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Lipid Levels and Disorders in Hospital Attendants in Banjul, The Gambia

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Abstract

Background: One of the major risk factors for cardiovascular diseases is lipid abnormalities. Objective: To determine the mean lipid levels and the prevalence of lipid disorders among patients attending outpatient clinics in Banjul, The Gambia. Design: Cross-sectional study. Setting: Outpatient clinics of Royal Edward Francis Small Teaching Hospital and Medical Research Council Laboratories in Banjul, The Gambia. Methods: Two hundred and eight consecutive patients with systemic hypertension on treatment and 108 non-hypertensive patients aged over 25 years were enrolled. A questionnaire was filled and anthropometric measurements were taken. An oral glucose tolerance test (OGTT) was done as well as blood investigations including total cholesterol (TC), high-density lipoprotein cholesterol (HDL) and triglycerides (TG). Low-density lipoprotein cholesterol (LDL) was calculated using the Friedwald formula. There were 305 participants with complete lipid results and these were included in the analysis. Results: The mean (standard deviation) TC was 4.92 (1.78) mmol/L; mean TG was 0.94 (0.56) mmol/L; mean HDL was 1.28 (0.48) mmol/L and mean LDL was 3.20 (1.41) mmol/L. The prevalence of lipid abnormalities was 41% for high TC, 9% for high TG, 36% for low HDL, 49% for high LDL and 6% for atherogenic dyslipidaemia. Conclusion: The mean lipid level and the prevalence of lipid disorders in patients attending clinics in Banjul were high.

Keywords

Lipids, Lipid Disorders, Atherogenic Dyslipidaemia, Systemic Hypertension, Diabetes Mellitus

Subject Areas: **Internal Medicine**

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1. Introduction

Lipid disorders are now established as major risk factors for cardiovascular diseases (CVD) such as coronary artery disease, stroke and peripheral vascular disease [1]. These abnormalities of lipids cause CVD through the promotion of atherosclerosis, where there is increased deposition of cholesterol in the blood vessel wall, resulting in narrowing of the lumen of the vessel and hardening of the vessel wall. High levels of LDL lead to increased deposition of cholesterol in arterial walls while high levels of HDL reduce the risk of CVD [1]. The role of hypertriglyceridaemia remains controversial though there is indirect evidence from studies which have shown its association with coronary artery disease [2] [3]. Lipid disorders are more common in patients with diabetes mellitus (DM) and systemic hypertension (HPT) than in the general population and the progression of atherosclerosis is more rapid in these patients resulting in an increased risk for CVD [4].

The main abnormalities of lipid metabolism are high TC, high TG, high LDL, low HDL and atherogenic dyslipidaemia. Atherogenic dyslipidaemia manifests itself by low HDL, elevated TGL, raised apolipoprotein B, increased remnant lipoproteins, small HDL and small LDL particles [2] [5]. Atherogenic dyslipidaemia is often seen in the metabolic syndrome and is also common in type 2 DM where TC and LDL levels are similar to those without DM. However in DM there is abnormal post-prandial hyperlipidaemia and LDL particles are dense and small and in addition there is accumulation of cholesterol-rich remnant particles. All these factors are associated with increased atherogenicity [2] [6].

There have been very few CVD studies in The Gambia and the only published study on lipids to date is a 1996-97 community study conducted in Banjul and Farafenni. The prevalence of high TC was 21.1% in urban Banjul and 6.1% in rural Farafenni while the prevalence of high TG was 2.2% and 2.9% in Banjul and Farafenni respectively. The mean TC was 4.4 (1.2) mmol/L for the urban participants and 3.8 (0.9) mmol/L for the rural participants while the mean TG was 0.68 (0.42) mmol/L and 0.78 (0.37) mmol/L for the urban and rural subjects respectively. This study did not assay for HDL and therefore could not report on HDL and LDL [7]-[9]. WHO's 2008 estimated prevalence of high cholesterol in The Gambia was 17.9% in males, 21.9% in females and 19.9% for the total population [10]. Therefore as part of our study to determine the relationship between left ventricular hypertrophy and insulin resistance we measured TC, TG, and HDL in non-hypertensive and hypertensive Gambians who were seen at outpatient clinics [11] [12]. Our main objective for this current study was to determine the mean lipid level and the prevalence of lipid disorders including atherogenic dylipidaemia among patients attending outpatient clinics in Banjul, The Gambia.

2. Materials and Methods

This cross sectional study was conducted at the Royal Edward Francis Small Teaching Hospital (REFSH), Banjul and Medical Research Council (MRC) Laboratories, Fajara, The Gambia from January to May 2000. Patients with systemic hypertension were recruited consecutively from the hypertension clinic of REFSH. Patients with normal blood pressure who reported with minor infectious diseases and had no cardiovascular disease or diabetes mellitus were recruited from the Gate Clinic of the MRC Laboratories as the non-hypertensives. The exclusion criteria for this study were cardiovascular disease (excluding hypertension) or labile hypertension, metabolic diseases, morbid obesity and severe inter-current illnesses.

A questionnaire was administered by a field worker using the appropriate local language and one physician undertook a physical examination of all the participants after the administration of the questionnaire. The weight of participants was measured (to the nearest 0.1 kg) on electric scales (Secca^{r} 770, CMS London), with subjects wearing light clothes and without footwear and the height was measured to the nearest 0.5 cm with footwear and head gear or cap off, using standardised stadiometer. The hip and waist circumferences were measured to the nearest 0.5 cm using a plastic tape measure. The blood pressure was measured with a digital blood pressure machines (Omron^{r} HOM-705 CP, Japan) on the left arm of participants [13]. Three readings were taken and the mean of the later two readings was used in the analysis [14].

An oral glucose tolerance test (OGTT) was performed utilising 75 g anhydrous glucose (BDH Chemicals Limited, Poole, England) in 300 - 350 ml of water. The glucose level on a fasting, 30 min and 120 min samples was determined immediately upon taking the samples using a Haemocue analyser (Haemocue AB, Sweden). In addition venous blood samples were collected and analysed for TC, HDL and TG at the MRC Biochemistry Laboratory using a centrifugal biochemical analyzer (Cobas Fara, Roche, UK). The Friedwald formula was used in calculating the level of LDL [15].

The following definitions were adopted for this study. Hypertension was defined as systolic blood pressure ≥ 140 and/or diastolic blood pressure ≥ 90 mmHg in subjects who are not taking antihypertensive medication [16]. Overall Obesity was defined as Body Mass Index (BMI) ≥ 30 kg/m^2 while Central Obesity or High Waist Hip Ratio (WHR) was defined as WHR > 0.9 for males and >0.8 for females [17]. And diabetes mellitus as fasting venous blood glucose ≥ 7.0 mmol/L and or 2 h post glucose capillary whole blood ≥ 11.1 mmol/L [18]. Lipid disorders were defined as follows; high serum TC, TC > 5.0 mmol/l; high serum TG, TG > 1.7 mmol/l; high serum LDL was LDL > 3.0 mmol/l and low serum HDL, HDL < 1.0 mmol/l in males and HDL < 1.2 mmol/l in females. Atherogenic dyslipidaemia was defined as TG > 1.7 mmol/l and HDL < 1.0 mmol/l in males or HDL < 1.2 mmol/l in females [19].

Data analysis was carried out using Microsoft Excel 2007 and Stata version 8.0 statistical package. Percentages were calculated for discrete variables and these were compared using Pearson Chi-square test. The mean and standard deviation were calculated for continuous variables, and were compared using the Student t-test. The participants were further classified into hypertensives with and without DM and normotensives with and without DM and these four subgroups were labelled as the clinical group. Univariate and multivariate logistic regression analysis were carried out with high TC, high TG, low HDL, high LDL and atherogenic dyslipidaemia as the independent outcome variables and sex, age, DM and HPT were used as the dependent variables. P-values of less than 0.05 were taken as statistically significant.

All the participants after careful consideration and explanation gave a formal consent by signing or thumb printing an informed consent form. The study was approved by The Gambia Government/MRC Ethical Committee.

3. Results

One hundred and eight consecutive normotensive patients (69 females) and 208 patients (138 females) with systemic hypertension on treatment were enrolled from outpatient clinics for our initial study [11] [12]. Three hundred and five participants (199 HPT, 199 females) out of the 316 with complete lipid results were included in this analysis.

The mean (standard deviation (sd)) age of the participants was 53.5 (12.0) years (**Table 1**). Smoking was significantly common in the males while obesity (central and general), mean BMI, WC and HC were higher in the females. The other characteristics including the proportion with DM and HPT were similar in the two sexes.

Mean TC was 4.92 (1.78) mean TG 0.94 (0.56), mean HDL 1.28 (0.48) and mean LDL was 3.20 (1.41) (**Table 2**). Mean HDL was significantly higher in the females than in the males. The sex differences in TC, TG and LDL were not statistically significant. The mean TG was significantly higher in the DM and DM-HPT groups than the controls and HPT only groups (**Table 3**). Mean TC and mean LDL were lower in the control and DM only groups compared to the HPT and DM-HPT groups though these were not statistically significant. Mean HDL was similar in all the clinical groups.

Prevalence of high TC was 41%, high TG 9%, low HDL 36%, high LDL 49% and atherogenic dyslipidaemia was 6%. There were no statistically significant sex differences in the prevalence of high TC, high TG and atherogenic dyslipidaemia. The prevalence of high LDL was significantly higher in the females compared to the males while that of low HDL was similar but not up to statistical significance (**Table 4**). **Table 5** shows the prevalence of lipid disorders by clinical group. There were no statistically significant difference in the prevalence of these disorders in the different groups, however the prevalence tend to be higher in the DM and DM-HPT groups. The exception was in atherogenic dyslipidaemia where the prevalence in the normal and HPT groups were higher. It is also worth noting that of the 46 previously undiagnosed DM patients found in this study only 3 had atherogenic dyslipidaemia and all the 3 were hypertensive as well.

High TC was in univariate logistic regression analysis associated with HPT but after adjusting for age, sex and DM this association was not up to statistical significance (**Table 6**). High TG was associated with only DM in both univariate and multivariate analysis. High LDL, low HDL and atherogenic dyslipidaemia were all not associated with DM and HPT in both univariate and multivariate analysis.

4. Discussion

Lipid disorders were very common among these outpatients in Banjul, The Gambia. The serum lipid levels of these participants were also high. The prevalence of high TC was 41%, high TG 9%, low HDL 36%, high LDL

Table 1. Characteristics of participants by sex.

	Male	Female	All	P
	Number (%)	Number (%)	Number (%)	χ^2 test
	106 (34.8)	199 (65.2)	305	
Age range (years)	31 - 80	27 - 99	27 - 99	
Smoking	57 (53.8)	14 (7.0)	71 (23.3)	<0.001
BMI ≥ 30	11 (10.7)	67 (33.8)	78 (25.9)	<0.001
HIGH WHR	41 (39.8)	175 (88.4)	216 (71.8)	<0.001
HPT	67 (63.2)	132 (66.3)	199 (65.3)	0.59
DM	13 (12.3)	33 (16.6)	46 (15.1)	0.32
	Mean (SD)	Mean (SD)	Mean (SD)	t test
Age (years)	54.7 (10.6)	52.9 (12.6)	53.5 (12.0)	0.23
Weight (kg)	69.8 (15.5)	71.5 (15.7)	70.9 (15.6)	0.35
Height (m)	1.7 (0.1)	1.6 (0.1)	1.6 (0.1)	<0.001
BMI (kg/m^2)	24.1 (5.4)	27.7 (6.0)	26.5 (6.1)	<0.001
WC (cm)	88.2 (12.9)	95.0 (12.1)	92.7 (12.8)	<0.001
HC (cm)	99.4 (11.1)	108.7 (12.2)	105.5 (12.6)	<0.001
Waist-Hip ratio	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)	0.15
SBP (mmHg)	140.1 (28.5)	136.1 (28.6)	137.5 (28.6)	0.24
DBP (mmHg)	82.9 (15.6)	83.6 (14.4)	83.4 (14.8)	0.70
FBG (mmol/L)	5.9 (3.2)	5.6 (1.8)	5.7 (2.4)	0.29

Table 2. Mean serum lipids by sex.

	Male	Female	All	P
	Mean (SD)	Mean (SD)	Mean (SD)	*t* test
Number (%)	106 (34.8)	199 (65.2)	305	
TC (mmol/L)	4.76 (1.78)	5.00 (1.79)	4.92 (1.78)	0.26
TG (mmol/L)	0.97 (0.54)	0.93 (0.58)	0.94 (0.56)	0.54
HDL (mmol/L)	1.21 (0.46)	1.32 (0.49)	1.28 (0.48)	0.05
LDL (mmol/L)	3.11 (1.43)	3.25 (1.39)	3.20 (1.41)	0.39

Table 3. Mean serum lipids by clinical group.

	Control	HPT	DM	DM-HPT	All	P
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	F test
Number (%)	98 (32.1)	161 (52.8)	8 (2.6)	38 (12.5)	305	
TC (mmol/L)	4.56 (1.22)	5.05 (1.93)	4.88 (1.54)	5.27 (2.26)	4.92 (1.78)	0.10
TG (mmol/L)	0.81 (0.51)	0.97 (0.48)	1.40 (1.00)	1.12 (0.78)	0.94 (0.56)	<0.01
HDL (mmol/L)	1.26 (0.36)	1.29 (0.53)	1.26 (0.31)	1.31 (0.58)	1.28 (0.48)	0.94
LDL (mmol/L)	2.94 (1.02)	3.32 (1.52)	2.97 (1.03)	3.45 (1.75)	3.20 (1.41)	0.11

Table 4. Prevalence of lipid disorders by sex.

	Male	Female	All	P
	Number (%)	Number (%)	Number (%)	χ^2 test
Number (%)	106 (34.8)	199 (65.2)	305	
High TC	40 (37.7)	85 (42.7)	125 (41.0)	0.40
High TG	6 (5.7)	21 (10.6)	27 (8.9)	0.15
Low HDL	31 (29.3)	80 (40.2)	111 (36.4)	0.06
High LDL	43 (40.6)	107 (53.8)	150 (49.2)	0.03
Dyslipidaemia	6 (5.7)	12 (6.0)	18 (5.9)	0.90

Table 5. Prevalence of lipid disorders by clinical group.

	Control	HPT	DM	DM-HPT	All	P
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	χ^2 test
Number (%)	98 (32.1)	161 (52.8)	8 (2.6)	38 (12.5)	305	
High TC	32 (32.7))	71 (44.1)	3 (37.5)	19 (50.0)	125 (41.0)	0.19
High TG	7 (7.1)	12 (7.5)	2 (25.0)	6 (15.8)	27 (8.9)	0.13
Low HDL	31 (31.6)	60 (37.3)	4 (50.0)	16 (42.1)	111 (36.4)	0.53
High LDL	44 (44.9)	81 (50.3)	4 (50.0)	21 (55.3)	150 (49.2)	0.71
Dyslipidaemia	6 (6.1)	9 (5.6)	0 (0)	3 (1.9)	18 (5.9)	0.85

Table 6. Univariate and multivariate logistic regression analysis with high TC, high TG, low HDL, high LDL and dyslipidaemia as the outcome variable.

	Univariate			Multivariate		
	OR	CI	P	OR	CI	P
High TC						
Age	1.00	0.98 - 1.02	0.88	1.00	0.98 - 1.02	0.85
Sex	1.23	0.76 - 1.99	0.40	1.20	0.74 - 1.95	0.47
HPT	1.67	1.02 - 2.74	0.04	1.64	1.00 - 2.72	0.06
DM	1.39	0.74 - 2.61	0.31	1.25	0.66 - 2.37	0.50
High TG						
Age	1.02	0.99 - 1.06	0.18	1.02	0.99 - 1.06	0.16
Sex	1.97	0.77 - 5.03	0.16	1.95	0.75 - 5.05	0.17
HPT	1.07	0.46 - 2.48	0.87	0.81	0.34 - 1.96	0.64
DM	2.66	1.09 - 6.50	0.03	2.60	1.03 - 6.54	0.04
High LDL						
Age	1.01	0.99 - 1.03	0.53	1.01	0.99 - 1.03	0.54
Sex	1.70	1.06 - 2.75	0.03	1.70	1.05 - 2.76	0.03
HPT	1.27	0.79 - 2.04	0.32	1.20	0.73 - 1.95	0.47
DM	1.8	0.68 - 2.39	0.45	1.17	0.62 - 2.23	0.63
Low HDL						
Age	1.02	1.00 - 1.04	0.13	1.02	1.00 - 1.04	0.13
Sex	1.63	0.98 - 2.70	0.06	1.65	0.99 - 2.75	0.05
HPT	1.25	0.76 - 2.06	0.37	1.12	0.67 - 1.87	0.68
DM	1.42	0.75 - 2.68	0.28	1.31	0.68 - 2.52	0.41
Dyslipidaemia						
Age	1.02	0.98 - 1.06	0.37	1.02	0.98 - 1.06	0.37
Sex	1.07	0.39 - 2.93	0.90	1.09	0.40 - 3.01	0.87
HPT	1.07	0.39 - 2.94	0.90	0.97	0.34 - 2.74	0.96
DM	1.13	0.32 - 4.09	0.85	1.11	0.0 - 4.07	0.88

49% and atherogenic dyslipidaemia was 6%. These prevalence rates are comparatively very high particularly that of high TC and high LDL.

These rates are higher compared to the previous community study by van der Sande *et al*. They reported an overall prevalence of 21% for high TC for urban Banjul, 13% in males and 29% in females, and total prevalence of 6% for rural Farafenni, 2% in men and 8% in women [7]. Our study found a prevalence of high TC of 38% for male and 43% for women and these were participants mainly from Banjul. Comparing with the Banjul pariticipants from the previous study our prevalence rates were still high. van der Sande *et al.* also reported the following prevalence rates for high TC in their hypertensive population, total 32%, 25% in men, 39% in women for urban participants and total of 10%, 4% in men and 14% in women for the rural participants [7]. Our prevalence rates of 44% HPT and 50% in DM-HPT were still higher.

The previous community study also reported on high TG prevalence rates. The total prevalence was 2%, 4% in men and 1% in women for the urban participants and a total of 3%, 4% in male and 2% in females for the rural participants. They also reported 4% for men, 5% for women, 4% total for urban hypertensives and 1% for men, 3% for women and 2% total prevalence for rural hypertensives [7]. These results were lower than our findings of 9% total prevalence, 6% in males, 11% in females, 8% in HPT only and 16% in DM-HPT. These findings can be explained by the fact that the participants in our study were hospital attendants compared to the previous study where the participants were recruited from the community.

Other hospital based studies have shown high prevalence of lipid abnormalities among patients. Idogun *et al.* found a dyslipidaemia prevalence of 25% - 69% among diabetics with and without complications reporting to the teaching hospital in Benin City, Nigeria [20]. Eghan and Acheampong reported prevalence of high TC of 45%, high TG of 26%, low HDL of 31% and high LDL of 72% while Micah and Nkum reported a prevalence of 54% for high TC, 32% for high TG, 14% for low HDL and 72% for high LDL for DM and HPT patients from the same tertiary hospital in Kumasi, Ghana [21] [22].

These high prevalence rates of lipid disorders certainly predisposes to an increased risk of CVD such as coronary artery disease, stroke and peripheral vascular disease among these Gambian hospital patients particularly those with HPT, DM and DM-HPT. However the prevalence of atherogenic dyslipidaemia, 6%, was not as high as that of the other lipid disorders. And among the 46 previously undiagnosed DM found in this study only 3 had this type of dyslipidaemia which is supposed to be very common among DM and all the 3 patients had HPT as well. In the Botnia Study, DM patients had a prevalence of atherogenic dyslipidaemia three times higher than those with normal glucose tolerance [23].

The mean TC was 4.92 (1.78) mmol/L, mean TG was 0.94 (0.56) mmol/L, mean HDL was 1.28 (0.48) mmol/L and mean LDL 3.20 (1.41) mmol/L. These levels were high especially that of LDL which was higher than the cut off for high LDL. The previous Gambian study had reported lower lipid levels compared to the current findings. It reported a mean TC of 4.1 (1.1) mmol/L for urban men, 4.6 (1.2) mmol/L for urban women, 3.6 (0.9) mmol/L for rural men and 3.9 (0.9) for rural women. The mean TG were as follows 0.68 (0.39), 0.68 (0.44), 0.81 (0.37) and 0.76 (0.37) for urban men, urban women, rural men and rural women respectively. The results for the hypertensives from the urban Banjul were rather similar to the findings from our study. They reported mean TC of 4.9 (1.1) mmol/L for men and 5.0 (1.2) mmol/L for women and mean TG of 1.13 (0.43) mmol/L for males and 0.79 (0.42) for females in the hypertensives [7]. These figures compares with our findings of 4.76 (1.78) mmol/L and 5.00 (1.79) mmol/L for mean TC in male and female respectively and mean TG of 0.97 (0.54) mmol/L in males 0.93 (0.58) mmol/L in females.

Similar results of high lipid levels have been reported from hospital based studies on DM and HPT patients from Accra and Kumasi, Ghana and Nigeria [20]-[22] [24]. Micah and Nkum reported 5.32 (1.24) mmol/L, 1.52 (0.81) mmol/L, 1.65 (0.57) mmol/L and 3.42 (1.22) mmol/L for mean TC, mean TG, mean HDL and mean LDL respectively. However in that report mean TC and LDL were significantly higher in than males but there were no sex difference in mean TG and HDL. There were significant clinical group differences for mean TC, TG and LDL but HDL was similar in the normal, DM, HPT and DM-HPT participants [22]. In this current study only mean HDL was significantly higher in the females than in the males while there were no sex differences in TC, TG and LDL. In addition mean TG was significantly higher in the DM and DM-HPT groups compared to the controls and HPT only groups but the difference in mean TC, mean LDL and mean HDL were not significant in the various clinical groups.

Logistic regression analysis revealed that in these participants there was only a weak relationship between high TC and HPT while there was a much stronger relationship between high TG and DM. DM and HPT had no

association with high LDL, low HDL and atherogenic dyslipidaemia. In Kumasi TC was shown to be associated with SBP, TG was associated with SBP and FBG, HDL was associated with FBG while LDL was not associated with DBP, SBP nor FBG [22]. Both FBG levels and BP were not associated with lipid levels in Accra [24].

The lowest prevalence of lipid abnormalities were in all cases recorded in the normal or the group with neither DM or HPT even though this was not shown to be statistically significant. The only exception was the prevalence of atherogenic dyslipidaemia which surprisingly was highest in the normal group, a finding at variance with the results of the Botnia Study [23]. Further the lowest mean levels of lipids were also recorded in these normal participants. These findings indicates the lower risk of atherosclerosis in the participants with no DM or HPT compared to the increased risk in patients with either or both of these conditions. These results were not different from the observations in Accra, Kumasi and Nigeria [20]-[22] [24].

5. Conclusion

The mean lipid levels and the prevalence of lipid disorders in these hospital attendants were high. There is a need therefore for further studies, increased screening and treatment of these disorders among the Gambian patients.

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List of Abbreviations

BMI	Body Mass Index
CVD	Cardiovascular Diseases
DBP	Diastolic Blood Pressure
DM	Diabetes Mellitus
FBG	Fasting Blood Glucose
HC	Hip Circumference
HDL	High-Density Lipoprotein Cholesterol
HPT	Hypertension
LDL	Low-Density Lipoprotein Cholesterol
MRC	Medical Research Council
OGTT	Oral Glucose Tolerance Test
REFSH	Royal Edward Francis Small Teaching Hospital
SBP	Systolic Blood Pressure
TC	Total Cholesterol
TG	Triglycerides
WC	Waist Circumference
WHR	Waist Hip Ratio

Questionnaire

Resting electrocardiographic/echocardiographic—findings in adults from an urban community in The Gambia. Qustionnaire/physical examination record form.

A. Demography and socio-economic factors

1	IDNO Surname First Name
2	Date of interview
3	Age in years
4	Sex
5	Religion (Moslem = 1, Christian = 2, Other = 3 and specify No response = 9)
6	Married status (Married = 1, Single = 2, Divorced = 3, Widowed = 4, No response = 9)
7	Occupation
8	Highest level of education (No formal education = 1, Madrassa = 2, Primary = 3, Secondary = 4, Technical = 5, University = 6, No response = 9)
9	Address Do you live permanently at the above address? (Yes = 1, No = 2, No response = 9)
10	Have you ever smoked tobacco? (Yes = 1, No = 2, Not Applicable = 8, No Response = 9) If Yes: Still a smoker = 1, Stopped less than 6 months ago = 2, Stopped less than 1 year ago = 3,Stopped less than 5 years ago = 4, Stopped greater than 5 years ago = 5 How many years have you smoked in total? How often do you smoke? (Not every day = 1, 1 - 10 times/day = 2, 11 - 20 times/day = 3, Over 20/day = 4) Do you smoke: (Cigarette = 1, Pipe = 2, Snuff = 3, Other = 4)
11	Receiving treatment for hypertension? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If yes, name/dosage
12	Receiving other medicatios? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If yes, name/dosage
13	Has the doctor ever diagnosed 13a. = Hypertension, 13b. = Obesity, 13c. = Diabetes, 13d. = Heart attack, 13e. = Stroke Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response
14	Family history of 14a. = Hypertension, 14b. = Obesity, 14c. = Diabetes, 14d. = Heart attack, 14e. = Stroke Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response
15	Do you have excessive thirst? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Do you produce a lot of urine? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response
16	Have you ever experienced severe pain across the front of your chest lasting > ½ hour? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response

Continued

17	Discomfort in your chest Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If yes, state where it occurs: Upper sternum Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Lower sternum Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Left anterior chest Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Other Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If other (specify) Do you get it: When walk at ordinary pace Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response What do you do when you get it while you are walking? Stop or slow down = 1, Carry on = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Is it relieved if you stand still? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If yes 1 = After less than 10 Min, 2 = More or equal 10 Min Precipitating factors: Exertion Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Emotion Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Cold weather Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If other yes, specify
18	Do you get pain in your leg Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If yes, specify where Calf pain Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If calf pain, does this pain occur when: Either standing or sitting? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Hurrying or walking uphill? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Walking at ordinary pace Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Does the pain ever disappear while you are walking? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response What do you do if you get it while you are walking? Stop or slow down = 1, Carry on = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Is it relieved when you stand still? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response If yes, After less than 10 Min = 1, More than or equal 10 Min = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response
19	When hurrying on level ground or walking up a slight hill? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response When walking with other people of your own age on level ground Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Do you have to stop for breath when walking at your pace on level ground? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response Are you short of breath on washing or dressing? Yes = 1, No = 2, Don't Know = 3, 8 = Not applicable, 9 = No Response

B. Physical examination

1	Weight (kg)
2	Height (m)
3	Waist circumference (cm)
4	Hip circumference (cm)
5	Cyanosis Yes = 1, No = 2
6	Icterus Yes = 1, No = 2
7	Digital clubbing present Yes = 1, No = 2 If yes, state grade
8	Peripheral oedema Yes = 1, No = 2
9	Pulse rate (beats/min) Pulse rhythm 1 = Regular, 2 = Regular + frequent ectopics, 3 = Regular + frequent ectopics, 4 = Regular + irregular, 5 = Irregular + irregular, 6 = Other If other, specify Pulse volume 1 = Small, 2 = Moderate, 3 = Large Arterial wall texture 1 = Normal, 2 = Hard/tortuous, 3 = Not felt Locomotor brachialis palpable? Yes = 1, No = 2 Volume of main peripheral pulses. 1 = Normal, 2 = Reduced, 3 = Absent, 4 = Increased Symmetry of main peripheral pulses 1 = Equal, 2 = Unequal Specify arteries affected

Continued

10	Arcus senilis Yes = 1, No = 2
11	BP (Systolic/diastolic, mmHg) SBP1 DBP1 SBP2 DBP2 SBP3 DBP3
12	JVP JVP Normal Yes = 1, No = 2 JVP Height (cm) a wave form Normal = 1, Absent = 2, Large = 3 v wave form Normal = 1, Giant = 2
13	Apical impulses: Character of apical impulse 1 = Normal, 2 = Sustained heaving, 3 = Tapping, 4 = Heaving/diffuse (thrusting), 5 = Feeble, 6 = Absent, 7 = Other If other, specify Location of apical impulse 1 = Normal, 2 = Ant. Axillary line, 3 = Axilla, 4 = Other If other, specify Specify interspace
14	Heart rate (beats/Min)
15	Heart rhythm 1 = Regular, 2 = Occasional premature beats, 3 = Frequent premature beats, 4 = Atrial fibrillation, 5 = Gallop, 6 = Other
16	If other, specify heart rhythm
17	Heart sounds 1 = Normal, 2 = Distant, 3 = Not heard, 4 = Abnormal A2 1 = Normal, 2 = Accentuated, 3 = Diminished/absent P2 1 = Normal, 2 = Accentuated, 3 = Diminished/absent M1 1 = Normal, 2 = Accentuated, 3 = Diminished/absent Other Yes = 1, No = 2 If other is yes, specify other
18	Murmurs/thrills None Yes = 1, No = 2 Aortic systolic Yes = 1, No = 2 Apical systolic Yes = 1, No = 2 Pulm systolic Yes = 1, No = 2 Aortic diastolic Yes = 1, No = 2 Apical diastolic Yes = 1, No = 2 Pulm diastolic Yes = 1, No = 2 Other specify
19	Respiratory findings: Normal respiratory finding? Yes = 1, No = 2 If no, specify abnormality
20	Abdomen Normal Yes = 1, No = 2 Specify if no
21	Attending diagnosis? Yes = 1, No = 2 Specify if yes

Restting electrocardiographic/echocardiographic-findings in adults from rural and urban communities in The Gambia.

Ecg Findings Record Form.

1	IDNO
2	Rate (/min)
3	Rhythm (Sinus = 1, Abnormal = 2) Specify abnormality rhythm
4	Axis Normal = 1, LAD = 2, RAD = 3, Indeterminate = 4, Extreme RAD = 5
5	Conduction abnormalities? Yes = 1, No = 2 If yes, specify
6	Minnesota coding
7	SV1 + RV5 OR RV6 =
8	R1 AMPLITUDE SV1 AMPLITUDE SV2 AMPLITUDE RV5 AMPLITUDE SV6 AMPLITUDE RAVL AMPLITUDE
9	ST-T changes Yes = 1, No = 2 If yes, specify change Specify leads involved: V1V2V3 Yes = 1, No = 2 V2V3V4 Yes = 1, No = 2 V4V5V6IaVL Yes = 1, No = 2 II, III, aVF Yes = 1, No = 2 OTHER ST-T changes Yes = 1, No = 2 Specify other ST-T changes
10	Pathological Q Yes = 1, No = 2 If yes, specify leads involved: V1V2V3 Yes = 1, No = 2 V2V3V4 Yes = 1, No = 2 V4V5V6IaVL Yes = 1, No = 2 II, III, aVF Yes = 1, No = 2 OTHER Pathological Q Yes = 1, No = 2 Specify other Pathological Q
11	QT Duration QTC duration
12	Other enlargements RAE Yes = 1, No = 2 LAA Yes = 1, No = 2 RVH Yes = 1, No = 2
13	QRS Durations V1 V5 V6

Restting electrocardiographic/echocardiographic—findings in adults from rural and urban communities in The Gambia.

Echocardiographic Findings Record Form.

1	IDNO
2	LEFT VENTRICULAR ENDO-DIASTOLIC DIAMETER (mm) LVEDD
3	LEFT VENTRICULAR ENDO-SYSTOLIC DIAMETER (mm) LVESD
4a	INTERVENTRICULAR SEPTAL THICKNESS IN DIASTOLE (mm) IVSTD
4b	INTERVENTRICULAR SEPTAL THICKNESS IN SYSTOLE (mm) IVSTS
5a	LEFT VENTRICULAR POSTERIOR WALL THICKNESS IN DIASTOLE (mm) LVPWTD
5b	LEFT VENTRICULAR POSTERIOR WALL THICKNESS IN SYSTOLE (mm) LVPWTS

Continued

6	FRACTIONAL SHORTENING (%) FS
7	EJECTION FRACTION (GIBSON) (%) EF
8	LAD TO AOD RATIO LADAOD
9	EF SLOPE (mm/s) EFSLOPE
10	MITRAL END-POINT SEPTAL SEPARATION (mm) MEPPS

Restting electrocardiographic/echocardiographic—findings in adults from rural and urban communities in the Gambia.

Biochemical results.

1	IDNO
2	OGTT OGTT (0 min) (mmol/l) OGTT (30 min) (mmol/l) OGTT (120 min) (mmol/l)
3	Insulin level (micro U/ml)
4	Lipids: Total cholesterol (mmol/l) Triglycerides (mmol/l) HDL (mmol/l)
5	Creatinine (umol/l)
6	Uric acid (umol/l)