	176 (10.0)		
Religion	Christian	893 (76.2)	384 (65.5)	1276(72.6)	22.29	0.000*
	Muslim	250 (21.3)	180 (30.7)	430 (24.5)		
	Traditionalist	29 (2.5)	22 93.8)	51 (2.9)		
Employment status	Not working	296 (25.3)	145 (24.7)	441 (25.1)	0.059	0.808
	Working	875 (74.7)	441 (75.3)	1316(74.9)		
Monthly income	Low	316 (27.0)	266 (45.4)	582 (33.1)	93.60	0.000*
	Middle	269 (23.0)	163 (27.8)	432 (24.6)		
	High	586 (50.0)	157 (26.8)	743 (42.3)		
Setting	Urban	864 (73.8)	456 (77.8)	1320 (75.1)	3.39	0.000*
	Rural	307 (26.2)	130 (22.2)	437 (24.9)		
Perceived susceptibility	Low	974 (83.2)	104 (17.7)	1078 (61.4)	730.22	0.000*
	Moderate	152 (13.0)	269 (45.9)	421 (24.0)		
	High	45 (3.8)	213 (36.3)	258 (14.6)		

**p-value is significant at 0.05.*

For the two groups of respondents (Group 1 and Group 2), perceived predisposition was found to be significantly associated with KD knowledge (p<0.05) (Table 1).

Frequency of lifestyle practices (modifiable risk factors) for KD: The commonest lifestyle practices were high in grain foods (81.8%), physical inactivity (70.0%), regular use of traditional herb drink (agbo) (46.4%), chronic alcohol ingestion (33.2%), regular use of medicines (28.6%) as well as habitual herbal supplement consumption (26.8%), and excessive cigarette smoking (11.5%) (Table 2). The main predictors of KD included habitual herbal supplement consumption (adjusted odds ratio = 1.4; confidence interval: 1.10–1.74; p = 0.006), physical inactivity (adjusted odds ratio = 3.5; confidence interval: 2.80–4.29; p = 0.000), high in grain foods (adjusted odds ratio = 1.3; confidence interval: 1.06–1.67; p = 0.014) and high in fast food (adjusted odds ratio = 1.4; confidence interval: 1.11–1.68; p = 0.003) (Table 2).

Perceived susceptibility to KD: In Group 1, respondents who had KD knowledge were found to have low perceived predisposition to KD ailments (83.2%), while in Group 2, respondents with no knowledge of KD were found to have moderate perceived predisposition to KD ailments, respectively (45.9%). The perceived predisposition for Group 1 and Group 2 are shown in Figure 1 below:

Table 2:
Determination of lifestyle practices for kidney diseases among the study respondents (univariate analysis)

Variable		Respondents with KD knowledge n(%), n = 1171	Respondents without KD knowledge n(%), n = 586	Total population N(%), N = 1757	OR (Odds Ratio)	95% CI	p value
Daily activities	Yes	296 (25.3)	145 (24.7)	441 (25.1)	0.97	0.77–1.22	0.808
	No	875 (74.7)	441 (73.3)	1316 (74.9)	RC		
Use of medicines	Yes	300 (25.6)	203 (34.6)	503 (28.6)	0.65	0.52–0.81	0.000*
	No	871 (74.4)	383 (65.4)	1254 (71.4)	RC		
No prescription (medicine)	Yes	16 (1.4)	9 (1.5)	310 (17.6)	0.89	0.39–2.02	0.777
	No	1155 (98.6)	577 (98.5)	1447 (82.4)	RC		
Use of analgesics/pain killers	Yes	202 (17.3)	108 (18.4)	25 (1.4)	1.08	0.84–1.40	0.541
	No	969 (82.7)	478 (81.6)	1732 (98.6)	RC		
Use of herbal supplement	Yes	338 (28.9)	133 (22.7)	471 (26.8)	1.38	1.10–1.74	0.006*
	No	833 (71.1)	453 (77.3)	1286 (73.2)	RC		
Use of traditional herb drink	Yes	513 (43.8)	303 (51.7)	816 (46.4)	0.73	0.59–0.89	0.002*
	No	658 (56.2)	293 (48.3)	941 (53.6)	RC		
Chronic alcohol ingestion	Yes	344 (29.4)	240 (41.0)	584 (33.2)	0.60	0.49–0.74	0.000*
	No	827 (70.6)	346 (59.0)	1173 (66.8)	RC		
Excessive cigarette smoking	Yes	90 (7.7)	112 (19.1)	202 (11.5)	0.35	0.26–0.48	0.000*
	No	1081 (92.3)	474 (80.9)	1555 (88.5)	RC		
Physical inactivity	Yes	925 (79.0)	305 (52.0)	1230 (70.0)	3.46	2.80–4.29	0.000*
	No	246 (21.0)	281 (48.0)	527 (30.0)	RC		
Sedentary lifestyle	Yes	349 (29.8)	177 (30.2)	526 (29.9)	0.98	0.79–1.22	0.863
	No	822 (70.2)	409 (69.8)	1231 (70.1)	RC		
Poor eating habits							
Low in vegetables/legumes	Yes	908 (77.5)	423 (72.2)	1331 (75.8)	0.80	0.61–1.04	0.095
	No	263 (22.5)	163 (27.8)	426 (24.2)	RC		
Low in fruits intake	Yes	788 (67.3)	352 (60.1)	1140 (64.9)	0.52	0.42–0.65	0.000*
	No	383 (32.7)	234 (39.9)	617 (35.1)	RC		
High in refined grain foods	Yes	945 (80.7)	492 (84.0)	1437 (81.8)	1.33	1.06–1.67	0.014*
	No	226 (19.3)	94 (16.0)	320 (18.2)	RC		
High in processed red meats	Yes	921 (78.7)	448 (76.5)	1396 (77.9)	1.14	0.90–1.44	0.295
	No	250 (21.3)	138 (23.5)	388 (22.1)	RC		
High processed high fat diary	Yes	567 (48.4)	283 (48.3)	850 (48.4)	1.01	0.82–1.23	0.960
	No	604 (51.6)	303 (51.7)	907 (51.6)	RC		
High intake in fast foods	Yes	269 (23.0)	213 (36.3)	482 (27.4)	1.37	1.11–1.68	0.003*
	No	902 (77.0)	373 (63.7)	1275 (72.6)	RC		

*p-value is significant at 0.05; RC = Reference category

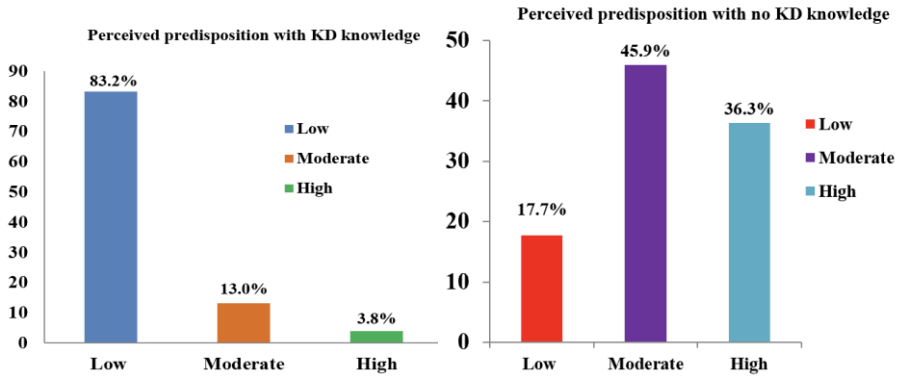

Figure 1:
Level of perceived predisposition among respondents with or without KD knowledge

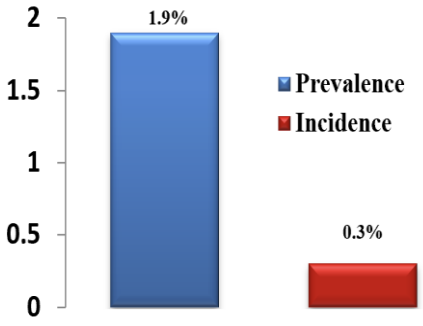

Figure 2:
Prevalence and incidence rates of KD among KD diagnosed self-reported respondents

Table 3:
Binary logistics regression analysis of lifestyle practices of diagnosed KD participants before diagnosis

Variable		Frequency n (%), n = 22	Total (100%)	OR (Odds Ratio)	95% CI	p value
Daily activities	Yes	4	18.2	1.56	0.52–4.65	0.420
	No			RC		
No prescription (medicine)	Yes	4	18.2	1.56	0.52–4.65	0.420
	No			RC		
Use of analgesics/pain killers	Yes	3	13.6	0.83	0.19–3.61	0.433
	No			RC		
Use of herbal supplement	Yes	4	18.2	1.56	0.62–5.49	0.254
	No			RC		
Use of traditional herb drink	Yes	7	31.8	1.68	0.68–4.17	0.252
	No			RC		
Chronic alcohol ingestion	Yes	5	22.7	1.42	0.52–3.89	0.489
	No			RC		
Excessive cigarette smoking	Yes	2	9.1	0.83	0.19–3.61	0.803
	No			RC		
Physical inactivity	Yes	19	86.4	0.59	0.17–2.01	0.392
	No			RC		
Sedentary lifestyle	Yes	8	36.4	0.74	0.31–1.78	0.497
	No			RC		
Low in vegetables/legumes	Yes	13	59.1	2.44	1.03–5.77	0.036*
	No			RC		
Low in fruits intake	Yes	16	72.7	0.84	0.63–1.12	0.583
	No			RC		
High in refined grain foods	Yes	11	50.0	4.34	1.86–10.15	0.000*
	No			RC		
High in processed red meats	Yes	4	18.2	1.35	0.45–4.02	0.590
	No			RC		
High processed high fat diary	Yes	7	31.8	2.04	0.83–5.03	0.116
	No			RC		
High intake in fast foods	Yes	14	63.6	4.34	1.86–10.15	0.000*
	No			RC		
	Biomedical risk factors					
Diagnosed with hypertension	Yes	5	22.7	0.41	0.15–1.13	0.077
	No			RC		
Diagnosed with diabetes	Yes	3	13.6	0.46	0.13–1.57	0.202
	No			RC		
Diagnosed with overweight	Yes	5	23.8	0.26	0.09–0.73	0.006*
	No			RC		
Diagnosed with obesity	Yes	3	15.8	0.24	0.07–0.84	0.015*
	No			RC		
Diagnosed with heart problems	Yes	1	4.5	0.28	0.04–2.20	0.195
	No			RC		

**p-value is significant at 0.05; No was used as the reference category (RC)*

Morbidity rates of KD among the respondents: Morbidity rates were calculated as prevalence and incident rates as shown in Figure 1. In this study, out of 1,171 respondents who had knowledge of KD, 22 of them reported that they have been diagnosed of KD in medical facilities and confirmed by nephrologists ranging from year 2006 to year 2016 (i.e. less than a year to ten years). Thus, ten respondents indicated that they have been diagnosed of stage 2 chronic kidney disease (CKD), presently undergoing medications and lifestyles modification; while five respondents reported that they were diagnosed of stage 4 CKD, undertaking dialysis, medications and diets modification; and seven respondents mentioned that they have been diagnosed of stage 5 CKD, taking on dialysis, transplant and medication. On the other hand, only three respondents with self-reported KD diagnosis is less than a year being diagnosed with KD ailment (year 2016). Overall, adjusted prevalence of KD in this study population was 1.9% with incidence rate of 0.3%. The measures of morbidity (prevalence (1.9%) and incidence (0.3%)) are shown in Figure 2.

Table 4:
Multinomial logistic regression analysis of factors associated with respondents' perceived predisposition

	Variable	Respondents with KD knowledge, n = 1171					Respondents without KD knowledge, n = 586				
Perceived predisposition		**Moderate**		**High**			**Moderate**		**High**		
Social characteristics		**RRR**	**CI**	**RRR**	**CI**	**p value**	**RRR**	**CI**	**RRR**	**CI**	**p value**
Gender	Female	0.70	0.49–0.99	1.06	0.58–1.92	0.046*	1.31	0.83–2.07	1.49	0.93–2.39	0.251
	Male	RC		RC			RC		RC		
Age (years)	< 20	RC		RC			RC		RC		
	20-29	0.10	0.55–1.72	8.03	1.05–61.43	0.000*	0.84	0.56–1.92	0.77	0.32–1.84	0.014*
	30-39	0.90	0.49–1.49	7.81	1.04–58.77	0.000*	0.59	0.26–1.31	0.75	0.33–1.72	0.014*
	40^{+}	1.09	0.62–1.89	4.37	0.55–34.83	0.000*	0.77	0.77–1.75	0.90	0.38–2.11	0.014*
Educational status	Non-educated	RC		RC			RC		RC		
	Educated	0.41	0.11–1.57	1.06	0.58-192	0.147	1.07	0.43–2.66	1.33	0.49–3.52	0.048*
Employment status	Not working	RC		RC			RC		RC		
	Working	1.63	1.06–2.52	2.39	1.00–5.72	0.000*	0.48	0.27–0.84	0.78	0.43–1.43	0.011*
Monthly income	Low	RC		RC			RC		RC		
	Middle	0.71	0.47–1.08	0.61	0.33–1.14	0.108	1.13	0.67–1.91	0.52	0.29–0.92	0.651
	High	1.20	0.77–1.89	0.18	0.05–0.62	0.007*	1.76	0.98–3.17	1.30	0.72–2.37	0.024*
Lifestyles											
Daily activities	No	RC		RC			RC		RC		
	Yes	1.63	1.06–2.52	2.39	1.00–5.72	0.027*	0.48	0.27–0.94	0.78	0.43–1.43	0.011*
Use of medicines	No	RC		RC			RC		RC		
	Yes	1.13	0.57–2.27	0.75	0.18–3.17	0.725	1.18	0.09–0.34	0.41	0.24–0.72	0.000*
No prescription (med)	No	RC		RC			RC		RC		
	Yes	0.42	0.06–3.23	0.00	0.01–0.07	0.000*	0.73	0.14–4.27	0.73	0.12–4.43	0.765
Use of analgesics	No	RC		RC			RC		RC		
	Yes	0.92	0.58–1.48	0.722	0.30–1.73	0.737	1.85	0.98–3.47	1.22	0.62–2.39	0.057
Herbal supplement	No	RC		RC			RC		RC		
	Yes	1.26	0.87–1.82	1.26	0.87–1.82	0.218	0.81	0.48–1.35	0.60	0.35–1.04	0.413
Tradition herb drink	No	RC		RC			RC		RC		
	Yes	1.55	1.10–2.19	2.10	1.14–3.86	0.012*	0.90	0.68–1.68	0.90	0.56–1.44	0.790
Alcohol ingestion	No	RC		RC			RC		RC		
	Yes	1.32	0.32–1.89	1.40	0.75–2.61	0.139	0.76	0.48–1.19	0.79	0.49–1.27	0.236
Cigarette smoking	No	RC		RC			RC		RC		
	Yes	1.27	0.69–2.32	1.22	0.43–3.51	0.433	0.41	0.24–0.72	0.71	0.42–1.22	0.002*
Physical inactivity	No	RC		RC			RC		RC		
	Yes	0.74	0.49–1.09	0.45	0.24–0.84	0.012*	2.74	1.72–4.36	0.76	0.47–1.22	0.000*
Sedentary lifestyle	No	RC		RC			RC		RC		
	Yes	1.00	0.69–1.46	0.58	0.28–1.22	0.984	0.68	0.68–1.81	0.92	0.55–1.55	0.687
Poor eating habits											
Low in vegetables	No	RC		RC			RC		RC		
	Yes	1.80	1.13–2.88	4.50	1.38–14.66	0.013*	0.71	0.43–1.18	1.06	0.62–1.82	0.189
Low in fruits intake	No	RC		RC			RC		RC		
	Yes	1.43	0.98–2.09	4.23	0.66–10.82	0.003*	0.49	0.31–0.78	1.24	0.75–2.04	0.004*
High in refined grain	No	RC		RC			RC		RC		
	Yes	1.74	1.06–2.85	3.69	1.13–12.01	0.029*	0.92	0.53–1.51	4.93	2.29–10.62	0.000*
Processed red meats	No	RC		RC			RC		RC		
	Yes	1.05	0.69–1.56	0.96	0.47–1.97	0.830	1.01	0.61–1.67	2.38	1.35–4.21	0.003*
High fat diary	No	RC		RC			RC		RC		
	Yes	1.02	0.73–1.44	1.23	0.68–2.24	0.047*	0.63	0.40–0.99	0.97	0.61–1.55	0.894
High in fast foods	No	RC		RC			RC		RC		
	Yes	2.47	1.46–4.18	6.68	1.61–27.81	0.001*	1.05	0.64–1.72	2.05	1.24–3.37	0.005*

**p-value is significant at 0.05; RC = is the reference category*

Frequency of risk factors for KD diagnosed respondents: Table 3 presented the binary logistics regression analysis of lifestyle practices of diagnosed KD respondents before diagnosis. Thus, physical inactivity was the commonest lifestyle practices reported by diagnosed respondents (86.4%) before their diagnosis, as shown in Table 3. A majority of the respondents indicated that they have engaged in patronized patient medicine vendors, indiscriminate use and regular use of analgesic/pain killers, habitual herbal supplement consumption, regular use of traditional herb drink (agbo), chronic alcohol ingestion, sedentary lifestyle and poor eating habits (high in grain and fast foods) before diagnosis (Table 3). Other biomedical factors mentioned by the respondents such as hypertension, diabetes overweight, and obesity were common among diagnosed respondents before their diagnosis of KD (Table 3).

Respondents' risk factors associated with low perceived predisposition to KD: In multinomial analyses performed on Group 1 respondents who have knowledge of KD (1171) and Group 2 respondents who have no knowledge of KD (586) were independently associated with low perceived predisposition toward KD development or progression as the base outcome. This is as shown in Table 4. For Group 1 respondents (1171), respondents with high perceived predisposition was found among older age 40+ years old (RRR: 4.37, CI = 0.55–34.83, $p<0.05$), working (RRR: 2.39, CI = 1.00–5.72, $p<0.05$), regular use of traditional herb drinks (RRR: 2.10, CI = 1.14–3.86, $p<0.05$), and poor eating habits (grain foods – RRR: 3.69, CI = 1.13–12.01, $p<0.05$ and fast foods – RRR: 6.68, CI = 1.61–27.81, $p<0.05$) were found to be 44%, 24%, 21%, 37% and 67% higher, predicting increased respondents' risk to KD development (Table 4).

For Group 2 (586), educated respondents with moderate perceived predisposition were found to be 11% higher, predicting respondents' high predisposition to KD development (RRR: 1.07, CI = 0.43–2.66, $p<0.05$) compared to those who are not educated. Similarly, respondents with moderate perceived predisposition with high income (RRR: 1.76, CI = 0.98–3.17, $p<0.05$), regular use of medicines patronized from patient vendors (RRR: 1.18, CI = 0.09–0.34, $p<0.05$), physical inactivity (RRR: 2.74, CI = 1.72–4.36, $p<0.05$), and poor eating habits (high in fast foods (RRR: 1.05, CI = 0.64–1.72, $p<0.05$) were found to be 18%, 12%, 27%, and 11% higher, predicting respondents' perceived predisposition to KD development (Table 4).

DISCUSSION

This study is the first community-based study that assessed prevalence, incidence and perceived predisposition to KD among Nigerians resident in Lagos State, as majority of the research are mostly hospital-based studies (Olagunju *et al*., 2018; Raji *et al*., 2018). Respondents' perceived predisposition to KD development was associated with level of KD knowledge, which reveals knowledge is extremely important to understand perceived predisposition and perception of health matters among different individuals. To a great extent, knowledge is central to social behaviour and the level of knowledge on health issue will have implication for individual's predisposition towards health matters. Knowledge of health issues have serious effect on perceived predisposition and, consequently, leading to adopting effective health behaviours towards addressing such health issues. Thus, recent studies have demonstrated that lack of awareness and poor knowledge regarding KD risk factors may contribute to individuals' inaccurate perceptions (Ulasi *et al*., 2013; Olagunju *et al*., 2018). Population-based education and KD screening programmes are intended to increase perceived predisposition of individuals with KD risk factors for early lifestyle modifications and to identified high-risk persons with KD risk factors for early detection of signs and symptoms to be established (Boulware *et al*., 2009; Akokuwebe, 2017).

The risk factors of KD reported by the study respondents included use of analgesic/pain killers, herbal supplement, traditional herb drinks, physical inactivity, sedentary lifestyles as well as poor eating habits. However, these risk factors have been documented in several studies described in other populations as probable causes of kidney ailments, if these risk factors are left unmodified (Afolabi *et al*., 2009; Oluyombo *et al*., 2013; Egbi *et al*., 2014). Other biomedical factors reported by the respondents included hypertension, diabetes, overweight, and obese. However, uncontrolled hypertension and diabetes remains the common two causes of CKD progression in Nigeria as a result of adoption of western lifestyles and increasing urbanization in Nigerian communities (Ulasi *et al*., 2013; Egbi *et al*., 2014). In this study, overweight and obesity were found to be significantly associated with diagnosed KD respondents prior their diagnosis, which confirmed earlier studies of growing prevalence of KD diagnosed adult Nigerians, linked with overweight and obesity (Ulasi *et al*., 2013; Seek *et al*., 2014). This relatively high prevalence of overweight and obesity can be attributed to poor eating habits such as high intake of sugar, refined carbohydrates and saturated fats. The seeming rise in fast food consumption as well as increased sedentary lifestyles may encourage fast development or progression of obesity among individuals (Eknoyan, 2011; Wickman *et al*., 2013). Improved awareness of KD might be achieved by combining KD education with KD risk factors education (lifestyles, demographic and biomedical).

The prevalence of self-reported kidney disease diagnosed persons observed in this study was 1.9%; this falls within the range of the national prevalence rate of kidney disease in Nigeria is 15% in year 2014 (Bamgboye, 2015). Available statistics for some individual hospital-based and community-based studies ranged between 1.6% and 45% (Oviasu *et al*., 1994; Ulasi *et al*., 2013; Kalantar-Zadeh *et al*., 2003; Nwankwo *et al*., 2005; Amira *et al*., 2007; Okoye *et al*., 2011; Arogundade *et al*., 2011; Oluyombo *et al*., 2016). Although, the current prevalence statistics (1.9%) in this study gives an impression of "no cause for alarm", but we have to take into consideration the participants' lifestyle practices (modifiable risk factors). In this study, this prevalence rate (1.9%) is lower than the median average (12.2%) of all the studies prevalence put together above. This implied that there is likelihood of the prevalence rate doubling in the next five to ten years.

Similarly, the evaluation of the overall incidence of self-reported kidney disease persons in this study population was 0.3%. Thus, available statistics on the incidence of CKD among Nigerian adults have shown in various studies ranges between 1.6% and 12.4% (Mabayoje *et al*., 1992; Alebiosu *et al*., 2005; Odubanjo *et al*., 2011; Oluyombo *et al*., 2016; Oluyombo *et al*., 2013). This finding gives an impression that there is "no need for apprehension" but it can be deduced that there is likelihood of the rate doubling in the next 5 to 10 years. This study found a significant association between increasing age of respondents with KD knowledge and high perceived predisposition to KD. This is consistent with findings from other studies. Afolabi *et al*. (2009) and Boulware *et al*. (2009) reported that high perceived susceptibility increases with older ages, as medically documented that estimated glomerular filtration rate (eGFR) declines with increasing age (Afolabi *et al*., 2009; Boulware *et al*., 2009). Further study is therefore needed to determine how age affects interventions to prevent or reduce these comorbidities in individuals with KD. Regarding indiscriminate and regular use of analgesics/pain killers showed a significant association with low perceived predisposition. Several studies have indicated analgesic abuse as a contributing factor for KD in Nigerian communities (Afolabi *et al*., 2009; Okwuonu *et al*., 2017). Though, such association may be explained by combination of other risk factors (e.g. hypertension or diabetes mellitus), which may act in concert for KD development or its progression. Similar reasons may explain the association found with traditional herb drink (agbo) and low perceived predisposition among the study respondents. The uninhibited increase of herbal practitioners has led to the trade and consumption of traditional herbal drinks and supplements that have prospective nephrotoxic effects which has led to increasing prevalence of kidney organ deterioration (Afolabi *et al*., 2009; Alebiosu *et al*., 2005).

Respondents' perceived predisposition to KD in this study was found not to be significantly associated with alcohol consumption. This is in line with other studies of Ulasi *et al*. (2013) and Okwuonu *et al*. (2017) in their study examining perceived predisposition to the effects of lifestyle on KD development, who reported their findings having no significant association with alcohol consumption (Okwuonu *et al*., 2017; Ekor, 2014). Equally, Ulasi *et al*. reported that alcohol consumption was not associated with perceived predisposition to KD in a non-concurrent cohort study of adults (Ulasi *et al*., 2013). Tobacco smoking was found to be associated with low perceived predisposition to KD, in line with the findings from other studies that identified smoking as a major cardiovascular risk factor that promotes KD development or progression (Afolabi *et al*., 2009; Okwuonu *et al*., 2017). Poor eating diets are associated with increased risk for KD with individuals whose diet quality is poor. Foods high in sodium, potassium and phosphorus have been documented in several studies as risk factors that impair the functions of the kidney organ (Ogah *et al*., 2012; Akinlua *et al*., 2015). For instance, sodium can raise blood pressure and retain fluids in individuals who consume much food with sodium. For individuals diagnosed with KD, extra sodium and fluid can build up in the body which can affect the heart and lungs.

In relation to low perceived predisposition of respondents' with KD knowledge, the relative low ranking or low recognition of KD might not be unconnected with the traditional "non-feasibility" of the kidney organ in the high ranking of importance or vital organs of the body. In other words, the kidney is not seen as a central organ or perceived as a central organ in body metabolism. It is often not "feasible" in the perception of the individuals (Akokuwebe, 2017). Similarly, another explanation for low perceived predisposition is the exhibition of 'complete denial' towards KD development or its progression. Staying in denial interfere with lifestyles modification or ignoring KD symptoms as well as seeking appropriate medical attention and adopting healthy behaviours. Generally, studies have shown that individuals will cognitively avoid chronic ailments by adopting lifestyle modifications, as they do not want to be diagnosed with chronic ailments or associated with terminal ailments (Kortte *et al*., 2004; Tan *et al*., 2010; Kazley *et al*., 2014; Liveneh *et al*., 2016).

Studies have revealed denial as a natural defence mechanism and its manifestations which includes, from using humour to complete rebuff to accept that an illness might exist, delay in seeing medical experts and minimizing disease symptoms when seeing a medical practitioners, as well as not discussing health issues with family members. Thus, negative outcomes of denial of health-related issues often leads to delayed diagnosis and treatment, and poorer health outcomes, as in the case of KD progression to an advanced stage of the disease. In order to address KD morbidity and mortality, we need to shift the focus from managing kidney ailments to preventive measures, knowing that KD is a lifestyle-related disease. Using this study as evidence, we can encourage changes in individual lifestyle choices, behaviours, perceptions, predisposition to KD risk factors, and eventually prevent people from developing KD. Further, research to enhance understanding of the medium through which attitudes regarding predisposition to KD as well as its risk factors may influence health behaviours, such as social and behaviour change communication is needed.

The present study has several limitations that permit consideration. First, the sample respondents were recruited by its cross-sectional nature as the respondents were not visited again to determine if there will be persistence of self-reported lifestyle practices associated with KD as well as documentation of lifestyle practices among the study respondents did not involve length of time. Such information on lifestyle practices were gotten during the research. Second, the perceived predisposition issues that the researcher looked at were based on perceptions and were measured with psychological scale of measurements. Third, the study did not include medical diagnosis of KD as well as other chronic ailments; for those diagnosed with KD and other chronic medical conditions, self-reporting was adopted. Fourth, the study includes incidence and prevalence rates of KD from only a small number of self-reported diagnosed participants and its establishment was calculated from respondents' responses which may not be fully representative among Nigerian population in Lagos State. More longitudinal studies are urgently needed to produce reliable data about KD incidence and prevalence in Nigerian population.

In conclusion, this study reveals a low perceived predisposition to KD, especially among respondents with knowledge of KD in Lagos State, Nigeria. However, prevalence rate of 1.9% and incidence of 0.3% from self-reported responses among respondents were documented. The major lifestyle practices reported by the respondents include physical inactivity, habitual herbal supplement, regular use of traditional herb drinks (agbo), sedentary lifestyles, chronic alcohol ingestion and poor eating habits. The main predictors of perceived predisposition include the socio-demographic factors (such as an increasing age, education, and high income), and lifestyle practices (such as an indiscriminate and regular use of analgesics/pain killers, habitual herbal supplement consumption as well as regular use of traditional herb drink (agbo)).

Authors' contributions

MEA was involved in conception and study design. MEA gained ethical approval and drafted the questionnaire. MEA performed and supervised data collection, analysed data, wrote and revised the manuscript; ESI was involved in the overall supervision of the manuscript. All authors read and approved the final manuscript

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