

## **Assessment of risk factors for kidney disease in an unselected population of Nigerians: A report of the routine screening conducted during the National Kidney Disease Awareness and Sensitization Programme**

*Organized by Nigerian Association of Nephrology (NAN)*

*The theme: "Renal Disease in Nigeria: Taming the Lion"*

*Held on the 9<sup>th</sup> of February 2006 at Sheraton Hotel and Towers, Abuja.*

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### **ABSTRACT**

To be able to define some risk factors for renal disease in an unselected population of Nigerians the Nigerian Association of Nephrology conducted a screening exercise during the National Kidney Disease Awareness and Sensitization Programme whose theme was "Renal Disease in Nigeria: Taming the Lion" which was held at the capital city of Abuja on the 9<sup>th</sup> of February 2006. A total of unselected 129 respondents who consented were screened. One hundred and nine (56 male and 72 female respondents) were analyzed and the others [2] could not be analyzed because of incomplete data. The mean age of respondents was 27.03 ( $\pm 10.75$ ) years and majority (89.1%), were in age group 15 to 44 years with no sex preference. Most of the respondents had normal BMI, the mean being 23.32 ( $\pm 4.52$ ) mg/m<sup>2</sup>. More females than males were found to be obese (16% versus 4%), the difference was not statistically significant ( $p=0.76$ ). A relatively high percentage of respondents gave positive family history of hypertension (40%) as against 25% for diabetes mellitus. Only 5% of respondents gave positive history of renal disease. Use of nephrotoxic agents – medicated soap, native medication and herbal supplements/tea was found in 40%, 30% and 19% respectively. More than half of the studied population did not have routine medical check and about a third engaged in self medication. The prevalence of hypertension and proteinuria were 13.6% and 19% respectively. It is concluded from this study that the risk factors for development of chronic kidney disease (CKD) is high in the studied population and the level of awareness regarding need

for routine medical check and appropriate attitude to health low. There is crying need for more intensive, aggressive and comprehensive education aimed at increasing the health seeking attitude of our population as well as establishment of preventive programmes against CKD in the country.

### **INTRODUCTION**

Chronic kidney disease (CKD) is under diagnosed and under recognized all over the world [1]. Worldwide, over 50 million individuals have progressive CKD and well over a million of them are on renal replacement therapy [2]. The magnitude of the problem of chronic kidney disease (CKD) is enormous. Currently, CKD is emerging as a global public health problem.

The World Health Report 2002 and Global Burden of Disease (GBD) project reported that diseases of the kidney and urinary tract contribute to the global burden of diseases – with approximately 850,000 deaths every year and 15,217,488 disability-adjusted life years [3], they represent the 12<sup>th</sup> cause of death and 17<sup>th</sup> cause of disability globally. It is currently estimated that 19.2 million Americans have CKD which translates to about 11% of the adult population in the US.

Early detection and intervention using appropriate measures to slow progression of the disease, prevent the loss of kidney function and ameliorates co-morbid conditions are likely to be key factors in alleviating the burden of the disease [1].

The Nigerian Association of Nephrology in recognition of these facts decided to create aware-

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ness and sensitize the public by organizing a one-day national kidney disease awareness and sensitization exercise in Abuja, the capital city of Nigeria. The event took place at the Sheraton Hotel and Towers, Abuja on the 9<sup>th</sup> of February 2006. The theme was "Renal Disease in Nigeria: Taming the Lion".

The keynote address given by a renowned physician and nephrologist, Prof A. Akinsola emphasized: the rising prevalence of CKD, dearth of facilities, high cost of treatment and the need for prevention. Speeches were also made by three transplant recipients detailing their experiences and also emphasizing the high cost of treatment. They implored the government and non-governmental agencies to aid with subsidies.

## THE SCREENING EXERCISE

### Method

A cross sectional, consecutive screening of all consenting adults and school children was done. A sampled structured questionnaire on the present, past and family history was administered after adequate briefing. Relevant social history was also taken looking for kidney disease and cardiovascular risk factors. Anthropometric data (height, weight, waist and hip circumference) were collected and body mass index (BMI) and waist hip ratio (WHR) were calculated using standard methods [4, 5]. Blood pressures were measured using Accoson's mercury sphygmomanometer with subjects well relaxed and the arms bared and positioned at level of the heart. Hypertension was defined using WHO/ISH Classification [6]. Urine analysis was done using dipstick (Combur 9) for proteinuria, glycosuria and haematuria.

### Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc, Chicago, IL) version 11.5 statistical software was used for data analysis. For continuous variables, mean values and standard deviations were calculated and the means compared using ANOVA or two sample *t* – test. Categorical variables were compared using the nonparametric tests – Chi-squares and Kruskal Wallis. The cross-tabulation was used to analyze the relationship between the BMI, grades of blood pressure (SBP and DBP) and sex in the respondents. Cross tabulation was also used to analyze drug prescription pattern, knowledge of need for routine medical check-up and those who go for medical check-up. All tests were two-tailed with  $p < 0.05$  and C.I of 95% taken as statistically significant.

Pearson's correlation for parametric and Spearman Rho's correlation for non-parametric were used to assess the relationship between age, blood pressure (SBP and DBP), anthropometric data and proteinuria in respondents. Significant variables were further analyzed using the stepwise method of multiple linear regression analysis to isolate predictors of SBP and DBP.

## RESULTS

A total of 129 individuals were screened. One hundred and nine (56 male and 72 female respondents) were analyzed and the others (20) could not be analyzed because of incomplete data.

### Age and Anthropometric Data of Respondents

Table 1 shows the characteristics of the respondents. The mean age of respondents is as shown in Table 1. There was no significant difference in the mean ages of both sexes,  $p$ -value 0.42. Most respondents seen were young: 54.7% were in the age range of 15 – 29 years, 34.4% in the 45 – 59 age range. None of the respondents was above 59 years of age, Fig. 1. The mean BMI was within normal for both male and female respondents and there was no difference statistically between the sexes,  $p$ -value 0.76. Further analysis showed that most respondents (69.8%) were within the range of 18.5 – 24.99 kg/m<sup>2</sup> (Fig. 1). Less than a third (30.2%) had abnormal BMI and about a third of this (10.1%) had BMI above 30 kg/m<sup>2</sup>. The female respondents had higher prevalence of obesity of 16% than the male respondents (4.1%),  $p$ -value 0.70. The mean waist circumference measurements were within normal and there was no difference in the mean values for the both male and female respondents,  $p$ -value 0.12. Only 13.04% of male respondents had their waist circumference >94cm while 21.62% of the females had their waist circumference >80cm.

The mean WHRs were within normal range for sex but the difference between male and female respondents was significantly different,  $p$ -value 0.004. About 3% of the female respondents had WHR >0.85 while about 4% of the male respondents had >0.90.

### Clinical Characteristics of the Respondents

#### A. Routine Medical Check and Drug History

Though ninety two (92) % of the respondents knew about routine medical check, only 43% actually had any form of medical check done. Of these, 49% had only physical examination done. About 35% admitted to having drugs prescribed by non-doctors, 12% would have drugs prescribed by pharmacists and 11.1% would prescribe drugs for themselves.

**Table 1:** Age and Anthropometric Data of the Respondents

Characteristics	Male	Female	All	F	p-value
Number	42	63	105		
Mean age (years)	27.91±10.44	26.35±11.01	27.03±10.75	0.665	0.42
Age range (years)	14-52	13-58	13-58		
Sex ratio	1	1.5	1:1.5		
Body mass index (kg/m <sup>2</sup> )	23.17± 3.73	23.44± 5.11	23.32± 4.52	0.096	0.76
Waist circumference (cm)	76.74±12.66	70.86±14.50	73.11±14.01	2.564	0.12
Waist hip ratio	0.82±0.063	0.77± 0.05	0.79± 0.06	9.347	0.004
Mean Systolic BP(mmHg)	117.36±15.49	113.46±14.76		1.76	0.19
Mean DBP(mmHg)	75.48±12.09	73.03± 9.84		1.35	0.25
Mean arterial pressure (mmHg)	89.17±12.93	86.53±10.84		1.28	0.26
Pluse pressure(mmHg)	41.74±8.67	40.10±9.14		0.85	0.36

**Table 2:** Correlation and p values of Age, SBP and DBP with anthropometric data and proteinuria in respondents

Parameters	Correlation					
	r	P-value	r	p-value	r	P-value
Diastolic blood pressure (DBP)	0.497	<0.001	0.814	0.001	1	
Proteinuria	0.068	<0.503	-0.082	0.442	-0.050	0.641

#### B. Family and Social History

There were significant family history for hypertension (40.3%) and diabetes mellitus (25%) documented in the screening exercise. In contrast only 5% gave family history of renal disease. Of the social habits 22.2% admitted to the use of alcohol, 4% smoked and 3% admitted to the use of recreational drugs.

#### C. History of Use of Probable Nephrotoxic Agents

Nineteen percent admitted to the use of imported herbal preparations (like Chinese tea). About 30% admitted to the use of native medications in various forms. Furthermore 41% of the respondents habitually use mercury-containing soaps while only about 9% used hydroquinone-containing bleaching creams.

#### D. Clinical Parameters

Table 1 shows the clinical parameters of respondents. The mean SBP though higher in the male respondents was not significantly different from the female respondents, p-value 0.187. Most respondents (91.7%) had normal SBP while 6.4% had grade 1 hypertension and 1.8% had grade 2. No respondent had grade 3 hypertension (Fig. 5a). Similarly for mean DBP, there was no statistically significant sex difference, p-value 0.249. About ninety percent of respondents had normal DBP while 3.7% and 6.4% had grades 1 and 2 hypertension respectively, Fig. 3.

The frequency of occurrence of hypertension noted in this study was 13.6%, 3.6% were previously diagnosed while 10% were diagnosed during the

**Table 3:** Stepwise multiple linear regressions of factors that correlate with SBP and DBP as dependent variables with BMI, waist circumference and WHR as independent variables.

Dependent variable	Model	Unstandardized coefficients		Beta	t	Sig.	95% Confidence Interval for B
		B	Std Error				
SBP	Constant	42.99	22.07		1.95	0.057	1.26 – 87.24
	Body mass index	1.15	0.41	0.34	2.77	0.008	0.32 – 1.98
	Waist hip ratio	58.67	28.43	0.26	2.06	0.044	1.66 – 115.69
DBP	Constant	22.39	16.27		1.38	0.175	-10.23 – 55.00
	Body mass index	0.83	0.31	0.34	2.71	0.009	0.22 – 1.44
	Waist hip ratio	42.47	20.96	0.25	2.03	0.048	0.45 – 84.49

screening including a 16 year old student who was noted to have a blood pressure of 160/100mmHg.

#### *E. Urine analysis*

Eighty-one percent of the respondents had no proteinuria while 19% had various levels of proteinuria, Fig.3. Of the proportion that had proteinuria seven percent were male while 12% were female respondents.

#### **Correlations and Multiple Regression Analysis**

Table 2, shows the age of respondents correlated positively with BMI (p-value <0.001), WHR (p-value <0.001), SBP (p-value <0.001) and DBP (p-value <0.001) but did not correlate with proteinuria (p-value = 0.503). Body mass index, waist circumference and waist hip ratio correlated with SBP (p-value = 0.001, =0.007 and =0.009), DBP (p-value 0.001, <0.001 and 0.010) but did not correlate with proteinuria (p-value = 0.123, 0.878 and 0.600).

**Table 4:** Comparison of results from various Screening Programmes.

	Present study	NHANES III <sup>20</sup>	NKFS <sup>21</sup>	AusDiab <sup>22</sup>	SHARE <sup>23</sup>
Country of Origin	Nigeria	USA	Singapore	Australia	Hong Kong
Year of Screening	2006	1988-1994	1997-2001	1999-2000	2003
Age range	13 – 58	20 years	Adults	=25 years	=20 years
N (total)	109	14,622	189,117	11,247	1703
N (asymptomatic)		8585	169,552		1201
Mean age (yrs)	27.01	20 to 39	36.3	51.5	56.4 (N=1703) 53 (N=1201)
Prevalence of proteinuria(%)	19	1 (N=14622) 0.3 (N=8585)	1.1	2.4	5.0 (N=1703) 3.2 (N=1201)

NHANES III: Third National Health and Nutrition Examination Survey

AusDiab: Australian Diabetes, Obesity and Lifestyle Study

The stepwise multiple regression analysis was carried out with SBP and DBP as dependent variables and the variables (BMI, waist circumference and WHR) that had significant univariate correlation with them as independent variables. BMI and WHR were isolated as predictors of SBP and DBP with BMI being the best predictor for SBP and DBP, Table 3.

population and affected more of the female respondents (16%) than males (4.1%). This is similar to observations made by Ugo[9] in 1997, who noted a prevalence of obesity of 5.9% in males, 16.3% in females and 10.5% in their study population.

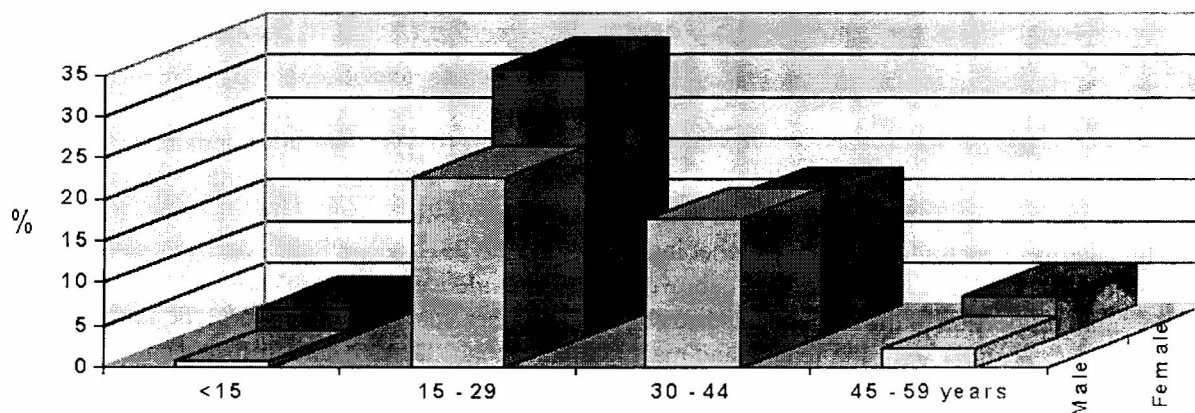


Fig. 1: Respondents (%) by Age group and Sex

### DISCUSSION

The mean age of respondents in this study was 27.03 years which is lower than 36.6 years recorded in the Non-Communicable Disease Survey by the Federal Ministry of Health in 1997 report [7]. The age group 15 to 44 years accounted for 89.1% of the study population. Data from World factbook [8] showed that the age range 15 to 64 accounted for 54.6% of the Nigerian population indicating that the study population was skewed in favour of the younger population.

Interestingly 69.8% of the respondents in this study had normal BMI =  $24.99 \text{ kg/m}^2$ . This suggests that obesity may not be as much a health problem in Nigeria as it is in developed countries. It also corresponds with the report of International Diabetes Federation [10] which estimated that the average BMI in Africa and Asia was between  $20 - 23 \text{ kg/m}^2$ . Truncal fat distribution has been reported to be more associated

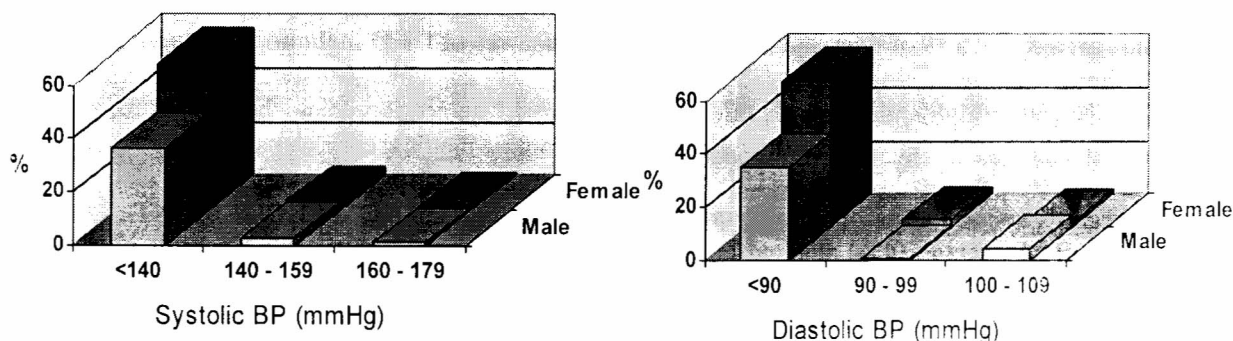


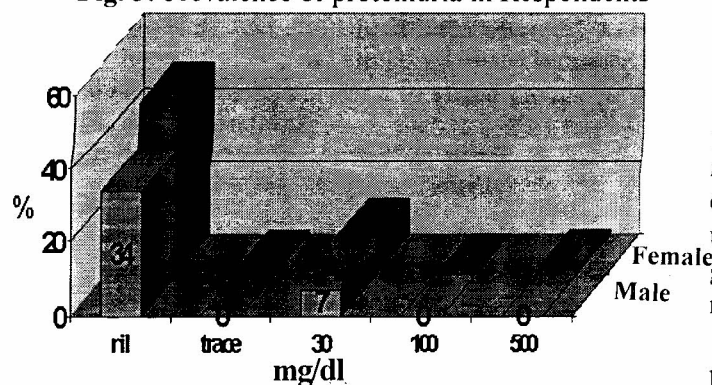
Fig. 2: Distribution of Respondents by grade of Systolic and Diastolic blood pressures.

However, in the Non-Communicable Disease in Nigeria Survey report [7], this age range (15 to 44 years) accounted for 72% of the study population which agrees reasonably with the findings of this present study.

Obesity was found in 10.1% of the study



Fig. 3: Prevalence of proteinuria in Respondents



with cardiovascular risk [11]. In many local settlements, females have been shown to have higher incidence of obesity [9, 11]. Notably the WHR showed that very small proportion of the respondents had abnormal values (3% and 4% for the female and male respondents respectively). The WHR appeared to under represent the true prevalence of obesity.

The waist circumference measurements gave a better representation of obesity. This disparity may be one of the reasons why WHR was excluded from the new definition of the Metabolic Syndrome released by the International Federation of Diabetes (IDF) in May 2005 [12].

Both BMI and WHR were identified as predictors of SBP and DBP in this present study. This is in line with the findings of others [13]. As many as 40% of the respondents gave a family history of hypertension, while 25% had positive family history of diabetes mellitus. Considering that these disease conditions have genetic bases, the implication therefore is that the prevalence of these diseases would be high in the study area. Only 5 % of the respondents gave a positive family history of renal disease. This does not explain the rather high and rising prevalence of CKD in Nigeria [14]. It reflects the low level of awareness and use of medical facilities [15].

As regards social habits of the respondents, only very small percentage (4%) smoked cigarette while 22% drank alcohol occasionally. One in five of the respondents used herbal supplements/tea and a third used other forms of native medications. The active ingredients in most of the native medications have not been isolated, characterized or studied. Indeed, some of these agents may be nephrotoxic [16]. In Belgium, the Chinese tea has been associated with development of interstitial fibrosis [17] as well as bladder malignancy [18]. A significant percentage of the respondents (40%) engaged in the use of mercury containing soaps and/or creams, which has long been associated with kidney damage locally in Nigeria and abroad [19, 20, 21].

This study revealed that 13.6% of the respondents had hypertension, we opine that this figure is staggering despite the fact that the population was unselected and may not be comparable to the crude prevalence rate of 11.2% reported during the community survey by the National non-communicable disease committee [7]. Both figures are astounding and underscores the observation that most people in Nigeria do not appreciate the importance and need for routine medical check.

Also worrisome, was the high prevalence of proteinuria (19%) in the study population. This figure is staggering when compared with results from other kidney prevention programmes in other parts of the world [22, 23, 24, 25]. It may partly explain the very high prevalence of CKD in our environment, though the number screened in this present study is much smaller than those of these other studies (Table 4) [22, 23, 24, 25].

## CONCLUSION

Proteinuria and hypertension are established risk factors for both renal and cardiovascular disease. The very high prevalence of the duo documented in this screening exercise is a wake up call for the Nigerian Association of Nephrology to spearhead implementation strategies for prevention of CKD. The Association should aim at establishing Kidney Disease Prevention Programmes such as is seen in other developing countries: Kidney Help Trust Rural Project in India by K Mani, Kidney Disease Research Programme in South Africa, Bolivian Renal Disease Project by Drs Plata & Remuzzi.

There was also a high prevalence of various risk factors of CKD including practices that impact negatively on health. Most of the population though informed, do not appreciate the importance and need for routine medical check-ups.

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## REFERENCES

1. Bello AK, Nwankwo E and El Nahas AM. Prevention of Chronic kidney disease: A global challenge. *Kidney Int.* 2005; 98 (suppl): S11 – S17.
2. Lysaght MJ: Maintenance dialysis population dynamics: Current trends and long-term implications. *J A Soc Nephrol* 2002, 13: S37 – S40.
3. World Health Organisation: Global burden of disease. Available at <http://www3.who.int/whosis/menu.cfm?path=evidence> Assessed 27<sup>th</sup> March 2006.
4. World Health Organisation Working Group. Use and interpretation of anthropometric indicators of nutritional status. *Bulletin of WHO* 1986, 64(6): 929 – 941.
5. WHO. Obesity: preventing and managing the global epidemic. Report on a WHO Consultation on obesity, Geneva 3-5 June 1997. WHO/NUT/NCD/98.1. Technical Report Series Number 984. Geneva: World Health Organization, 2000.
6. World Health Organization, International Society of Hypertension Writing Group. 2003 World Health Organization (WHO)/ International Society of Hypertension (ISH) statement on management of hypertension. *J Hypertens* 2003, 21: 1983 – 1992.
7. Federal Ministry of Health. Non-Communicable Disease in Nigeria. Final Report of National Survey, Lagos 1997: 1 – 118.
8. World Factbook. Facts on Nigeria available at <http://www.odcigov/cia/publication/factbook/geos/ni.html> Accessed on 8/6/2006.
9. Ugo CC. A Study of Correlations of Obesity with Hypertension in Nigerians living in Enugu. A dissertation submitted to the National Postgraduate Medical College in partial fulfillment of the requirement for the fellowship of the College in Internal Medicine. May 1996.
10. Allgot B, Gan D, King H, Lefebvre P, Mbanya J-C, Silink M, Siminerio L, Williams R and Zimmet P. The International Diabetes Federation Diabetes Atlas: The Widening Circle: Obesity. Ed Delice Gan. 2<sup>nd</sup> ed. 2003: 21 – 22.
11. Okosun IS, Chandra KMD, Choi S, Christman J, Dever GEA and Prewitt TE. Hypertension and Type 2 Diabetes Comorbidity in Adults in the United States: Risk of Overall and Regional Adiposity. *Obes Res.* 2001; 9: 1–9.
12. The International Diabetes Federation. The IDF consensus worldwide definition of the metabolic syndrome. Available at <http://www.eatlas.idf.org/> Assessed on 19/6/2006.
13. Sakurai M, Miura K, Takamura T *et al.* Gender differences in the association between anthropometric indices of obesity and blood pressure in Japanese. *Hypertens Res.* 2006;29(2):75-80.
14. Arogundade FA, Sanusi AA and Akinsola A. Epidemiology, clinical characteristics and outcomes in ESRD patients in Nigeria; is there a change in trend? In: Proceedings at the World Congress of Nephrology, Nephrology (Suppl) 2005, Singapore Blackwell Publishing Suntec, Singapore 2005: Pg 56.
15. Ojogwu LI and Anah CO. Renal failure and hypertension in Tropical Africa – A predialysis experience from Nigeria. *East Afr J Med* 1983; 60: 478 – 484.
16. Kadiri S, Arije A and Salako BL. Traditional herbal preparations and acute renal failure in South West Nigeria. *Tropical Doctor* 2000; 29: 244 – 246.
17. Vanherweghem JL, Deprerreu M, Tieleman C *et al.* Rapidly progressive interstitial fibrosis in young women: association with slimming regimen including Chinese herbs. *Lancet* 1993; 341: 387 – 391.
18. Nortier JL, Schmeiser HH, Martinez MM, Arlt VM, Vervaet C, Garbar C H, Daelemans P, and Vanherweghem JL. Invasive urothelial carcinoma after exposure to Chinese herbal medicine containing aristolichic acid may occur without severe renal failure. *Nephrol Dial Transplant* 2003; 18: 426 – 428.
19. Bar RD, Rees PH, Cordy PE, Kungu, A, Woodger BA and Cameron HM. Nephrotic syndrome in adult Africans in Nairobi. *Br Med J* 1972; 2: 131 – 134.
20. Kibukamusoke JW, Davis DR and Hutt MSR. Membranous nephropathy due to skin-lightening cream. *Br Med J* 1974; 2: 646 – 647.
21. Ulası II, Ijoma CK and Kalu OA. Aetiological relationship between nephrotic syndrome and mercury containing skin lightening creams and

- medicated soaps. *Niger Med J* 2005; 2: 29 – 32.
22. Garg AX, Kiberd BA, Clark WF, Haynes RB and Clase CM. Albuminuria and renal insufficiency prevalence guides population screening: results from the NHANES III. *Kidney Int* 2002; 61: 2165 – 2175.
23. Ramirez SP, McClellan W, Port FK and HSU SI. Risk factors for proteinuria in a large, multiracial, Southeast Asian population. *J Am Soc Nephrol* 2002; 13: 1907 – 1917.
24. Chadban SJ, Briganti EM, Kerr PG, Dunstan DW, Welborn TA, Zimmet PZ and Atkins RC. Prevalence of kidney damage in Australian adults: The AusDiab Kidney Study. *J Am Soc Nephrol* 2003, 14: S131 – S138.
25. Li PK, Kwan BC, Leung CB, Kwan TH, Wong KM, Lui SI *et al.* Prevalence of silent kidney disease in Hong Kong: the screening for Hong Kong Asymptomatic Renal Population and Evaluation (SHARE) program. *Kidney Int* 2005; 67(94): S36 – S40.