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3 **COMPARATIVE ANALYSIS OF CLINICAL HISTORY, SOCIODEMOGRAPHIC,**  
4 **BEHAVIOURAL FACTORS AND CARDIOVASCULAR RISK FACTORS AMONG**  
5 **HYPERTENSIVE IN AWKA, NIGERIA**  
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9 **ABSTRACT**

10 **Background:** Hypertension is a major modifiable risk factor for cardiovascular diseases and  
11 research studies done in Nigeria observed prevalence rate of hypertension to range from  
12 26.4% to 36.9%.

13 **AIM:** This study aimed to evaluate the sociodemographic, clinical, behavioral and  
14 cardiovascular risk factors associated with hypertension in Awka, South East, Nigeria.

15 **Methods:** Cross-sectional study was used. 391 participants aged from 18 years above were  
16 recruited for this study. Structured questionnaires were constructed in line with World Health  
17 Organization Step approach were utilized for data collection. Hypertension was defined as  
18 systolic blood pressure  $\geq 140$ mmHg and Diastolic blood pressure  $\geq 90$ mmHg. Data was  
19 presented descriptively in frequency tables and figures, chi-square and independent sample  
20 T test were used to test comparison between two groups.

21 **Results:** The mean age of the subjects was  $45.87 \pm 17$ . 49.33.7% of retired subjects has the  
22 highest prevalence was statistically associated with hypertension in occupational status of  
23 the subjects, marital status was statically significant with hypertension and prevalence of  
24 hypertension among the subjects were 81.1%, 8.5%, 8.6% for married, single and divorcee  
25 respectively, ( $P < 0.001$ ) and also no association was observed between hypertension and  
26 subjects that occasionally use high salt often ( $\chi^2 = 0.341, P > 0.001$ ).

27 **Conclusion:** The study showed that age, family history of hypertension, heart rate,  
28 consistent increase in blood pressure, occupational and marital status are associated risk  
29 factors of hypertension in Awka, South East, Nigeria. There is need to create awareness on  
30 the risk factors and encourage changes in sedentary life style.  
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32 **Keywords**

33 Hypertension, Risk Factors, Prevalence, Blood pressure.  
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## INTRODUCTION

42 Hypertension is a major public **healthcare** **health** problem with increasing level of cardiovascular  
43 mortality and morbidity both in developed and developing countries(1,2). **Hypertension is a consistent**  
44 **elevated blood pressure in the arteries to pump blood harder than normal through the blood vessels**  
45 (3,4). Africa has the highest prevalence of hypertension and so described as a disease for Africa (4).  
46 About 90% of diagnosed hypertension are primary hypertension and 10% are secondary hypertension  
47 (2). Several risk factors are associated with primary hypertension although the cause is yet unknown  
48 (4). These factors are characterized into modifiable and non-modifiable risk factors (6). The modifiable  
49 risk factors of hypertension are those attributes of an individual that can be adjusted or changed (7,  
50 8).These includes: obesity, alcohol consumption, tobacco use, lack of exercise etc. The non-  
51 modifiable risk are attributes of an individual that cannot be changed. This includes sex, family history,  
52 genetic composition race (9, 10 and11). Hypertension if not properly controlled and managed may  
53 lead to cardiovascular complications which include coronary heart disease, heart failure, renal  
54 damage, ischemic heart disease, strokes (14, 13). Previous studies showed a positive relationship of  
55 cardiovascular risk factor and hypertension and suggested implementation management of  
56 cardiovascular disease and prevention policy; this includes management of obesity, blood pressure,  
57 lipid and glucose metabolism, increase physical activity, strictly compliance of drug complication (27).  
58 In Nigeria, complications of hypertension attributes to 25% of all emergency admission in health  
59 institutions (14). This has been proven to be associated to individuals who are unaware of their health  
60 condition or poorly controlled hypertension (2).

61 Few research studies have been done in south-south and south-east Nigeria and have shown  
62 prevalence rate of hypertension and its complications ranges from 21% and 21.3% respectively (15).  
63 However, there is need to explore more on associated risk factors with hypertension. This study  
64 aimed to evaluate the sociodemographic, clinical and behavioral factors which are associated with  
65 hypertension in Awka, South east, Nigeria.

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## METHODS.

### STUDY POPULATION:

69 A total of three hundred and ninety-one subjects (n=391) were recruited for this research study and  
70 comprises of Male (n=181) and female (n=210). This research study was carried out in  
71 Chukwuemeka Odimegwu Ojukwu University Teaching Hospital, Awka at General Outpatient  
72 Department (GOPD). A cross-sectional design study was used. The research study participants were  
73 adults aged from 18years and above. This study was carried out between November 2018 to April  
74 2019.

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### ASSESSMENT OF ASSOCIATED RISK FACTORS:

78 Structured questionnaires were constructed in line with WHO Steps Instrument 1 and 2 (16). Informed  
79 consents were obtained from each participant and also explained what it is being used for and its  
80 importance. The questionnaire consists of two steps parts.

81 Step 1; the first part consisted of socio-demographic, clinical history and behavioral life styles  
82 variables of each participant. These variables includes; age, smoking habit, alcohol consumption,  
83 dietary habit, physical activity, duration of being hypertensive, diabetes mellitus status, used  
84 medication, stress strain, and family history of being hypertensive. Smoking habit variable were  
85 grouped into two groups; smokers and non smokers. Alcohol consumption was grouped into two;  
86 alcohol drinkers and non alcoholic drinkers. Physical activity was assessed using IPAQ. Job stress,  
87 financial instability, Family distress, sleep inadequacy were all grouped under stress strain (17).

88 Step 2; captured the anthropometric measurements and Body Mass Index (BMI). BMI was  
89 determined as  $\text{weight}/\text{height}^2$  ( $\text{Kg}/\text{M}^2$ ). Height and weight was measured using a stadiometer. In  
90 measuring height, participants were made to remove their shoes, stand on top of the stadiometer  
91 scale, standing erect, facing forward and height measured from the meter rule. Also, weight was  
92 measured during the procedure. BMI were classified according to WHO standard; in four groups.  
93 They are underweight ( $<18.5\text{kg}/\text{m}^2$ ), normal weight ( $18.5 -24.9\text{kg}/\text{m}^2$ ), overweight ( $25-29.9\text{kg}/\text{m}^2$ ) and  
94 obesity ( $>30\text{kg}/\text{m}^2$ ). Blood pressure measurements were taken using sphygmomanometer.  
95 Participants were asked to sit on a chair with their feet flat on the floor and left arm made to rest on  
96 the upper arm and participants assured to be calm. Auscultation was done over the brachial artery  
97 with a stethoscope. The first appearance of korotkoff sounds as the cuff swings was taken as systolic  
98 and the disappearance of the sounds taken as diastolic (17). Blood pressure measurements were  
99 recorded in mmHg. This procedure was measured for three times over a period of 3 minutes.  
100 Subjects were classified hypertensive if their blood pressure were greater or equal to 140mmHg  
101 (systolic) and 90mmHg (Diastolic) (18). Pulse rate was also gotten from participants using a Pulse  
102 oximeter. The Right thumb is placed inside the pulse oximeter and the participant assured to be calm  
103 when the pulse rate is taken.

104 Socio-economic status was also taken. Their occupational status was grouped into civil servants,  
105 public servants, Business, Applicant, and Retired. Marital status was also grouped into; Married,  
106 Single, Divorced, Widowed. Participants were assured of Oath of secrecy and well explained that it is  
107 voluntary and has the right to withdraw from the study if need be. Participants that were found to be  
108 hypertensive through BP readings were informed, counseled and urged to commence treatment as  
109 soon as possible. Data generated we analyzed using statistical package for social sciences version  
110 21 software. The results presented descriptively in frequency tables and figures. Chi square test was  
111 used to test comparison between the two groups and independent sample T test for normally  
112 distributed data and also for comparison, value  $<0.001$  was taken as to be statistically significant.

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## 114 RESULTS

115 A total of three hundred and ninety one subjects comprising of 181(46.3%) Male and 210(53.7%)  
116 females participated in this study. The mean (SD) age of all subjects was  $45.87 \pm 17$ .

### 117 STUDY POPULATION ACCORDING TO THEIR DEMOGRAPHIC AND CLINICAL 118 CHARACTERISTICS

119 Table 1 shows the result of frequency distribution of clinical variables. Respondents who had family  
120 history of hypertension were 101(25.8%) compared to 290(74.2%) of respondents who had no traits  
121 of hypertension. 317(81.1%) of the subject study presented with a normal heart rhythm while  
122 68(17.4%) presented with heart rhythm greater than 100 beats per/minute. 285(72.9%) of the  
123 participants had their systolic blood pressure  $\leq 140\text{mmHg}$  compared with 106(27.1%) of the  
124 participants had their systolic pressure  $\geq 140\text{mmHg}$ . Likewise, 274(70.1%) of the subjects had their  
125 diastolic blood pressure  $\leq 90\text{mmHg}$  compared to 117(29.9%) of the subjects with diastolic blood  
126 pressure  $\geq 90\text{mmHg}$ . 90(23.0%) of the subjects had their age range between 28-37 compared to  
127 other age range.

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135 **Table 1: Study Population according to their Demographic and Clinical characteristics**

Clinical Variables	N(391)	%
Family History of hypertension	101	25.8
No with Family History	90	74.2
Heart Rate		
Bradycardia	6	1.15
Normal Heart Rhythm	317	81.1
Tachycardia	68	17.4
Systolic		
≤140mmHg	285	72.9
≥140mmHg	106	27.1
Diastolic		
≤90mmHg	274	70.1
≥90mmHg	117	29.9
Sex		
Male	181	46.3
Female	210	53.7
Age		
18-27	67	17.1
28-37	90	23.0
38-47	70	17.9
48-57	47	12.0
58-67	57	14.6
68-77	44	11.3

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139 **RELATIONSHIP BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS AND**  
 140 **PREVALENCE OF HYPERTENSION.**

141 In occupational status of subjects, 31(33.7%) of retired subject had the highest prevalence and was  
 142 statistically associated with hypertension, ( $P < 0.001$ ) (Table 2). Male subjects had high prevalence  
 143 51(54.3%) compared to female subjects 43(45.7%), the difference was statically significant( $\chi^2 = 3.151$ ,  
 144  $P > 0.001$ ). Prevalence of hypertension was slightly different from 58(53.4%) subjects who responded  
 145 to pass through stress compared to 36(38.3%) subjects that responded not to have pass through  
 146 stress, thus the difference was statistically insignificant( $\chi^2 = 6.490$ ,  $P > 0.001$ ). Marital status was  
 147 significantly associated with hypertension, ( $P < 0.001$ ) and prevalence of hypertension was highest  
 148 among married participants 77(81.9%) followed by widowed 9(8.6%) and single participants 8(8.5%).  
 149 Prevalence of hypertension were higher with participants admitted to be involved in physical activities  
 150 64(68.1%) than those participants that are not involved in physical activity 30(31.9%), the difference  
 151 between hypertension and physical activity was statically insignificant( $\chi^2 = 11.917$ ,  $df = 2$ ,  $P > 0.001$ )

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157 **Table 2: Relationship between Sociodemographic Characteristics and Prevalence of**  
 158 **Hypertension.**

Sociodemographic variables (N=391)	Hypertension		Total	df	x <sup>2</sup>	P
	NO	YES				
<b>Sex</b>						
Male	130(43.8)	51(54.3)	94(100.0)	1	3.151	0.076
Female	167(56.2)	43(45.7)	297(100.0)			
<b>Marital Status</b>						
Married	186(62.6)	77(81.9)	263(67.3)	2	34.458	0.000*
Single	106(35.7)	8(8.5)	114(29.2)			
Widowed	5(1.7)	9(8.6)	14(3.6)			
<b>Occupation</b>						
Civil servant	59(20.3)	11(12.0)	70(18.3)	6	33.476	0.000*
Public servant	117(40.2)	25(27.2)	142(37.1)			
Business	70(24.1)	25(27.2)	95(24.8)			
Applicant	10(3.4)	0(0.0)	10(2.6)			
Retired	31(10.7)	31(33.7)	62(16.2)			
Student	2(0.7)	0(0.0)	2(0.5)			
Housewife	2(0.7)	0(0.0)	2(0.5)			
<b>Age</b>						
18 – 37	67(22.6)	0(0.0)	67(17.1)	6	83.317	0.000*
28-37	82(27.6)	8(8.5)	90(23.0)			
38-47	58(19.5)	12(12.8)	58(19.5)			
48-57	33(11.1)	14(14.9)	47(12.0)			
58-67	27(9.1)	30(31.9)	57(14.6)			
68-77	23(7.7)	21(22.3)	44(11.3)			
78 - >	9(9.6)	7(2.4)	16(14.1)			
<b>Stress</b>						
Stress	138(46.6)	58(61.7)	196(50.3)	1	6.490	0.011
No stress	158(53.4)	36(38.3)	194(49.7)			
<b>Physical Activity</b>						
Physical Activity	249(83.8)	64(68.1)	313(80.1)	2	11.917	0.003
No Physical Activity	47(15.8)	30(31.9)	77(19.7)			

159 \*P<0.001 is considered statistically significant.

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161 **ASSOCIATION BETWEEN BEHAVIORAL RISK FACTORS AND HYPERTENSION**

162 No significant association was observed between hypertension and Subjects that are strong addicts  
 163 to alcohol (df =1, x<sup>2</sup>=1.527, P>0.001) and subjects that are strong addicts to smoking (df=1, x<sup>2</sup>=0.256,  
 164 P>0.001). (Table 3) There was also no positive association between hypertension and subjects that  
 165 takes high vegetable (df=2, x<sup>2</sup>=0.6999, P>0.001) and subjects that occasionally use salt often (df=1,  
 166 x<sup>2</sup>=0.341, P>0.001).

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170 **Table 3: Association between behavioral risk factors and hypertension**

Behavioural Factors	Hypertension		Total	df	X <sup>2</sup>	P
	No	Yes				
<b>Alcohol Addicts</b>						
Yes	61(20.5)	25(26.6)	86(22.0)	1	1.527	0.217
No	236(79.5)	69(73.4)	305(78.0)			
<b>Smoke Addicts</b>						
Yes	13(4.4)	3(3.2)	16(4.1)	1	0.256	0.613
NO	284(95.6)	91(96.8)	375(95.9)			
<b>Vegetable Intake</b>						
high	155(52.2)	48(51.1)	203(51.9)	2	0.699	0.705
low	140(47.1)	46(48.9)	18(47.6)			
<b>Salt Intake</b>						
High	107(36.0)	37(39.4)	144(36.8)	1	0.341	0.559
Low	109(64.0)	57(60.6)	247(63.2)			

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**COMPARATIVE ANALYSIS OF CLINICAL FACTORS, BETWEEN HYPERTENSION AND THEIR CONTROL.**

Table 4 shows the comparison between hypertension and clinical risk factors. The mean (SD) systolic pressure of hypertensive subjects (143.02±33.484) were increased compared to Normotensive subjects (117.62±25.570) and the difference were statistically significant (P<0.001). The mean (SD) diastolic pressure of hypertensive subjects (84.93±20.069) of normotensive subjects, there was significant association with hypertension, (P<0.001). Also, the relationship between subjects that have family history of hypertension and hypertension was statistically significant, P<0.001.

**Table 4: Comparative analysis of Clinical Factors, between Hypertension and their control.**

Clinical Factors Mean/STD	Hypertensive Mean /STD	Nomotensive	P value
Heart Rate	91.66± 19.905	85.26±16.063	0.002
Systolic	43.02±33.484	117.62±25.570	0.000*
Diastolic	84.93±20.069	78.26±14.172	0.000*
Family History	1.48±0.502	1.82±0.382	0.000*
B.M.I	2.96±0.802	2.95±0.729	0.959

186 \*P<0.001 is considered statistically significant.

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**DISCUSSION**

In this cross-sectional study, the prevalence of hypertension was 24.0 % (Male 46.3% and Female 53.7%).Associated risk factors of hypertension were compared between normotensive and hypertensive subject groups.

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### **Sociodemographic Factors**

The results data demonstrated a strong significant association between age and hypertension. Increase in age has been found to be a risk predictor of hypertension (22). This findings are consistent with the study results on prevalence of hypertension and associated factors among residents in Ibadan, Nigeria(19) and prevalence of hypertension in Akwa Ibom, South-South, Nigeria(1). Stress and hypertension showed no linear relationship as P value is  $>0.001$ . Exposure to chronic stress has been stated as risk factors/biomarker of hypertension. Chronic stress stimulates the release of cortisol which increases cardiovascular reactivity in the body. This results finding are contrary with a study that observed a positive association between stress and hypertension in their study of sociodemographic correlates of hypertension in a rural setting of Oyo state, Nigeria. (17) Also, results data expressed a significant relationship between hypertension and economic status. Prevalence of hypertension were seen more among retired (33.7%), followed by public servants and business people with the same percentage rate (27.2%). This study findings agreed with the study carried out by (2), however noted a slight difference in prevalence rate of hypertension to had been more among minor retailers (60.7%).This may be attributed to the study population. Prevalence of hypertension were higher among married subjects(81.9%) when compared to other status; widowed(8.5%),single(8.5%) and also observed a significant association between hypertension and marital status. These results are similar with the findings on a survey of hypertension and its socio-economic factors in a market population, Awka, Nigeria (2). This study observed no positive association observed between hypertension and Gender. In females, cardiac output is less than in males because of less blood volume and so cardiac index is more than in males, because of less body surface area. Increased in cardiac output has been noted to be strongly associated with hypertension. This results are consistent with a study carried out by (2), the study observed hypertension was more prevalent in females (68.9%) than in males (31.1%) and  $P<0.001$ .

### **Behavioral Factors**

This study observed insignificant association between increased salt intake and hypertension. Increased salt intake had been positively associated with progression of cardiovascular disorders. A study had a contrary study that observed high salt intake to be associated with progression of cardiovascular and renal dysfunction, suggesting high salt intake to be a potential risk factor of hypertension. Increased vegetable consumption and hypertension showed no statistically significant association. This findings is contrary with a meta-analysis study carried out and six other research studies. One of the studies revealed an inverse association while the other five research studies were not statistically significant(26). Vegetables are high in potassium, magnesium, vitamin, folic acid and carotenoid. Research studies reported it to lower blood pressure through vasodilatation, improve endothelial function and increase antioxidant activity (24, 25).

### **Clinical Factors**

Heart rate was not statistically significant with hypertension in this study, P value is  $>0.001$ . This result is contrary to a research findings that suggest heart rate is strongly associated with peripheral and central blood pressures(20). Heart rate is an independent risk factor of cardiovascular disease with high mortality rate among hypertensive subjects (20).Clinical studies has observed patients with increase heart rate are more likely to develop atherosclerosis and acute coronary syndromes (21). Also recent studies analyzed an increased heart rate is frequently associated with high blood pressure, obesity, dyslipidemia and increase haematocrit. However, this finding is in contrast with (21) that explains heart rate greater than 80 beats per minute has a positive association with hypertension. This study demonstrated a strong positive association between participants that has family history of hypertension and hypertension,  $P<0.001$ . This findings are consistent with a study that reported a statistically significant association between hypertension and family history (17, 2).

### **CONCLUSION**

This study observed that family history of hypertension, marital status, and occupational status, are associated to increase in blood pressure and increase in age may be positively associated with hypertension and can also be a cardiovascular risk factor in Awka, Nigeria. This calls for an increase awareness program and improved health policy on these risks

253 **CONFLICT OF INTEREST**

254 There was no conflict of interest

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257 **ETHICAL STATEMENT**

258 This research study was reviewed and approved by the Ethical committee of Chukwuemeka  
259 Odumegwu Ojukwu University Teaching Hospital, Amaku Awka with Ref No: COOUTH/AA/Vol.1.001.

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UNDER PEER REVIEW