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Indices of Kidney Damage in Nigeria: A Survey of 8077 Subjects in the Six Geopolitical Zones of the Country

Awobusuyi JO,[1] Bakare O,[2] Dada A [3], Adamu U[4], and Abasi- Ekong Udobang[4], Effa E[5], Ummate I[6], Uwakwem A[7], Umeizudike T[8], Amisu A[8], Adekoya A[8], Makursidi M[9], Limman HM[9] and Adegun P[3]

1.Department of Medicine, Lagos State University College of Medicine, Ikeja, Lagos, Nigeria

2. Department of Community Medicine, Lagos State University College of Medicine, Ikeja, Lagos, Nigeria

3.Department of Medicine, Ekiti State University Teaching Hospital, Ado-Ekiti. Ekiti State, Nigeria

4.Ekiti State University Teaching Hospital, Ado-Ekiti. Ekiti State, Nigeria

5.Health Portfolio, MTN- Foundation, Ikoyi, Lagos. Nigeria.

6. University of Calabar Teaching Hospital, Calabar, Nigeria

7. University of Maiduguri Teaching Hospital, Maiduguri, Nigeria

8. Federal Medical Centre, Owerri, Nigeria

9. Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria

ABSTRACT

Introduction: Community diagnosis and identification of health problems in societies are crucial, as they enable the estimation of disease burden in any community. Desirable as community screening exercises are, multi-centre country wide screening exercises are rarely carried out in developing nations because of the financial and manpower implications.

Objectives: This article describes the findings from a large scale community health screening project by the MTN – Foundation in collaboration with Nigerian Association of Nephrology.

Materials and method: Eight thousand and seventy seven (8077) participants were screened over a three-year period in the six geopolitical zones of the Federation.

Results: Three thousand five hundred and ninety (44.45%) were males while 4487(55.55%) were females (M: F = 1:1.2). The mean age of the participants was 40.12±13.54 years. The crude

Corresponding Author: **Dr. Jacob Olugbenga Awobusuyi**,, Dept. of Medicine, Lagos State University College of Medicine, Ikeja. Lagos, Nigeria. +2348023046830. *E-Mail*: - awojaco@yahoo.com.

prevalence rate of kidney damage (Proteinuria, haematuria or reduced eGFR) was 23.47% with proteinuria occurring in 88.34% of the participants with kidney damage. Statistically significant differences were found in the crude prevalence rates of Kidney damage when age groups, gender, social class and zones were compared. However, when adjusted for age, the prevalence of kidney injury was observed to be similar in all the zones. A 36-52% likelihood of development of kidney damage was also observed in patients with risk factors of kidney disease; namely hypertension, diabetes, obesity and a positive family history of kidney disease.

Conslusion: It was conclusion the crude prevalence rate of kidney damage in Nigeria was found to be 23.47%. This was not substantially different in the six geopolitical zones of the federation when age adjusted rates were compared. It was recommend that age-adjusted standardization of prevalence rates of kidney disease, using the 2006 national census population figures may be more informative and would enable comparability of results from the various communities of the country.

Keywords: *Kidney damage, prevalence rates, standardization, community health screening*

INTRODUCTION

Chronic Kidney Disease (CKD) prevalence has been observed in many populations to be increasing.[1,2,3] In the developed world, this increase in prevalence has been attributed to an increase in predisposing factors such as diabetes and hypertension.[1,3]. This observation has also been noted in some developing countries.[4] However, data on the prevalence of CKD in Nigeria is still emerging, and the relative contributions of predisposing factors such as diabetes and hypertension to the development of CKD in many communities is yet to be adequately elucidated. Thus, screening exercises for CKD and its risk factors in Nigerian communities are relevant, to enable epidemiological clarification of this important health problem.

Large scale epidemiological studies on risk factors and diseases (CKD inclusive) are however difficult to conduct in Nigeria, as resources required for the co-ordination and execution of such projects are generally lacking. Thus, available data in most cases are derived from studies involving relatively few subjects in small communities.[5,6,7,8] Apart from the study by Ulasi *et al* [8] with over 2,000 participants, the sample sizes in most of the other studies were relatively small. For instance, Afolabi *et al.*[5] studied 250 subjects in the South West zone of the country, while Egbi and his colleagues, [7] had 179 subjects in a study conducted in the South-South zone of the country. Although, these studies have contributed significantly to our knowledge of epidemiology of CKD in their respective communities, extrapolation of the results to the general population of Nigeria needs to be undertaken with caution.

Opportunities to study large numbers of subjects could become possible, if partnership with organizations, whose corporate social responsibilities incorporating health could be established, with a view of using the partnership to acquire data with wider coverage, than would otherwise be possible in the absence of such partnership.

The MTN-Foundation in Nigeria as part of its corporate social responsibility, established 12 haemodialysis centres in the 6 geopolitical zones of the country. In order to create awareness of the Centres by the population in the zones, and also evaluate the prevalence of kidney damage and its risk factors, a phased community health awareness and screening programme was initiated. The project aimed at achieving four objectives namely: Educating the community on Hypertension, Diabetes and Kidney Disease; determining the prevalence rates of these diseases in the screened community; identifying individuals with these diseases and offer professional counselling and referral to appropriate health facilities for treatment; and lastly, creating awareness of the availability of highly subsidised MTN Foundation dialysis centres that have been donated to some hospitals in these communities.

This article describes findings on indices of kidney damage observed during the community health awareness and screening exercises conducted in the six geopolitical zones of the Federation.

SUBJECTS AND METHOD

Study Design and Population.

This is a cross sectional study of indices of kidney damage in the six geopolitical zones of the Federation.

Ten sites, (Lagos, Owerri, Onitsha, Calabar, Yola, Makurdi, Ado-Ekiti, Port-Harcourt, Abuja and Sokoto) located in six different geopolitical zones of the Nigeria were highly subsidised In- Hospital based dialysis centres have previously been provided by the MTN-Foundation, were selected for the project.

Additional data obtained during the 2012 and 2013 world kidney day celebrations in Lagos where same protocol was used were also included. Mobilization of participants for each of the events was achieved through radio and television jingles and announcements in English and local dialects.

Registration and Health Talk

Participants were registered on the morning of the exercise and a forty-minute health talk was held in vernacular to address health implications of renal diseases, diabetes, and hypertension. The aims of the screening exercise, the procedures, and order of conduct were explained to the participants at the end of the health talk.

Specimen and Data Collection

A health screening form (in duplicate) capturing contact information, biodata, and medical history of participant was distributed at the health talk venue. This was filled by the participants with the assistance (if required) of medical records personnel recruited from the participating hospitals. Participants were then directed to the screening investigation points. Weight, height, and blood pressure were taken at the first point.

At the second point, five millilitres of blood was taken into heparinised sample bottles for evaluation of urea, creatinine, cholesterol, and triglyceride levels. This was centrifuged, and the separated plasma was stored in an on-site refrigerator. The centrifuged samples were subsequently transferred to the analysis laboratory for analysis immediately after the screening exercise. Random blood glucose was done on site at this second point using Accuchek® glucometer.

Participants were asked to collect urine samples at on-site toilet facilities. These were taken to the third screening point, where urinalysis was performed using Combi-9® urinalysis strips. Menstruating women were instructed not to provide urine samples.

Participants were thereafter referred to the on-site doctors' consulting rooms for discussion of their test results and appropriate referral for treatment of any abnormality discovered during the screening exercise. The results of all on-site measurements, investigations, and specific problems identified during the screening were reviewed by the doctors, recorded in duplicates and the original form where given to the participants for record purpose.

All participants were counselled appropriately. Participants needing referral were referred appropriately for further evaluation and management. Blood chemistries were performed with autoanalyzer at a reference Laboratory. A comprehensive report which included laboratory results from the analysis laboratory was later given to each participant through a designated collection point at the screening sites.

Definitions

Elevated blood pressure was defined by a systolic blood pressure $\geq$ 140mmHg or diastolic blood pressure $\geq$ 90mmHg. [9] Hypertension was taken to be present if the participant reports prior diagnosis at a hospital and being on prescribed antihypertensive medication.

Diabetes was taken to be present if the participant reports prior diagnosis at a hospital and being on prescribed hypoglycaemic medication.

The body mass index (BMI) was calculated from the measured weight (in kilograms) and height (in metres).Obesity was defined according to the 1999 WHO criteria. Cut off points for BMI were overweight (BMI 25.0–29.99 kg/m2), and obesity (BMI 30 kg/m2).[10]

Kidney Damage was diagnosed if a patient has urinary abnormality (Proteinuria or haematuria) or reduction in estimated Glomerular filtration rate (eGFR) less than 60mls/min/1.73m^2 (based on the Modification of Diet in Renal Disease (MDRD) formula) [11,12].

For the assessment of socio-economic status, participants were classified with regard to social class based on their occupations. Following the Registrar General's scale of social classes, [13] participants were grouped into five occupational classes:

Class 1: Professionals
Class 2: Managerial and Technical occupations
Class 3: Skilled occupations
Class 4: Partly skilled occupations
Class 5: Unskilled occupations

Statistical Analysis

Data obtained was entered into Microsoft Excel 2010 spreadsheet and exported to SPSS version 20 spreadsheet for analysis. Results are presented as numbers and percentages or mean ± *1*SD. Prevalence rate of kidney damage was age adjusted using the age distribution in the 2006 national population census.Odds ratio (OR) and 95% confidence intervals were calculated to measure the degree of associations. A *P* value < 0.05 is considered as being statistically significant.

RESULTS

Eight thousand and seventy seven (8077) participants were screened over a three-year period. There were 2878(35.63%) participants from the South West, 1631(20.19%) from South East, 1240(15.35%) from South South, 387(4.79%) from North West, 616(7.63%) from North East and 1325(16.40%) from North Central. [Figure 1]. Three thousand five hundred and ninety (44.45%) were males while 4487(55.55%) were females (M: F = 1:1.2). The mean age of the participants was 40.12±13.54 yrs [Table 1].

Using the Registrar General's scale of social classes, 106(1.31%) participants were professionals in social class 1, while 2472(30.617%) participants were intermediate in social class 2. 1524(18.87%) were in skilled workmen in social class 3, 2163(26.87%) semiskilled craftsmen in social class 4 and 1464(18.15%) participants were unskilled in social class 5. Occupation was not recorded in 348(4.31%) of the participants. [Table 1]

Indices of Kidney Damage

The crude prevalence rate of kidney damage (Proteinuria, haematuria or reduced eGFR) was 23.47% (1896 out of 8077 participants). This is comprised of 919 (48.47%) males and 977(51.53%) females. The crude prevalence rate of kidney damage was found to be significantly higher in male participants compared with female participants. (25.60% of the 3590 males Vs 21.77% of 4487 females, X^2= 16.24, df=1, p<0.001). Crude prevalence rate of chronic kidney disease was also found to be significantly higher in elderly participants compared with middle aged and the young. (X^2=18.17, df=2, p<0.001). Participants in the lower social classes were also observed to have a significantly higher prevalence rate of kidney damage compared with social class 1 (χ^2= 105.484, df = 4, p<0.001). [Table 2]

Proteinuria

One thousand six hundred and seventy five (20.73%) participants had proteinuria [815(48.90%) males Vs 856(51.10%) females]. 6272(77.65%) had negative or trace results on dipstick test for proteinuria. 130 (1.61%) participants had no record of urinary protein testing. Prevalence of proteinuria was 22.81% in males compared with 19.08% in females (X^2=17.08, df =1, p<0.001). Proteinuria occurred in 88.34% of participants classified as having Kidney injury. No significant difference was found in the prevalence rates of proteinuria when the age groups were compared [X^2=3.35, df=2, p>0.05].

Haematuria

Forty (0.49%) participants had haematuria. There were 24(60.00%) females and 16(40.00%) males. 7892(97.01%) participants had negative results, while no record was found in 145(1.79%) participants. Twelve (0.15%) participants had both haematuria and proteinuria. There was no statistically significant difference in the prevalence rate of haematuria when male participants were compared with females. [X^2=0.33, df=1, p>0.05]. Also, prevalence rates between the age groups were found not to be statistically significant. [X^2=0.57, df=2, p>0.05.

Reduced eGFR

Two hundred and forty five participants (3.03%) out of had estimated glomerular filtration rates (eGFR) lower than 60mls/min. 134(54.69%) were females and 111(45.31%) males. There was no statistically significant difference in the prevalence rates of reduced eGFR when male participants were compared with females. [X^2=0.33, df=1, p>0.05]. However, a significant difference was observed when age groups were compared (χ^2 = 38.939, df = 4, p<0.001).

Table 1. Sociodemographic characteristics of the participants of health screening program

		NC	NE	NW	SE	SS	SW	TOTAL
Age group								
	0-19	79(6.0%)	21(3.4%)	0(0.0%)	46(2.8%)	32(2.6%)	44(1.5%)	222(2.7%)
	20-39	677(51.1%)	339(55.0%)	135(34.9%)	775(47.5%)	618(49.8%)	1229(42.7%)	3773(46.7%)
	40-59	463(34.9%)	228(37.0%)	211(54.5%)	641(39.3%)	476(38.4%)	1151(40.0%)	3170(39.2%)
	60-79	94(7.1%)	17(2.8%)	18(4.7%)	133(8.2%)	81(6.5%)	343(11.9%)	686(8.5%)
	≥ 80	7(0.5%)	0(0.0%)	1(0.3%)	16(1.0%)	2(0.2%)	22(0.8%)	48(0.6%)
	no record	5(0.4%)	11(1.8%)	22(5.7%)	20(1.2%)	31(2.5%)	89(3.1%)	178(2.2%)
	TOTAL	1325(100.0%)	616(100.0%)	387(100.0%)	1631(100.0%)	1240(100.0%)	2878(100.0%)	8077(100.0%)
Gender								
	F	590(44.5%)	275(44.6%)	203(52.5%)	994(60.9%)	726(58.5%)	1699(59.0%)	4487(55.6%)
	M	735(55.47)	341(55.4%)	184(47.5%)	637(39.1%)	514(41.5%)	1179(41.0%)	3590(44.4%)
	TOTAL	1325(100.0%)	616(100.0%)	387(100.0%)	1631(100.0%)	1240(100.0%)	2878(100.0%)	8077(100.0%)
Social class								
	1	14(1.1%)	6(1.0%)	2(0.5%)	17(1.0%)	9(0.7%)	58(2.0%)	106(1.3%
	2	346(26.1%)	313(50.8%)	219(56.6%)	428(26.2%)	369(29.8%)	797(27.7%)	2472(30.6%)
	3	343(25.9%)	70(11.4%)	33(8.5%)	290(17.8%)	319(25.7%)	469(16.3%)	1524(18.9%)
	4	173(13.1%)	119(19.3%)	31(8.0%)	521(31.9%)	253(20.4%)	1066(37.0%)	2163(26.8%)
	5	408(30.8%)	90(14.6%)	62(16.0%)	327(20.0%)	233(18.8%)	344(12.0%)	1464(18.1%)
	no record	41(3.1%)	18(2.9%)	40(10.3%)	48(2.9%)	57(4.6%)	144(5.0%)	348(4.3%)
	TOTAL	1325(100.0%)	616(100.0%)	387(100.0%)	1631(100.0%)	1240(100.0%)	2878(100.0%)	8077(100.0%)

NC- North Central NE- North East NW- North West SE- South East SS- South South SW- South West

N.B: *Values in the no records rows and columns were not utilized in the calculation of Chi square*

Table 2. Frequency distribution of Kidney damage: Age group, Zone and Social Class

Age Group	**0-19**	**20-39**	**40-59**	**60-79**	**e"80**	**no record**	**Total**	**X2**
Normal Kidney	144(1.78%)	2939(36.39%)	2406(29.79%)	482(5.97%)	31(0.38%)	118(1.46%)	6120(75.77%)	
Kidney damage	780.97%)	828(10.25%)	759(9.40%)	203(2.51%)	17(0.21%)	11(0.14%)	1896(23.47%)	
no record	0(0.00%)	6(0.07%)	5(0.06%)	1(0.01%)	0(0.00%)	49(0.61%)	61(0.76%)	(X^2=18.17,
Total	222(2.75%)	3773(46.71%)	3170(39.25%)	686(8.49%)	48(0.59%)	178(2.20%)	8077(100%)	df=2, $p<0.001$).
Zone	**NORTH CENTRAL**	**NORTH EAST**	**NORTH WEST**	**SOUTH EAST**	**SOUTH SOUTH**	**SOUTH WEST**	**Total**	
Normal Kidney	883(66.64%)	459(74.51%)	342(88.37%)	1108(67.93%)	937(75.56%)	2391(83.08%)	6120(75.77%)	
Kidney damage	442(33.33%)	157(25.49%)	42(10.85%)	512(31.39%)	291(23.47%)	452(15.71%)	1896(23.47%)	
no record	0(0.00%)	0(0.00%)	3(0.78%)	11(0.67%)	12(0.97%)	35(1.22%)	61(0.76%)	
Total	1325(100.00%)	616(100%)	387(100%)	1631(100%)	1240(100%)	2878(100%)	8077(100%)	($Ç^2$ = 4.443,
Age adjusted Rates	7.81%	6.22%	2.20%	6.16%	5.12%	2.99%	30.49%	df = 5, p = 0.4876
Social Class	**1**	**2**	**3**	**4**	**5**	**no record**	**Total**	
Normal Kidney	96(90.57%)	2003(81.03%)	1175(77.10%)	1604(74.16%)	995(67.96%)	247(70.98%)	6120(75.77%)	
Kidney damage	10(9.34%)	462(18.69%)	348(22.83%)	558(25.80%)	467(31.90%)	51(14.66%)	1896(23.47%)	
no record	0	7(0.28%)	1(0.07%)	1(0.05%)	2(0.14%)	50(14.37%)	61(0.76%)	($Ç^2$ = 105.484,
Total	106((100.00%))	2472(100%)	1524(100%)	2163(100%)	1464(100%)	348(100%)	8077(100%)	df = 4, $p<0.001$

N.B: *Values in the no records rows and columns were not utilized in the calculation of Chi square*

Table 3. Kidney damage and risk factors for chronic kidney disease

Blood Pressure	**Elevated BP**	**Normal**	**No record**	**Grand Total**	**Odds Ratio**
Normal Kidney	1503(72.36%)	4397(77.34%)	220(69.84%)	6120(75.77%)	OR 1.45, 95%CI
Kidney damage	571(27.49%)	1281(22.53%)	44(13.96%)	1896(23.47%)	1.272-1.656
no record	3(0.14%)	7(0.12%)	51(16.19%)	61(0.76%)	
Grand Total	2077(100%)	5685(100%)	315(100%)	8077(100%)	
Diabetes	**Diabetic**	**Normal**	**No record**	**Grand Total**	
Normal Kidney	391(68.96%)	5274(76.68%)	455(71.99%)	6120(75.77%)	OR 1.519, 95%CI
Kidney damage	176(31.04%)	1597(23.22%)	123(19.46%)	1896(23.47%)	1.238-1.864
no record	0(0.00%)	7(0.10%)	54(8.54%)	61(0.76%)	
Grand Total	567(100%)	6878(100%)	632(100%)	8077(100%)	
Family hx	**Negative**	**Positive**	**No record**	**Grand Total**	
Normal Kidney	4847(75.44%)	253(69.51%)	1020(79.19%)	6120(75.77%)	OR 1.36, 95%CI
Kidney damage	1568(24.40%)	111(30.49%)	217(16.85%)	1896(23.47%)	1.077-1.707
no record	10(0.16%)	0(0.00%)	51(3.96%)	61(0.76%)	
Grand Total	6425(100%)	364(100%)	1288(100%)	8077(100%)	
Weight Status	**Normal**	**obese**	**No record**	**Total**	
Normal Kidney	4454(75.30%)	1387(77.31%)	279(75.82%)	6120(75.77%)	OR 1.419, 95% CI
Kidney damage	1451(24.53%)	407(22.69%)	38(10.33%)	1896(23.47%)	1.338-1.964
no record	10(0.17%)	0(0.00%)	51(13.86%)	61(0.76%)	
Grand Total	5915(100%)	1794(100%)	368(100%)	8077(100%)	

Zonal Differences in Prevalence Rates of Indices of Kidney Injury

Crude prevalence rate of kidney injury was highest in the North Central zone 33.36%, and lowest in the North West (10.85%). [X^2=261.38, df=5, p<0.001]. The age adjusted prevalence rates were 12.5% in North-Central zone, 10.58% in North-East, 4.77% in North-West 11.72% in South-East, 9.48% in the South-South and 6.06% in South-West. (χ^2 = 5.297, df = 5, p = 0.3807 [Table 2].

Highest prevalence of proteinuria (31.25%) was found in of participants from the North-Central Zone, 30.10% in the South-Eastern zone, 24.35% in the North-East, 22.10% in South-South, 10.88% in South-West and 8.53% in the North-West zone. [X^2=377.35, df=5, p<0.001].

Prevalence of haematuria was generally low with the highest in the South West zone (0.76%), 0.55% in South East, 0.52% in North West, 0.32%in North East, 0.24% in South South and 0.15% in North Central. This was however not statistically significant. [X^2=9.74, df=5, p>0.05].

Reduced eGFR less than 60mls/min/1.73m^2 was observed more in the South West zone (4.83%), 3.32% in the North Central zone, 2.07% in North East, 1.59% in South East, 1.53 in South South and 1.46%. in the North East zone. This was statistically significant (χ^2= 62.817, df = 5, p<0.001).

Kidney Injury, Hypertension, Diabetes, Obesity and Family History of Kidney Disease

One Thousand three hundred and seven (16.18%) participants had hypertension. Of these, 389 (29.61%) were found to have kidney injury. This was statistically significant (OR 1.45, 95%CI 1.272-1.656) [Table 3]

Five hundred and sixty seven (5.68%) participants had Diabetes mellitus, 176 (31.04%) of which were found to have kidney injury. (OR 1.519, 95% CI 1.238-1.864).

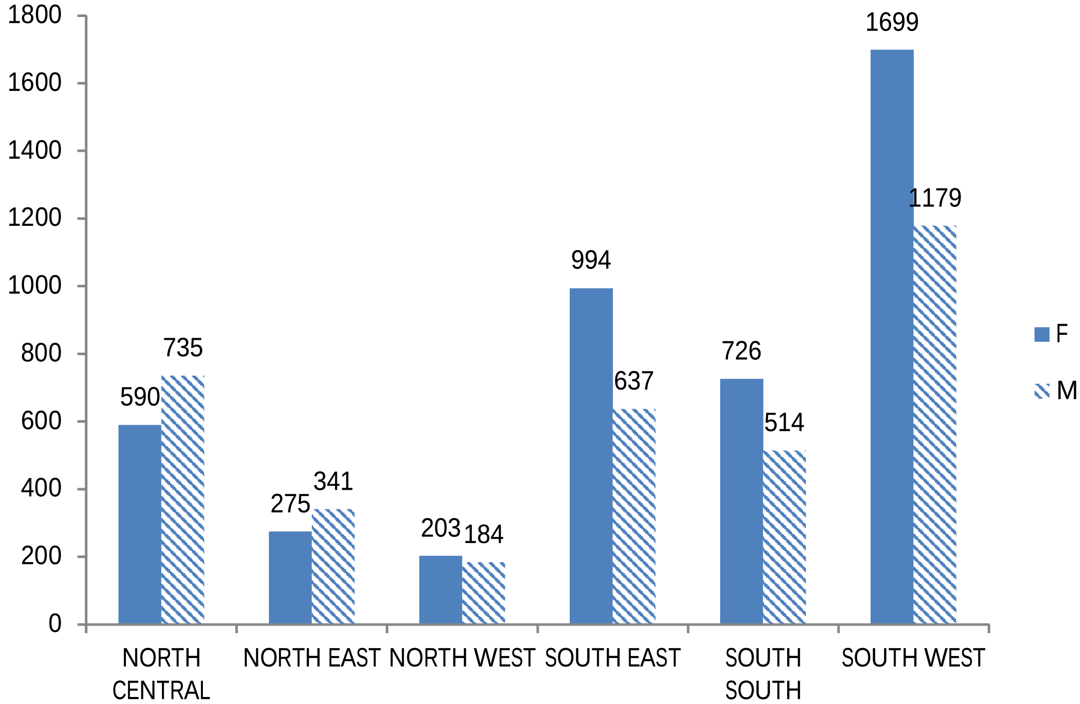

Fig. 1: Zonal and Gender distribution of study participants

Obesity was found in 1794 (22.21%) of the participants, 2355 (29.16%) were overweight, while 324(4.01%) were found to be underweight. Kidney injury occurred in 407(22.69%) of the obese participants, 557(23.65%) of the overweight participants and 110(33.95%) of the 324 underweight participants. This was statistically significant (OR 1.419, 95% CI 1.338-1.964).

Three hundred and sixty four (4.51%) participants had positive family history of kidney disease while 6425(79.55%) 0f the participants had no family history. In 1288(15.95%) of the participants, there was no documentation. Out of the 364 participants with positive family history, 111(30.49%) had kidney injury compared with 1568(24.40%) of 6425 participants without family history of kidney disease. (OR 1.36, 95%CI 1.077-1.707).

DISCUSSION

Chronic Kidney Disease is a widespread world-wide problem of immense public health importance because of its high prevalence, the catastrophic expenditure associated with its treatment and the devastating outcomes, especially in a resource poor economy such as we have in Nigeria. In addition, the prevalence of CKD has in recent times been shown to be increasing steadily both in the developed and developing countries. The implication of CKD management to healthcare resources is enormous. For instance Kerr M. et. al. [14] using economic modelling to estimate the annual cost of Stages 3–5 CKD to the National Health Service (NHS) in England, estimated the cost of CKD to the English NHS in 2009–10 to be between £1.44 to £1.45 billion, which is about 1.3% of all NHS spending for that year. In a cross-sectional study of 247 prevalent CKD patients in Sydney, Australia by Essue *et al.*,[15] observed an average out of pocket spending of AUD$907 per three months (catastrophic financial out-of-pocket spending exceeding 10% of household income) in 71% of participants. The situation in Nigeria appears worse, as majority of Nigerians on Renal replacement therapy pay out of pocket.[16, 17]

Given the poor outcome and catastrophic expenditure of CKD management in the Nigerian economy, a reasonable approach is an early detection and treatment through community diagnosis and identification of health problems. Community diagnosis is crucial, as it enables early detection of diseases in individual subjects in addition to providing data about diseases in the community, that is useful in estimating disease burden in that community. Desirable as community screening exercises are, multi-centre country wide screening exercises are rarely carried out in developing nations because of the financial and manpower implications.

One way of funding large scale community screening exercises is the involvement of corporate organizations. This study describes the findings of a multi-centre country wide health screening exercise conducted in Nigeria in 2011 through 2013, by the MTN – Foundation in collaboration with Nigerian Association of Nephrology, as a part of the corporate social responsibility of the company and the association.

The crude prevalence of kidney damage in the studied participants was 23.47%. In Nigeria, variable crude prevalence rates of Kidney damage have been published in many community based studies [5, 6, 7, 8, 9, 18]. While Egbi, *et. al.*[7] found a prevalence rate of 7.8% in their study, prevalence rate in Ulasi's [8] study was 11.4%, 12.4% in Afolabi *et. al.*[5] and 19.9% in a study by Abioye-Kuteyi, *al.*[18] The variation in the results could be accounted for by the differences diagnostic criteria for kidney damage, age distribution, gender composition and laboratory techniques used in the various studies. For instance, the mean age of participants in a study by Ulasi, *et. al.*[8] in Enugu was 43.7years with 53.4% of the participants being females whereas, the mean age was 50.52yrs in Afolabi's study with more than 70% of the studied population were above 45years of age, and 70% of the participants being females.[5] The mean age in our study was 40.12yrs with 55.55% of study participants being females.

The most common laboratory evidence of kidney damage was proteinuria (prevalence rate of 20.73%) compared with 0.49% haematuria and 3.03% reduced eGFR. Proteinuria occurred in 88.34% of participants classified as having Kidney injury. Proteinuria is not only a marker for kidney injury it is also a predictor of progression of renal disease. In addition, proteinuria is an independent risk factor for an increased incidence of cardiovascular morbidity and mortality [19]. Of concern is the finding of proteinuria in greater than 30% of the screened participants in the North East and South Eastern zones of the country. These findings were consistent throughout the 3 years of the study. Aetiological assessment of proteinuria is outside the scope of the current study; however, future researches into the possible causes of the high prevalence of proteinuria in these zones are definitely desirable. All patients with urinary abnormalities were referred to appropriate clinics for follow up assessment and treatment.

Zonal differences were observed in the crude prevalence rates of kidney damage with the highest crude prevalence rate observed in the North Central zone. As pointed out earlier, a direct comparison between the crude rates would be misleading since crude rates are not very informative about the health status of a population in view of multiple confounding variables that could account for the differences.[20] Age adjusted prevalence rates in the zones using the 2006 national population figures shows that there is no substantial difference in the adjusted prevalence rates of kidney damage in the zones.We would suggest using the 2006 Nigerian population census for standardization of prevalence values.

Expectedly, the odds of having kidney injury was observed to be greater in patients with known risk factors for CKD; hypertension, diabetes, obesity and a positive family history of CKD. [21, 22, 23] What is not known in Nigeria is the strength of association of these risk factors to the development of kidney injury.

In this study, diabetic participants were found to be 1.52 times more likely to develop kidney injury compared with non-diabetics, while the odds of developing kidney injury is 45% higher in hypertensive participants compared with non-hypertensive participants. Individuals with a family history of kidney disease are 36% more likely to develop CKD compared with individuals without a family history of Kidney injury. Obese participants were found to be 1.42 times more likely to develop kidney injury compared with non-obese participants. Further studies are however required to confirm these observations.

In conclusion our study the crude prevalence rate of kidney damage in Nigeria was found to be 23.47%. This was not substantially different in the six geopolitical zones of the federation when age adjusted rates were compared. A 36-52% likelihood of development of kidney damage was also observed in patients with risk factors of kidney disease namely hypertension, diabetes, obesity and a positive family history of kidney disease. Further studies are however considered necessary to confirm these observations. We recommend that age-adjusted standardization of prevalence rates of kidney disease, using the 2006 national census population figures may be more informative and would enable comparability of results from the various communities of the country.

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