



Prevalence and Perception of Hypertension among Female Adults Living on the Atlantic Coastline of Rural Lagos State, South-West Nigeria – A Baseline Exploration

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Authors' contributions

This study was carried out in collaboration between the Principal Investigator and all other co-investigators. The Principal Investigator BMA, proposed the idea, designed the study and trained the field workers. Authors DFG and RA applied the questionnaire and collected the data while author AA supervised the data collection. Author BMA led data analysis and the writing of initial and final draft of the manuscript. The paper was read by all authors who collectively agreed on the format and presentation and approved the final draft manuscript.

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ABSTRACT

Aims: This study attempted to describe the prevalence and perception of hypertension (HPT) among consenting female adults in two rural communities on the Atlantic coastline of Lagos, Southwest Nigeria.

Study Design: This was a community-based descriptive survey design.

Place and Duration of Study: The study was conducted at Iyafin and Ketu-Ejirin in Lagos State,

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Nigeria, between March and June 2014.

Methodology: To accomplish this aim, a structured questionnaire was served to all parents/care-givers who brought their children to an on-going malaria program so as to evaluate their perception of hypertension. Socio-demographic and other relevant data were obtained and resting blood pressure (BP) of each participant was measured. Hypertension, defined as systolic BP ≥ 140 and/or diastolic BP ≥ 90 mmHg, was categorized into mild, moderate and severe. Data were analyzed using STATA 13.

Results: A total of 77 adult females (mean age 33.4 years) participated in the study. The prevalence of hypertension in our study participants was 18.2% while 19.5% of the participants presented with elevated systolic blood pressure only and 26.0% with elevated diastolic blood pressure only. Approximately 24%, 7% and 2% of married participants presented with mild, moderate and severe diastolic hypertension respectively and 20.8% of hypertensive participants measured their BP more than 2 years prior to survey. A proportion (33, 43%) of the participants did not know what hypertension is while 14 (18%) and 11(14%) respectively related it to excessive thinking and fear. Married participants were about 6 times more likely to have had their BP measured ($\chi^2=9.2$, $P = 0.002$, $OR=5.9$, $CI =1.8, 20.1$) compared to single participants. The commonest reason for measuring BP was general check-up (13%) among single and illness-related (23%) among married participants. Majority of single (73%) and married (53%) participants wanted their BP measured to know about personal health problems. Linear regression analysis showed a positive significant relationship between both systolic blood pressure and length of time of last BP measurement (Coef. = 0.20, $P=0.01$).

Conclusion: Findings in our study suggest a relatively high prevalence of hypertension among women in rural coastline communities in Nigeria coupled with limited knowledge and misconception of the disease. This gap in knowledge and misconception could impact negatively on their health-seeking attitude and family life, calling for an aggressive approach to health promotion/education on and regular screening of hypertension in these coastal rural communities.

Keywords: Rural; Atlantic coastline; adult females; hypertension; perception; Lagos; Nigeria.

1. INTRODUCTION

Hypertension (synonym high blood pressure) is a leading cause of cardiovascular morbidity and mortality. It is designated as either essential (primary) hypertension or secondary hypertension and is now defined as a consistently elevated systolic blood pressure (SBP) ≥ 140 or diastolic blood pressure (DBP) ≥ 90 mm Hg [1]. High blood pressure is called "the silent killer" because it often causes no symptoms for many years, even decades, until it finally damages certain critical organs. The global dimension of hypertension is immense, as it ranks the most common cardiovascular ailment afflicting about one billion people in the world and causing roughly 7.1 million deaths annually [2]. Four main non-communicable diseases (NCD) afflict people everywhere, among which are cardiovascular diseases, cancer, diabetes and chronic lung diseases [3]. Further, NCD was accountable for 36 million (63%) out of the 57 million global deaths in 2008 and it is projected that the economic and health burden of these diseases is escalating disproportionately especially in developing countries. For example, of the 29 million deaths due to NCDs in 2008,

approximately 80% happened in unindustrialized or developing countries and roughly 29% of these mortality happened before the age of 60 years [3].

Ashavaid et al. [4] contend that Asian Indians have increased risk of coronary events, a situation with unsatisfactory reason though it is adduced to be of genetic origin. Statistical reports from Iran indicate hypertension prevalence of roughly 27% and 42%, in people aged 45 to 69 years and those over 70 years of age, respectively [5]. In rural China, from 1991 to 2002, there was an increase, from 16.3% to 21.0%, in the prevalence of hypertension among urban adults and from 11.1% to 18.0% among rural adults [6-8].

Hypertension is said to be the most common cardiovascular disease among Africans and congestive cardiac failure its commonest complication [9,10]. Earlier studies suggested that hypertension was rare in African population [11,12], however, epidemiological transition, urbanization, adoption of urban and foreign lifestyles and improved case findings, among

others, have made hypertension more prevalent as shown in some studies [13-15].

Nigeria is a relatively large country with a population of about 156 million [National Pop. Commission], 52.5% of whom reside in rural areas [16]. The last Nigerian National Non-communicable Disease Survey (NNCDs) conducted in 1997 reported 11.4% prevalence of adult hypertension, varying from 14.8% in urban to 9.8% in rural residences respectively. However, a report on Nigeria from the World Health Organization says that, in 2008, the probability of dying between the ages of 30 and 70 years from any of the 4 main NCD is 20% while adult risk factors for raised blood pressure was 34.8% – 33.5% for males and 36.1% for females [17]. Another report estimated 38.6% of males and 41.2% of females in the country suffered from hypertension in 2012, figures that were above the regional average for both genders [18]. The high prevalence of hypertension together with its deleterious effect on health make it a major public health problem. The disease has been called "a neglected disease that is often ignored by the general public and underappreciated by the medical community" [19]. The prevalence of hypertension is increasing in metropolitan and rural residences [20] and various isolated surveys at community level in Nigeria indicate adult prevalence of the disease to range from 15.0 to 36.6% [21,22]. At any rate, the end-result of uncontrolled or poorly managed hypertension is often end-organ damage such as blindness, renal necrosis, hardening of the arteries (arteriosclerosis), heart disease and apoplexy [23,24] consequences that can be averted by early detection, health promotion and adequate blood pressure monitoring and control [25,26]. The prevention and control of hypertension, especially in rural Nigeria, has not received much attention, although the disease is one of the most modifiable risk factors for cardio-vascular disease in the country [27]. Since data on blood pressure levels among rural population in sub-Saharan Africa is limited [28] and since race [29] and ethnicity [30] impact the incidence of hypertension and metabolic syndrome, hypertension and metabolic syndrome, we aimed to describe the prevalence and perception of hypertension among communities living on the Atlantic coastline in rural Lagos, Southwest Nigeria. The idea behind this study is predicated on scarcity of data on hypertension in this geographical location, on relatively large

population in these remote coastal areas and on ethnographic understanding of HPT which may affect its perception and thus health-seeking behavioral pattern.

2. MATERIALS AND METHODS

This community-based study was carried out in two rural communities on the Atlantic coastline of Lagos State in the extreme southwest area of Nigeria between May 20 and June 4 2014. These coastline communities were Iyafin in Badagry LGA – which is bordered by the Republic of Benin to the west, Ogun State to the north as well as Ojo and Ajeromi-Ifelodun LGAs to the west – and Ketu-Ejirin in Epe LGA which is bordered by Ogun State to the east and Ibeju-Lekki to the southwest. The total population of these communities was estimated to be 6,000. Majority of the community members were of Yoruba ethnic group with a few mixture of other groups. They were classified as of elementary occupation such as farmers, fishermen and petty traders while a few were local machine operators according to the International Standard Classification of Occupations [31]. There were infra-structures such as health facilities, schools and tarred roads, yet there is a need for improved waste disposal and sewage. Though these communities are connected to the national grid, still electricity supply is very infrequent. Houses were made of bricks though there were still few thatched huts. Factors predisposing to western lifestyle appeared minimal in these communities. The target population were community members aged 18 years and above.

This survey was implemented as part of a bigger community-based screening program for raising awareness and providing protective clothing against malaria for children to wear between the hours of 5-9 pm. Advocacy was paid to community gate-keepers and town-hall meetings were held to communicate to community members the overall purpose of the project which included screening for HPT.

All consenting adults who participated in the screening exercise had their BP measured and recorded. Participants were ascertained of the confidentiality of their data and the purpose of the study was clearly explained to them. Agreeing to participate in the survey was accepted as oral consent. Ethical approval to conduct the study was obtained from Lagos State Health Research Ethics Committee.

Participants were earlier counselled to stay away from alcoholic beverages, cigarettes, coffee, tea, and exercise for at least 30 minutes before their blood pressure measurement. They all rested for at least 10 minutes before their sitting blood pressures were taken on three occasions respectively.

2.1 Training of Data Collectors

Three interviewers, graduates of the College of Technology in Lagos State conducted the interview. They were given an initial one-day training to administer a pretested questionnaire to gather data on socio-demographic features and other relevant information on HPT in a face-to-face interviews with the participants. These interviewers were well-versed in the local language and were able to interpret the questionnaire in vernacular when necessary. Intermittent trainings, or reminders, of the interviewers continued during data collection at the respective study sites. These reminders focused exclusively on the importance of collecting full and correct responses from each participant and completing each questionnaire.

2.2 Working Definitions and Procedures

We defined HPT as a condition whereby a participant recorded a systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg according to recommended guidelines [32,33]. Since the left hand and the left radial artery are closer to the heart to give as appropriate a reading as possible, blood pressure measurement of each participant was carefully taken thrice, in sitting position, using the left arm, with the sphygmomanometer at the level of the heart. Pulse was also palpated at the left radial artery. This served as calibrating all blood pressures by one system (Accuson sphygmomanometer and Littman stethoscope) and by one researcher (BMA). Blood pressures were read at the appearance (systolic) and the disappearance (diastolic) of Korotkoff's [34] sound during auscultation. For the purpose of this study, systolic HPT (mmHg) was classified as mild, moderate or severe if the corresponding readings were $\geq 140 < 160$, ≥ 160 and < 180 and ≥ 180 respectively. Diastolic HPT (mmHg) was defined as mild, moderate or severe if corresponding readings were $\geq 90 < 110$, ≥ 110 and < 130 and ≥ 130 respectively. Marital status was defined as "single" if the participant had never had a

conjugal relationship or "married" if there had been or there is still conjugal relationship.

2.3 Data Collection/Measurements

Validity and reliability of the questionnaire were calculated using Cronbach's alpha test which was accepted at 0.71 level. Not more than 6 participants were interviewed per day, leaving ample time for rest prior to taking serial blood pressure measurements and a brief period of about 5 minutes between each measurement that was taken.

2.4 Statistical Analysis

Raw data were initially coded and then entered into a laptop computer where they were cleaned and saved in the computer and in an external storage drive before analysis. Confidentiality was assured by coding each participant with a combination of two alphabets, an underscore and two numbers. Before analysis was conducted, there was recoding of some of the string variables into numerical variables using the "create or change data variable" drop-down menu which gave "other variable-transformation commands" leading to "convert variables from string to numeric." Statistical analysis of prepared data was implemented using STATA 13 software employing both descriptive and inferential statistics both descriptive and inferential statistics (student's t-test, Pearson correlation coefficient and Spearman correlation coefficient). A multiple regression analysis with "What is hypertension?" as the dependent variable against other independent variables was also conducted. A $P \leq 0.05$ level of statistical significance was considered acceptable.

3. RESULTS

The demographic characteristics of the 77 women who participated in the study, stratified by marital status and years of education are as illustrated in Table 1. In all, 13% of these women had no formal education, while about 5% has only primary education. The remaining participants had between 6 and 20 years of education. None of the participants that were single had less than six years of education while most of them (73%) had between 11-15 years of education. On the contrary, about 16% of married participants had no formal education while about 47% of them had 6-10 years of education.

Table 1. Demographic characteristics of participants in the study

	Years of education					
	All	0	1-5	6-10	11-15	16-20
Age (years)						
<20						
Freq. (%)	7 (9.1)	0 (0.0)	0 (0.0)	2 (28.6)	5 (71.4)	0 (0.0)
Mean (±SEM)	18.4 (0.2)	0 (0.0)	0 (0.0)	18.0 (0.0)	18.6 (0.2)	0 (0.0)
20-29						
Freq.(%)	23 (29.9)	1 (4.3)	3 (13.0)	9 (39.1)	10 (43.5)	0 (0.0)
Mean (±SEM)	24.5 (0.6)	26.0 (0.0)	25.0(0.6)	23.8 (1.0)	24.9 (1.0)	0 (0.0)
30-39						
Freq.(%)	27 (35.1)	4 (14.8)	0 (0.0)	14 (51.9)	8 (29.6)	1 (3.7)
Mean (±SEM)	33.4 (0.5)	34.0 (0.7)	0 (0.0)	33.0 (0.9)	33.8 (0.9)	34.0 (0.0)
40-49						
Freq.(%)	14 (18.2)	3 (21.4)	0 (0.0)	5 (35.7)	6 (42.9)	0 (0.0)
Mean (±SEM)	43.7 (0.8)	43.7 (2.7)	0 (0.0)	41.8 (0.9)	45.3 (1.1)	0 (0.0)
50-59						
Freq. (%)	3 (3.9)	0 (0.0)	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)
Mean (±SEM)	55.3 (2.7)	0 (0.0)	50.0(0.0)	58.0 (1.0)	0 (0.0)	0 (0.0)
≥60						
Freq.	3 (3.9)	2 (66.7)	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)
Mean (±SEM)	67.3 (1.5)	67.5 (2.5)	0 (0.0)	67 (0.0)	0 (0.0)	0 (0.0)
Marital status						
Single						
Freq. (%)	15 (19.5)	0 (0.0)	0 (0.0)	4 (26.7)	11 (73.3)	0 (0.0)
Mean(±SEM)	21.3 (1.1)	0 (0.0)	0 (0.0)	18.7 (0.7)	22.0(1.3)	0 (0.0)
Married						
Freq. (%)	62 (80.5)	10 (16.1)	4 (6.4)	29 (46.8)	18 (29.0)	1 (1.6)
Mean (±SEM)	36.1 (1.4)	42.8 (4.6)	31.3(6.3)	34.9 (2.0)	35.7 (1.9)	4.0 (0.0)
Total						
Freq. (%)	77 (100.0)	10 (13.0)	4 (5.2)	29 (37.7)	33 (42.9)	1 (1.3)
Mean	33.4 (1.3)	42.8 (4.6)	31.3 (6.3)	33.5 (2.0)	30.5 (1.8)	34.0 (0.0)

3.1 Prevalence of Hypertension

The mean SBP and DBP of married participants (124.9 and 80.1 mmHg respectively) was significantly higher ($t=-2.50$, $df=75$, $P=0.007$; $t=-3.20$, $df=75.0$, $P=0.001$) than the SBP and DBP of single participants (110.3 and 71.3 mmHg) (Table 2a). In all, 62 (81%) of participants were normotensive for SBP including all the single and 47 (76%) of the married participants while 57 (74%) were normotensive for DBP. The BP measurements of the rest categorized them into mild (8, 10%; 15, 20%), moderate (5, 7%; 4, 5%) and severe (2, 3%; 1, 1%) systolic and diastolic HPT respectively. The participants were 1½ times more likely to have normal SBP ($\chi^2=0.9$, $P=0.3$, $OR=1.5$, $CI=0.7, 3.1$) but twice as likely to develop mild diastolic HPT ($\chi^2=2.5$, $P=0.1$, $OR=2.1$, $CI=0.8, 5.3$). Unexpectedly, approximately 9% and 24% of participants aged 20-29 had mild systolic and mild diastolic HPT respectively while 1 (4%) of them had severe systolic and diastolic HPT. Five (63%) of the participants aged 40 years and above had mild systolic HPT and 8 (53%) presented with mild

diastolic HPT. About 21% of participants measured their BP more than 2 years prior to the study. Table 2b illustrates that 14 (18.2%) of participants in the study had both systolic and diastolic HPT.

3.2 Knowledge of Hypertension

Table 3 shows the distribution of knowledge of HPT based on years of education, marital status and blood pressure levels of the participants. In all 33 (43%) of the study participants, including 10 single and 23 married, did not know what HPT is. The remaining participants related it to excessive thinking (14, 18%), “when blood overflows” or “*ejeriru*” (13, 17%), fear (11, 14%) and other responses such as shock, fatigue, fast breathing and making noise (4, 5%). Thirty eight percent and 40% of those with mild systolic and mild diastolic hypertension described hypertension as foaming blood. Twenty-five percent of those with moderate diastolic hypertension hypertension and all with severe systolic and diastolic hypertension related it to fear.

Table 2a. Means of SBP and DPB and their distribution as normotensive, mild, moderate and severe hypertensive among participants in rural coastal Nigeria

	Blood pressure (mmHg)									
	Systolic					Diastolic				
	Mean(±SEM)	95% CI	t-test	df	P	Mean (±SEM)	95%CI	t-test	df	P
Single	110.3 (2.3)	105.6,114.9				71.3 (1.3)	68.5, 74.2			
Married	124.9 (2.7)	119, 130.3	-2.50	75.0	0.007	83.8 (1.9)	80.1, 87.7	-3.20	75.0	0.001
	Systolic				Diastolic					
	<140	140-159	160-179	≥180	<90	90-109	110-129	≥130		
All	62(80.5)	8 (10.4)	5 (6.5)	2 (2.6)	57 (74.0)	15(19.5)	4(5.2)	1 (1.3)		
χ ²	0.9	2.5	0.0	0.0						
P	0.3	0.1	0.0	1.0						
OR	1.5	2.1	0.8	0.5						
CI	0.7, 3.1	0.8, 5.3	0.2, 3.1	0.0, 5.6						
Marital status										
Single	15 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	15 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)		
Married	47 (75.8)	8 (12.9)	5 (8.1)	2 (3.2)	42 (67.7)	15(24.2)	4 (6.5)	1 (1.6)		
χ ^{2*}	3.10	1.00	0.31	0.04	4.97	3.10	0.13	0.58		
P	0.08	0.32	0.58	0.85	0.03	0.08	0.72	0.45		
OR	Und.	Und.	Und.	Und.	Und.	Und.	Und.	Und.		
CI	Und.	Und.	Und.	Und.	Und.	Und.	Und.	Und.		
Age										
<20	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)		
20-29	19 (82.6)	2 (8.7)	1 (4.3)	1 (4.3)	17 (68.0)	4 (24.0)	1 (4.0)	1 (4.0)		
30-39	27 (100.0)	0 (0.0)	0(0.0)	0 (0.0)	24 (88.9)	3 (11.1)	0 (0.0)	0 (0.0)		
40-49	6 (42.9)	4 (28.6)	3 (21.4)	1 (7.1)	6 (42.9)	5 (35.7)	3 (21.4)	0 (0.0)		
50-59	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)		
≥60	1 (33.3)	1 (33.3)	1 (33.3)	0 (0.0)	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)		

*=Fisher's exact test

Table 2b. Cross tabulation of systolic and diastolic blood pressure to ascertain prevalence of hypertension

Systolic (mm Hg)	Diastolic BP (mmHg)				Total
	<90	90-109	110-129	≥130	
<140	56	6	0	0	62
140-159	1	7	0	0	8
160-179	0	2	3	0	5
≥180	0	0	1	1	2
-Total	57	15	4	1	77

Shaded area illustrates absolute number of completely hypertensive women (14, 18.2%)

3.3 Health Seeking Behavior Relative to Blood Pressure Measurement

In all, 23% of the study population had never had their BP measured before participating in this study (Table 4). Twenty-two (29%) of them, distributed by age group and marital status, had their BP measured within the last 6 months prior

to the study. Participants who were married were about 6 times more likely to have had their blood pressure measured compared to those who were single ($\chi^2=9.2$, P value=0.002, OR=5.9, CI=1.8,20.1).

3.4 Reasons Why Participants had Their Blood Pressure Measured

To quickly probe into participants' perception of HPT, the survey asked why they had their blood pressure taken the last time. More than half (55, 71%) of them did not know the reason why their blood pressure was measured (Table 5) as this was not explained to them. However, among the reasons why blood pressure was measured among married participants were illness (18, 23%) and pregnancy (7, 10%) and as a result of general check-up among 2 (13%) single participants.

Table 3. Distribution of knowledge of hypertension by years of education, marital status and category of SBP and DBP

Variables	Responses to the question "What is hypertension?"					
	DK	Excessive thinking	Foaming blood	Fear	HBP	Others
Years of education						
0	4 (40)	2 (20)	1 (10)	0 (0)	0 (0)	3 (30)
1-5	2 (50)	1 (25)	0 (0.0)	1 (25)	0 (0)	0 (0)
6-10	14 (42)	6 (18)	6 (18)	6 (18)	0 (0)	1 (3)
11-15	12 (41)	5 (17)	6 (21)	4 (14)	2 (7)	0 (0)
16-20	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Marital status						
Single	10 (67)	3 (20)	1 (7)	1 (7)	0 (0)	0 (0)
Married	23 (37)	11 (18)	12 (19)	10 (16)	2 (3)	4 (6)
χ^2	4.30	0.03*	0.60*	0.28*	0.04*	0.13*
P	0.04	0.87	0.42	0.60	0.84	0.72
OR	3.4	1.2	0.3	0.4	0.0	0.0
CI	1.0, 11.2	0.3, 4.8	0.0, 2.5	0.04, 3.2	undefined	undefined
SBP						
Normal	27 (44)	12 (19)	9 (15)	9 (15)	2 (3)	3 (5)
Mild	3 (38)	1 (12)	3 (38)	0 (0)	0 (0)	1 (12)
Moderate	3 (60)	1 (20)	1 (20)	0 (0)	0 (0)	0 (0)
Severe	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)
DBP						
Normal	25 (44)	11 (19)	7 (12)	9 (16)	2 (4)	3 (5)
Mild	6 (40)	2 (13)	6 (40)	0 (0)	0 (0)	1 (7)
Moderate	2 (50)	1 (25)	0 (0)	1 (25)	0 (0)	0 (0)
Severe	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)

*DK=Don't know; HBP=High Blood Pressure; OR=Odds Ratio; CI=Confidence interval; *=Fisher's Exact test; SBP=Systolic Blood Pressure; DBP=Diastolic Blood Pressure*

Table 4. Chi-square analysis of whether participants had ever had their blood pressure measured or not and duration since last BP measurement

	Have you had your blood pressure taken before?						χ ²	P-value	OR	CI
	No	Yes								
		Duration (mths)								
	<6	6-12	13-24	25-36	37-48					
Yrs. Ed.										
- None	3 (30)!	1 (10)	1 (10)	3(30)	2(20)	0 (0)	0.02*	0.90	0.67	0.15, 2.93
- 1-5	2 (50)	0 (0)	1 (25)	0 (0)	1(25)	0 (0)	0.47*	0.49	0.28	0.04, 2.15
- 6-10	6 (18)	11 (33)	8 (24)	3 (9)	2 (6)	3 (9)	0.86	0.35	1.69	0.56, 5.10
- 11-15	7 (24)	9 (31)	10(34)	3(31)	0 (0)	0 (0)	0.01	0.90	0.93	0.32, 2.76
- >15	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0.40*	0.53	Und.	Und.
Marital status										
- Single	8 (53)	4 (27)	3 (20)	0 (0)	0 (0)	0 (0)				
- Married	10 (19)	18 (29)	17(27)	9(15)	5 (8)	3 (5)	9.2	0.002	5.94	1.76,20.12
SBP										
- Normal	16 (26)	19 (31)	17(27)	6(10)	3 (5)	1 (2)	0.5	0.49	0.44	0.09, 2.18
- Mild	0 (0)	2 (25)	2 (25)	2(25)	2(25)	0 (0)	1.5*	0.22	Und.	Und.
- Moderate	2 (40)	1 (20)	0 (0)	1(20)	0 (0)	1(20)	0.5*	0.49	0.28	0.04, 2.15
- Severe	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	1(50)	0.4*	0.53	Und.	Und.
DBP										
- Normal	15 (26)	18 (32)	16(28)	6(11)	1 (2)	1 (2)	0.5*	0.47	0.49	0.13, 1.93
- Mild	2 (13)	4 (27)	3 (20)	2(13)	4(27)	0 (0)	0.5*	0.49	2.23	0.46,11.13
- Moderate	1 (25)	0 (0)	0 (0)	1(25)	0 (0)	2(50)	0.3*	0.60	0.91	0.09, 9.34
- Severe	0 (0)	0 (0)	1(100)	0 (0)	0 (0)	0 (0)	0.4*	0.53	Und.	Und.

Mths=months; Yrs, Ed=years of education;! = (%); * = Fisher's exact test; CI=Confidence Interval; Und.=undefined

Table 5. Reasons why participants had their blood pressure measured previously based on marital status

	Reasons				
	DK	Illness	Pregnancy	General check-up	On-going program
Marital status					
- Single	13 (86.7)	0 (0)	1 (6.6)	1 (6.6)	0 (0)
- Married	34 (54.8)	16 (25.8)	7 (11.3)	3 (4.8)	2 (3)
- χ ²	3.9*	3.4*	0.0	0.1	0.0
- P value	0.04	0.06	0.95	0.72	0.84
- OR	5.4	0.0	0.56	1.40	0.0
- CI	1.1, 25.7	Und.	0.1, 4.9	0.1, 14.5	Und.
SBP					
- Normal	39 (62.9)	13 (21.0)	6 (9.7)	3 (4.8)	1 (1.6)
- Mild	5 (62.5)	1 (12.5)	1 (12.5)	0 (0.0)	1 (12.5)
- Moderate	2 (40.0)	2 (40.0)	0 (0.0)	1 (20.0)	0 (0.0)
- Severe	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)
DBP					
- Normal	38 (61.3)	12 (19.4)	3 (4.8)	3 (4.8)	1 (1.6)
- Mild	7 (46.7)	3 (20.0)	4 (26.7)	0 (0.0)	1 (6.6)
- Moderate	2 (50.0)	1 (25.0)	0 (0.0)	1 (25.0)	0 (0.0)
- Severe	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)

DK=don't know; * =Fisher's exact test; OR=Odds ratio; CI=Confidence Interval; SBP=systolic blood pressure; DBP=diastolic blood pressure

3.5 Brief Investigation into Participants' Health-seeking Behavior Concerning Hypertension

Lastly, participants were asked why they wanted their blood pressure measured during the survey. This was to give the study team a glimpse into participants' knowledge of HPT, to determine if they value the exercise, to conclude a possible transient health seeking behavior and to investigate their willingness to submit themselves to blood pressure measurement in their own familiar environment.

The desire to know about "personal health problems" prompted 73% of single and 33% of married participants to voluntarily present themselves for blood pressure measurement (Table 6). One married participant did not want her BP to be measured while another wanted it measured because she had never had her BP measured while a third wanted it measured "to know if I have an illness after child birth". One single participant said "I want to know if my blood is high..." while another stated "...to know about my blood."

In Table 7, six predictor variables were selected for a linear regression analysis against systolic and diastolic blood pressures as dependent variables. The analysis showed a positive but weak relationship between SBP and age of participants (Coef.= 0.15, P=0.06), a stronger and significant relationship between SBP and duration of last BP measurement (Coef.= 0.20, P=0.01) and yet a stronger relationship between SBP and whether the participant has had her BP measured before (Coef.= 0.53, P=0.04). The situation was similar for DBP except for age.

4. DISCUSSION

As far as we know, ours is the first study to document the prevalence of hypertension among women living in communities along the Atlantic coastline of Lagos in southwest Nigeria. One of the most important findings in this study was that a relatively high proportion of our study participants are hypertensive. The relatively high prevalence of hypertension reported in our study should be regarded as a public health concern. Consequences of hypertension such as heart failure, stroke, blindness and renal necrosis, are expected to occur in these communities and may lead to prolonged disability especially among those who are unaware that they have the illness.

Table 6. Response given to the question "why do you want your blood pressure to be taken now?" relative to marital status and blood pressure measurements

	Marital status		Blood pressure			
	Single	Married	Systolic		Diastolic	
			NTV	HTV	NTV	HTV
	Freq.	Freq.	Freq.	Freq.	Freq.	Freq.
- Desire to know about personal health problems	11 (73.3)*	33 (53.2)!	33(53.2)	11 (73.3)	32 (56.1)	12(60.0)
- Illness related	1 (6.7)	9 (14.5)	9 (14.5)	1 (6.7)	7 (12.3)	3 (15.0)
- Don't know	1 (6.7)	5 (8.1)	5 (8.1)	1 (6.7)	5 (8.8)	1 (5.0)
- I was told to come	1 (6.7)	0 (0.0)	1 (1.6)		1 (1.8)	0 (0.0)
- To know about my blood	1 (6.7)	0 (0.0)	0 (0.0)	1 (6.7)	1 (1.8)	0 (0.0)
- I have never done it before	0 (0.0)	4 (6.4)	4 (6.4)	0 (0.0)	3 (5.3)	1 (5.0)
- I benefit from it	0 (0.0)	4 (6.4)	4 (6.4)	0 (0.0)	4 (7.0)	0 (0.0)
- I measured my BP a long ago	0 (0.0)	3 (4.8)	3 (4.8)	0 (0.0)	2 (3.5)	1 (5.0)
- For health advice	0 (0.0)	1 (2.9)	1 (2.9)		1 (1.8)	0 (0.0)
- Don't want BP taken	0 (0.0)	1 (1.6)	0 (0.0)	1 (6.7)	0 (0.0)	1 (5.0)
- Just gave birth	0 (0.0)	1 (1.6)	1 (1.6)	0 (0.0)	1 (1.8)	0 (0.0)
- Request to focus on adults	0 (0.0)	1 (1.6)	0 (0.0)	1 (6.7)	0 (0.0)	1 (5.0)
- Total	15 (19.5)	62 (80.5)	62(80.5)	15 (19.5)	57 (74.0)	20(26.0)

*= (%); !=(χ²=2.0; P=0.2; OR=2.4; CI=0.7, 8.4); NTV=Normotensive; HTV=Hypertensive

Table 7. Linear regression analysis of SBP and DBP as the dependent variables among all participants

Predictor variables	SBP as dependent variable				
	Coef.	Std. Err.	t	P> t	[95% CI]
Age (years)	0.15	0.08	1.86	0.06	-0.01, 0.32
Years of education	0.10	0.09	1.19	0.24	-0.07, 0.28
Marital status	0.21	0.24	0.86	0.39	-0.28, 0.70
What is hypertension	0.00	0.00	0.26	0.79	-0.00, 0.00
Have you had your BP taken before?	0.53	0.26	2.02	0.04	0.01, 1.05
How long ago was your BP taken?	0.20	0.08	2.41	0.01	-2.76, 0.70
	DBP as dependent variable				
Age (years)	0.04	0.07	0.55	0.58	-0.11, 0.19
Years of education	0.10	0.08	1.28	0.20	-0.06, 0.27
Marital status	0.38	0.22	1.73	0.08	-0.06, 0.81
What is hypertension	0.00	0.00	0.55	0.58	-0.00, 0.00
Have you had your BP taken before?	0.50	0.23	2.15	0.03	0.04, 0.97
How long ago was your BP taken?	0.23	0.07	3.16	0.002	0.09, 0.38

Over 40 years ago, hypertension prevalence of 2-5% was reported from a survey of blood pressure in rural Ghana [35]. Within the last ten years however, many studies conducted in rural and urban sub-Saharan Africa, report much higher prevalence of hypertension among both adult males and females indicating a gradual rise in the occurrence of the disease thus confirming the disease has definitely assumed a public health dimension in this part of the world [36]. For example, apart from our findings of 18.2% prevalence of hypertension, other studies conducted in southwest Nigeria reported prevalence of 13.16% [20], 20.8% [37] and 26.4% [38] while those conducted further north describe a prevalence of 20.9% [39], though some did not particularly address women. Studies conducted among much older people in eastern part of Nigeria showed higher frequency of hypertension [40,41]. The prevalence of hypertension in our study is quite similar to 18.3% [42] and 23.6% [43] reported from South-south geo-political zones of the country. While the 28.3% and 28.9% prevalence of hypertension reported from Ethiopia [44], [45] and the 32.9% reported from Ghana [46] are higher than our findings, other studies reported lower prevalence of 10.2% in southern Ethiopia [47] and 14.1% in Vietnam [48].

Data from our study and those of others within and outside Nigeria clearly indicate a rising trend in hypertension affecting adults. Data from our study also indicates that hypertension is more prevalent among married than single people. Married women may be more prone to hypertension because of various types of stress

they face such as financial, family, environmental and social stress. Women have to not only source for livelihood but also cater for children, fetch water and do other household chores. Younger people, on the other hand, are less prone to hypertension because they have lesser responsibilities, are not yet married, have no mental pressure and have free time for leisure and exercise.

More than half of the participants in our study did not know what hypertension means while others have poor perception of the illness, consonant with the findings of Ike et al. [49]. In a national survey of non-communicable diseases in Nigeria it was reported that only about a third of hypertensive individuals were aware of their condition [50], which corresponds to our findings.

In our study, half of the participants could not correctly describe what hypertension is while others described it as excessive blood or overflowing blood or foaming blood (*ejeriru*), thereby relating the illness with blood (*eje*). We do not know the origin of this ethnographic terminology of hypertension though it probably was as a comparison to epilepsy. This specific description of hypertension in rural communities has never been documented before. In the Akan-speaking area of rural Ghana, hypertension is also described as "*mogyabrosowo*" meaning excessive blood. Others in our study described hypertension as resulting from fear or excessive thinking, contrary to medical model of hypertension which focuses mainly on the physical [51] and contrary to obesity, heavy alcohol consumption, sedentary lifestyle, high

salt intake and age as risk factors of hypertension [52], avoiding physical exercise and smoking [53] and city life [51].

Factors that may predispose to the low level of hypertension knowledge in these rural communities are probably low level of education among women, lack of information materials such as posters and radio and television jingles and advertisement in print and electronic media.

Resources from the state and local governments should be explicitly allotted to hypertension. In addition, local pharmacies/chemists should be trained to monitor blood pressure, especially among marginal populations such as married or those with little or no education, for free while critically needed information about hypertension should be disseminated using print and electronic media as well as using mobile phone short text messages. These steps may probably enhance a better knowledge of not only hypertension but of health in general and also increase the proportion of women who have their blood pressure measured at least twice a year. Finally, it is obvious from our study that rural women desire to know more about their health and this can be provided for them through rural regular hypertension programs, health information and health education at health facilities.

5. CONCLUSION

This study describes hypertension from the point of view of women on the Atlantic coastline of Lagos Nigeria. The study concludes that awareness and knowledge about hypertension and its consequences are inadequate in these communities. Incorrect community understanding of hypertension and its negative outcomes are apparent factors that may influence self-treatment. Though hypertension-related complications are avoidable, misconception and deficiency of public awareness about the illness are common and may be connected with ongoing inadequate awareness, especially among rural women in coastal Lagos. One of the priorities of the state and local governments' health priorities should be increasing public awareness of hypertension using public education through interventions that encourage hypertension screening and other health provider strategies. Findings from this study are essential to identify and fill gaps in current hypertension information, awareness and understanding for the

development of effective and broad-based health promotion programs leading to the prevention, control and overall management of hypertension in Nigeria. Efforts should be made at local government level to minimize the spreading of incorrect information on hypertension.

6. LIMITATIONS AND STRENGTHS

There were some limitations in this study that need to be highlighted. First, a representative sample was not drawn and the sample size may not be representative of all the rural coastal dwellers in Nigeria. Secondly, the classical qualitative methods of extracting information on perception, attitude and awareness, such as Focus Group Discussions, In-depth Interviews and Observational technique, were not used. However, the opinions of individuals were taken to give a moderate and probably acceptable account of the knowledge of hypertension in these small rural coastal communities. Thirdly, stratification by marital status was skewed more towards the married than single and classification by years of education presented only 2 participants with more than 15 years of education and their views and perception may not be representative of others with higher levels of educational standard. Fourthly, the study did not document participants' knowledge of risk factors, treatment or complications associated with hypertension. Lastly, Focus Group Discussions and in-depth interviews which could have yielded more and probably richer information than individual interviews were not used to explore complex beliefs of individuals. This part of the study was next phase of the study. Finally, non-inclusion of males in this study is a major limitation that would prevent generalization of our results.

The strength of the study was the absence of inter-observer error as only one medical doctor measured the blood pressure of all the participants using the same instruments. The blood pressure of not more than six participants were recorded daily, leaving time for multiple blood pressure of the same person to be taken. The exercise took place in an area within the community that the participants are familiar with. Therefore, participants were not intimidated by medical gadgets and hospital environment, giving the community a relaxed atmosphere for blood pressure measurement.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Mathers C, Stevens G, Mascarenhas M. Global health risks: mortality and burden of disease attributable to selected major risks. Geneva, Switzerland. World Health Organization; 2009.
- Brundtland GH. From the World Health Organization. Reducing risks to health, promoting healthy life. JAMA. 2002;288:1974.
- World Health Organization (WHO). Available:http://www.who.int/gho/ncd/mortality_morbidity/en/
- Ashavaid TF, Shalia KK, Kondkar AA, Todur SP, Nair KG, Nair SR. Gene polymorphism and coronary risk factors in Indian population. Clinical chemistry and Laboratory Medicine. 2002;40:975-985.
- Sabouhi F, Babaee S, Naji H, MSc, Zadeh AH. Knowledge, awareness, attitudes and practice about hypertension in hypertensive patients referring to public health care centers in Khor & Biabanak. Iran J Nurs Midwifery Res. 2011;16(1):34–40.
- Yu, JO, Cho YB. The effect of an internet community on knowledge, self-efficacy and self care behavior in workers with hypertension. J. Korean Acad. Nurs. 2005;35:1258–1267.
- Tao S, Wu X, Duan X, Fang W, Hao J, Fan D, Wang W, Li Y. Hypertension prevalence and status of awareness, treatment and control in China. Chin. Med. J. 1995;108:483–489.
- Hua W, Zhang LF, Wu YF, Liu XQ, Guo DS, Zhou HL, Gou ZP, Zhao LC, Niu HX, Chen KP, et al. Incidence of sudden cardiac death in China: Analysis of 4 regional populations. J. Am. Coll. Cardiol. 2009;54:1110–1118.
- Akinkugbe OO. High Blood Pressure in the African. Edinburg, Scotland:Churchill Livingstone; 1972.
- Akinkugbe OO. World epidemiology of hypertension in blacks. In: Hall WD, Saunders E, Shulman NB, editors. Hypertension in Blacks. Philadelphia, PA: Chicago Year Book Publishers; 1985.
- Shaper AG, Wright DH, Kyobe J. Blood pressure and body built in three nomadic tribes of northern Kenya. East Afr Med J. 1969;46:273–281.
- Pobee JO, Larbi EB, Belcher DW Wurapa FK, Dodu SR. Blood pressure distribution in a rural Ghanaian population. Trans R Soc Trop Med Hyg. 1977;71:66–72.
- Cooper RS, Rotimi CN, Karfman JS. Hypertension treatment and control in sub-Saharan Africa: the epidemiological basis for policy. BMJ. 1998;316:614–617.
- Sun Z, Zheng L, Wei Y, Li J, Zhang X, Liu S, et al. The prevalence of pre hypertension and hypertension among rural adults in Liaoning province of China. Clin. Cardiol. 2007;30:183–187.
- Sun Z, Zheng L, Detrano R, Zhang X, Xu C, Li J, et al. Incidence and predictors of hypertension among rural Chinese adults: Results from Liaoning province. Ann. Fam. Med. 2010;8:19–24.
- Available:<http://www.indexmundi.com/facts/indicators/SP.RUR.TOT>
- World Health Organization (WHO). Available:http://www.who.int/nmh/countries/nga_en.pdf
- World Health Organization (WHO). Available:http://www.who.int/nmh/countries/nga_en.pdf
- Institute of Medicine (IOM). A population-based policy and systems change approach to prevent and control hypertension. Washington, DC; The National Academies Press; 2010.
- Asekun-Olarinmoye EO, Akinwusi PO, Adebimpe WO, Isawumi MA, Hassan MB, Olowe OA, Makanjuola OB, Alebiosu CO, Adewole TA. Prevalence of hypertension in the rural adult population of Osun State, southwestern Nigeria; 2013.
- Kadiri S. Tracking cardiovascular disease in Africa. BMJ. 2005;331:711–712.
- Adedoyin RA, Mbada CE, Balogun MO, Martins T, Adebayo RA, Akintomide A, et al. Prevalence and pattern of hypertension in a semiurban community in Nigeria. Eur J

- Cardiovasc Prev Rehabil. 2008;15:683–687.
23. Post WS, Hill MN, Dennison JL. High prevalence of target organ damage in young, African American Inner-city men with hypertension. *Journal of clinical hypertension*. 2003;5:24-30.
 24. Khakurel S, Agrawal RK, Hada R. Pattern of end stage renal disease in a tertiary care center. *Journal of the Nepal Medical Association*. 2009;48:126 –130.
 25. Neal B, MacMahon S, Chapman N. Effects of ACE inhibitors, calcium antagonists and other blood pressure lowering drugs: Results of prospectively designed overviews of randomised controlled trials. *Lancet*. 2000;356:1955-1964.
 26. Cuspidi C, Lonati L, Sampieri L, Michev L, MaccaG, Rocanova JI, Salerno M, Fusi V, Leonetti G, Zanchetti A. Prevalence of target organ damage in treated hypertensive patients: different impact of clinic and ambulatory blood pressure control. *Journal of Hypertension*. 2000;18:803-809.
 27. Sola AO, Chinyere OI, Stephen AO, Kayode JA. Hypertension prevalence in an Urban and Rural area of Nigeria. *Journal of Medicine and Medical Sciences*. 2013;4(4):149-154.
 28. Kunutsor S; Powles J. Descriptive epidemiology of blood pressure in a rural adult population in Northern Ghana. *Rural Remote Health*. 2009;9(2):1095
 29. Perez-Stable EJ, Salazar R. Issues in achieving compliance with antihypertensive treatment in the Latino population. *Clin Cornerstone*. 2004;6(3):49-64. DOI:10.1016/S1098-3597(04)80064-4.
 30. Prussian KH, Barksdale DJ, Dieckman J: Racial and ethnic differences in the presentation of metabolic syndrome. *J Nurse Pract*. 2007;3:229-239.
 31. International Standard Classification of Occupations (ISCO). Available:http://en.wikipedia.org/wiki/International_Standard_Classification_of_Occupations
 32. World Health Organization Guidelines subcommittee. 1999 WHO/ ISH guidelines for the management of hypertension. *J Hypertens*. 1999;17:151–183.
 33. Chobanian AV, Bakris GL, Black HR, et al. National High Blood Pressure Education Programme Coordinating Committee: Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII). *Hypertension*. 2003;42:1206–1252.
 34. Korotkoff NS. Available: http://www.lifeclinic.com/focus/blood/article_View.asp?MessageID=187
 35. Pobee JO, Larbi EB, Belcher DW, Wurapa FK, Dodu SR. Blood pressure distribution in a rural Ghanaian population. *Trans R Soc Trop Med Hyg*. 1977;71:66–72.
 36. van der Sande MA, Milligan PJ, Nyan OA. Blood pressure patterns and cardiovascular risk factors in rural and urban Gambian communities. *J Hum Hypertens*. 2000;14:489–496.
 37. Oladapo OO, Salako L, Sadiq L, Soyinka K, Falase AO. Knowledge of hypertension and other risk factors for heart disease among Yoruba Rural Southwestern Nigerian Population. *British Journal of Medicine & Medical Research*. 2013;3(4):993-1003.
 38. Adebayo RA, Balogun MO, Adedoyin RA, Obashoro- John OA, Bisiriyu LA, Abiodun OO. Prevalence of hypertension in three rural communities of Ife north local Government Area of Osun state, south West Nigeria. *International Journal of General Medicine*. 2013;6:863–868.
 39. Okeahialam BN, Ogbonna C, Otokwula AE, Joseph DE, Chuhwak EK, Isiguzoro IO. Cardiovascular epidemiological transition in a rural habitat of Nigeria: The case of mangu local government area. *West Afr J Med*. 2012;31(1):14–18.
 40. Onwubere BJ, Ejim EC, Okafor CI, Emehel A, Mbah AU, Onyia U, Mendis S. Pattern of blood pressure indices among the residents of a rural community in South East Nigeria. *Int J Hypertens*. 2011;621074;
 41. Ahaneku GI, Osuji CU, Anisiuba BC, Ikeh VO, Oguejiofor OC, Ahaneku JE. Evaluation of blood pressure and indices of obesity in a typical rural community in eastern Nigeria. *Ann Afr Med*. 2011;10(2):120–12.
 42. Onwuchekwa AC, Mezie-Okoye MM, Babatunde S. Prevalence of hypertension in Kegbara-Dere, a rural community in the Niger Delta region, Nigeria. *Ethn Dis*. 2012;22(3):340–346.
 43. Andy JJ, Peters EJ, Ekrikpo UE, Akpan NA, Unadike BC, Ekott JU. Prevalence and

- correlates of hypertension among the Ibibio/Annangs, Efiks and Obolos: A cross sectional community survey in rural South-South Nigeria. *Ethn Dis.* 2012;22(3):335–339.
44. Awoke A, Awoke T, Alemu S, Megabiaw B. Prevalence and associated factors of hypertension among adults in Gondar, Northwest Ethiopia: A community based cross-sectional study. *Cardiovascular Disorders.* 2011;12:113.
45. Tesfaye F, Byass P, Wall S. Population based prevalence of high blood pressure among adults in Addis Ababa: uncovering a silent epidemic. *BMC Cardiovasc Disord.* 2009;9:39.
46. Amoah AGB. Hypertension in Ghana: A cross-sectional community prevalence study in Greater Accra. *Ethn Dis.* 2003;13(3):310–315.
47. Giday A, Tadesse B. Prevalence and determinants of hypertension in rural and urban areas of Southern Ethiopia. *Ethiop Med J.* 2001;49(2):139-147.
48. Van H, Byass P, Chuc N, Wall S. Gender differences in prevalence and socioeconomic determinants of hypertension. Findings from WHO STEPs survey in a rural community of Vietnam. *J Hum Hypertens.* 2006;20(2):109-115.
49. Ike SO, Aniebue PN, Aniebue UU. Knowledge, perceptions and practices of lifestyle-modification measures among adult hypertensives in Nigeria. *Trans R Soc Trop Med Hyg.* 2010;104(1):55-60. DOI: 10.1016/j.trstmh.2009.07.029. Epub 2009 Sep 4.
50. Akinkugbe OO. Noncommunicable disease in Nigeria-Final Report of a National Survey. Federal Ministry of Health National Expert Committee on Noncommunicable Diseases Lagos. 1999;2-5.
51. Yadlapalli S, Kusuma YS. Perceptions on hypertension among migrants in Delhi, India: a qualitative study. *BMC Public Health.* 2009;9:267. DOI:10.1186/1471-2458-9-267. Received: 12 October 2008.
52. Sola AO, Chinyere OI, Stephen AO, Kayode JA. Hypertension prevalence in an Urban and Rural area of Nigeria. *Journal of Medicine and Medical Sciences.* 2013;4(4):149-154. Available:<http://www.interestjournals.org/JMMS>
53. Aubert L, Bovet P, Gervasoni J, Rwebogora A, Waeber B, Paccaud F. Knowledge, Attitudes, and Practices on Hypertension in a Country in Epidemiological Transition. *Hypertension.* 1998;31:1136-1145. DOI: 10.1161/01.HYP.31.5.1136.

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