

Determinants of Hypertension among Elderly People in the Bongo District of Ghana

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Abstract Hypertension is one of the commonest non-communicable diseases seen among elderly persons in Ghana in recent times, with many preventable factors contributing to its prevalence. This study sought to establish the determinants of hypertension among elderly people living in the Bongo district of Ghana. This was a cross-sectional study conducted among 240 participants, aged 60 years and above, in 5 randomly selected centres in the Bongo district. Data on participants smoking habits, salt intake behaviour, alcohol consumption and physical activity level were collected. Blood pressure and anthropometric measurements were taken. The prevalence of hypertension among the participants was 38.3%. Past smoking behaviour (OR=2.541, p=0.043), high alcohol intake (OR=1.657, p=0.040), high salt intake (OR=3.839, p=0.037) and physical activity (OR= 0.804, p=0.032), obesity (OR=2.311, p=0.019) and low socioeconomic status (OR=2.211, p=0.029) were the determinants of hypertension among the study participants. Hypertension among elderly people in the Bongo district is on the ascendancy and assuming proportion of public health importance. Findings from this study could serve as an impetus for public health policy formulation for prevention and early diagnosis of hypertension among elderly people in the Bongo district and other resource poor rural communities in Ghana.

Keywords: hypertension, smoking, salt intake, alcohol intake, elderly people

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1. Introduction

Hypertension is a major global public health problem [1]. It is a significant contributor to the burden of stroke, heart disease and kidney disease worldwide [1,2]. More than 90% of hypertensive patients have hypertension of unknown cause [3]. Globally, high blood pressure is one of the commonest cardiovascular conditions, especially among the elderly [1,4]. It was estimated to cause 7.1 million deaths, about 13% of the total deaths per year [5]. In the U.S, 77.9 million Americans were hypertensive with 1 out of every 3 adults being hypertensive [6]. In the past, hypertension was seen to be a reserve for the affluent in the western world. However in recent years, the prevalence of high blood pressure has been higher in Africa compared to other regions of the world [7,8], affecting individuals across the socio-economic divide [9]. Increasing population on the continent coupled with weak health systems has been identified to contribute to the high number of people with undiagnosed, untreated and uncontrolled hypertension [1].

In Ghana, hypertension is equally widespread and still on the rise. The prevalence was found to be about 28% in Accra [10] and Kumasi [11], after earlier studies had revealed prevalence rate of 4.5% among rural dwellers

and 8% to 13% in urban residents [12]. Hypertension became the second leading cause of outpatient morbidity in Accra, the capital city of Ghana, after malaria in 2007 although in most regions of Ghana hypertension ranked as the fifth highest cause of outpatient morbidity [13].

Hypertension, tobacco smoking, alcohol intake, diet and physical inactivity were identified as the leading risk factors of global disease burden [2]. On the African scene, tobacco use, alcohol consumption, physical inactivity and a shift in taste towards "westernised" diets, which tend to be high in sodium, fats, and simple sugars, have been linked to the rising prevalence of high blood pressure [9]. Studies in Ghana have shown increasing prevalence of high blood pressure with increasing age [14].

In resource poor countries, the rising incidence of non-communicable diseases could overstretch the weak health systems already grappling with infectious diseases, maternal and infant mortality and childhood malnutrition. This could cripple socioeconomic development [15]. Like other chronic conditions, it takes huge percentage of family resources to manage hypertension and its health complications. Regular clinic visits for hypertensive workers and the disabilities from complications such as stroke and retinopathy could lead to loss of productivity. This would ultimately pose significant stress on the individual/household budget and the local/national budget at large. The Bongo district is a rural district also saddled

with challenges facing many deprived districts in Ghana, such as ill-equipped limited hospital facilities and health care worker shortages. In poor rural communities like the Bongo district, knowledge and practice of primary health care and basic disease prevention are often lacking. Hence, it is imperative to have baseline information on non-communicable diseases, such as hypertension in order to provide an impetus for specific and informed public health interventions. This study was designed to determine the association between smoking, salt intake, alcohol consumption, physical inactivity and hypertension among elderly people living in the Bongo District in the Upper East Region of Ghana.

2. Methods

2.1. Study Site

The study was conducted in the Bongo district in the Upper East Region of Ghana with a population of 84,545 and a total land area of 459.5 sq. km [16]. The Bongo District is one of the nine districts in the Upper East Region with Bongo township as the district capital. The district lies between longitudes 0.45°W and latitudes 10.50°N to 11.09°N. It shares boundaries with Burkina Faso to the North and East, Kassena-Nankana District to the West and Bolgatanga Municipal to the South.

2.2. Subjects

The study was a cross-sectional survey. A total of 240 elderly participants were interviewed. All Consenting prospective participants who had attained 60 years or older and were resident in the Bongo district at the time of the study were included in the study. Prospective participants who reported being hypertensive and were on hypertensive medication during the recruitment stage were excluded from the study. Aged people who were too old and could not stand for anthropometric measurements or respond to questions were excluded.

2.3. Ethical Approval

Ethical clearance was sought from the institutional Review Board of the Ethics Committee for Humanities at the Institute of Statistical, Social and Economic Review of the University of Ghana.

2.4. Sampling Technique

Convenience and purposive sampling techniques were used to select the study sites. Data were collected in five study locations. The study locations included the Bongo district hospital, the Bongo market, the Zorko health centre, the Bongo Soe health center and the Vea health center. The Bongo market was included to ensure that people residing in communities within the district are represented in the sample. This is because people commute from all communities within the district to trade at the market on market days. For the participants who were recruited from the district hospital and health centres, a health worker first informed the volunteers about the study and those who showed interest in taking part were directed to meet the interviewers. Prospective participants who volunteered and consented were recruited. Regarding

the participants who were recruited from the Bongo town market, the interviewers approached prospective participants and those who volunteered and consented were recruited.

2.5. Data Collection

Data were collected by using the WHO STEP-wise approach for surveillance for non-communicable disease [17]. STEPS is a sequential process starting with gathering information on key risk factors by use of questionnaires (Step 1), then moving to simple physical measurements (Step 2), and then recommending the collection of blood samples for biochemical assessment (Step 3). Steps 1 and 2 were used in this study. The questionnaire was pretested for face and content validity.

2.5.1. Socio-demographic Data

An interviewer-administered questionnaire was used to collect data on age, sex, marital status, level of education, average income per month and mode of transport.

Questions in the questionnaire were used to develop an index used to determine the socioeconomic status of participants. Level of education, monthly income, number of persons depending on the income, type of residence, toilet facility, source of water and ownership of items such as radio, TV, fridge, freezer, air condition, were the questions that were used in the development of the score. The items were scored on a 1-7 scale depending on the number of responses and the highest rated item was assigned a score of 1 while the least was assigned a score of 7. For instance, in scoring participants' level of education, university/ polytechnic education was given 1 while no education was scored 6 out of the six responses available for that category. Because items such as radio, TV, freezer, fridge are commonly owned house hold items across socioeconomic divide, they were scored on a scale of 1-3 where 1 implied owning more than three of these items while 3 means owning just one item. The more luxurious items such as computers, fixed telephone line, air conditioners, among others were scored on a two-point scale with 1 implying owning an item and 2 for not owning any of the items. The scores for the various items were put together to obtain the best score of 14 and worse score of 44. The scores between 14 and 44 were then categorized to represent three socioeconomic groups of high (14-24), middle (25-34) and low (35-44).

2.5.2. Salt Intake

Participants' attitude towards salt and their salt intake were investigated. Participants were asked whether they add salt to their food at table and whether they read food labels before buying. The subjects were also asked to estimate the amount of salt they consume in a day. The estimated amounts consumed were in teaspoons.

2.5.3. Alcohol Intake

The participants' use of alcohol both present and in the past was examined and those who consumed alcohol were asked to state the type of alcohol they consumed, the frequency of consumption, description of alcohol usage and estimate the amount consumed in a day. For the purpose of this study, the alcohol was classified into three groups. Group one consisted of participants who consumed Beer. Those who consumed Pito (local beer)

were also classified under Beer. The second group consisted of consumers of all wines including palm wine. The third group comprised consumers of Liquor including akpeteshi, a local gin. With the beer category, participants were classified as non-consumers if they do not take anything, low consumers, normal consumers for taking 1 bottle/1 calabash pito/1glass wine/1 tot (25ml) of gin or liquor and high consumers for taking more than 1 bottle/1 calabash pito/1glass wine/1 tot (25ml) of gin or liquor.

2.5.4. Smoking

Participants' smoking habit was also investigated. Questions were asked to find out if participants smoked, either presently or in the past. The participants were put into three groups; non- smokers, past smokers and present smokers.

2.5.5. Physical Activity

Participants were asked to indicate the type of exercise they do and to estimate how much time they spend doing the exercise in a day and the number of days in a week that they do that exercise. The number of times per week of exercising was then used to develop an index which was used to classify them into three strata - active, moderately active and sedentary. The index had a best score of 36 points and worse score of 9. There were a total of nine activities and each was assigned between 1 to 4 points depending on the number of times the participant engages in that activity in a week. If the participant does not deliberately do any activity at all in a week for the purpose of exercising, it attracts 1 point, 1-2 times deliberate exercise a week attracts 2 points, 3-4 times attracts 3 points while 5 or more times a week attracts 4 points to arrive at a total least score of 9 and highest score of 36 points. For the purpose of this study, participants who were engaged in these exercises and household chores like walking, weeding/gardening, cycling, sweeping, washing clothes, sports, and scored below 18 points were considered inactive/sedentary, 18-27 as moderately active and 28 and above as active.

2.5.6. Blood Pressure Measurements

At least two blood pressure measurements were taken for each study respondent using the Omron digital sphygmomanometer (Omron HEM 432C, Japan). Before taking the measurements, the respondent was asked to sit quietly for 10 minutes with the legs. All blood pressure readings were taken twice and the average was used in the final analysis. For the purpose of this study, blood pressure reading of 130/85mmHg and above was considered as high.

2.5.7. Anthropometric Data

Respondents were weighed on a standard scale (seca-880, UK) correct to the nearest 0.1 kg without shoes and looking straight ahead. Respondents' heights were measured correct to the nearest 0.1 cm using a seca stadiometer (Seca 217, UK). Respondents' heights measurements were taken without footwear. Waist circumference was measured at the halfway point between the lowest rib and the iliac crest in the mid-axillary line with a non-elastic tape measure. Hip circumference was measured with the non-elastic tape measure at the widest

part of the hip. Anthropometric measurements were taken twice for each participant and the averages were used in the analysis. BMI categories were computed using the WHO BMI standards [18]. Respondent were classified as underweight (BMI <18.5 kg/m²), normal weight (BMI = 18.5-24.9 kg/m²), overweight (BMI = 25-29.9 kg/m²), or obese (BMI ≥30 kg/m²). Respondents with waist to hip ratio (WHR) ≥ 0.85 were classified obese.

2.6. Statistical Analysis

The data were analyzed using SPSS statistical software version 20. Independent samples t-test was used to test differences between two means. Logistic regression analysis was used to determine the predictors of hypertension among the respondents. Statistical significance was set at $p < 0.05$.

3. Results

Table 1 shows that 56.7% of the respondents were between 60-69 years. Married respondents constituted 73.3% of the respondents, 62.1% of respondents had low educational status and 93.8% were of low/ middle socioeconomic status.

Table 1. Demographic characteristics of respondents

Variable	Overall N(%)	Male n(%)	Female n(%)
Age			
60-69	136(56.7)	67(49.3)	69(50.7)
70-79	87(36.3)	43(49.4)	44(50.6)
≥80	17(7.1)	9(52.9)	8(47.1)
Marital status			
Single	13(5.4)	5(38.5)	7(61.5)
Married	176(73.3)	98(55.7)	78(44.3)
Widowed/Separated	51(21.3)	16(31.4)	35(68.6)
Education*			
High	37	37(15.4)	29(78.8)
Middle	54	54(22.5)	28(51.9)
Low	32	149(62.1)	62(41.6)
Socioeconomic status			
High	15	15(6.2)	10(66.7)
Middle	112(46.7)	66(58.9)	46(41.1)
Low	113(47.1)	43(38.1)	70(61.9)

*Low educational level was defined as never attended school/primary/Middle school education; Middle educational level was defined as secondary education; High educational level was defined as post-secondary/tertiary education.

Shown in Table 2 are the socio-demographic characteristics of respondents by blood pressure. Overall, 38.3% of respondents had high blood pressure. Among respondents aged 60-69 years, 36.8% had high blood pressure. Respondents who had high blood pressure constituted 37.9% of respondents aged 70-79 years. Based on level of education, respondents with high blood pressure represented 38.9% and 42.6% of respondents with low and middle educational level respectively. Age ($p = 0.017$) and socioeconomic status ($p = 0.043$) were significantly associated with blood pressure.

Table 3 shows that 26.7% of the respondents add salt at table and 43.8% use artificial spices. Only 19.6% of the

respondents check food labels for sodium content. Majority of the respondents (60.0%) reported low salt intake, 35.8% described their salt intake as normal and 4.2% reported high salt intake of more than 1 teaspoon/day.

Table 2. Socio-demographic characteristics by blood pressure

Characteristics	N	NORMAL		Both n(%)	HIGH		Both n(%)	P-Value
		Male n(%)	Female n(%)		Male n(%)	Female n(%)		
Age								
60-69	136	48(35.3)	38(27.9)	86(63.2)	19(14.0)	31(22.8)	50 (36.8)	0.017*
70-79	87	29(33.3)	25(28.7)	54(62.0)	14(16.1)	19(21.8)	33(37.9)	
≥80	17	5(29.4)	3(17.6)	8(47.0)	4(23.5)	5(29.4)	9(52.9)	
Total	240	82(34.2)	66(27.5)	148(61.7)	37(15.4)	55(22.9)	92(38.3)	
Sex	240	79(32.9)	69(28.7)	148(61.7)	40(16.7)	52(21.7)	92(38.3)	0.136
Education								
High	37	21(56.8)	4(10.8)	25(67.6)	8(21.6)	4(10.8)	12(32.4)	0.067
Middle	54	18(33.3)	13(24.1)	31(57.4)	10(18.5)	13(24.1)	23(42.6)	
Low	149	40(26.8)	51(34.2)	91(61.0)	22(14.8)	36(24.1)	58(38.9)	
Total	240	79(32.9)	68(28.3)	147(61.2)	40(16.6)	53(22.1)	93(38.8)	
Socio-economic status								
High	15	8(53.3)	4(26.7)	12(80.0)	2(13.3)	1(6.7)	3(20.0)	0.043*
Middle	112	56(50.0)	35(31.2)	91(81.2)	10(8.9)	11(9.8)	21(18.8)	
Low	113	37(32.7)	56(49.6)	93(82.3)	6(5.3)	14(12.4)	20(17.7)	
Total	240	101(42.1)	95(39.6)	196(81.7)	18(7.5)	26(10.8)	44(18.3)	
Marital status								
Single	13	4(30.8)	6(46.1)	10(76.9)	1(7.7)	2(15.3)	3(23.1)	0.830
Married	176	65(36.9)	56(31.8)	121(68.8)	33(18.9)	22(12.5)	55(31.2)	
Widowed/Separated	51	9(17.6)	31(60.8)	40(78.4)	7(13.7)	4(7.8)	11(21.6)	
Total	240	78(32.5)	93(38.8)	171(71.2)	41(17.0)	28(11.7)	69(28.8)	

*P-values are significant at $p < 0.05$.

Table 3. Salt intake behaviour among respondents

Salt intake behaviour	Male n(%)	Female n(%)	Total N(%)
Salt intake behaviour at table			
Add salt	33(51.6)	31(48.4)	64(26.7)
Add no salt	86(35.8)	90(37.5)	176(73.3)
Use of artificial spices			
Add spices	45(48.9)	60(57.1)	105(43.8)
Add no spices	74(54.8)	61(45.2)	135(56.2)
Checking food labels for sodium			
Check for sodium	33(89.2)	14(37.8)	37(19.6)
Does not check food labels	86(44.6)	107(44.6)	193(80.4)
Self-reported salt intake/day*			
Low	70(48.6)	74(51.4)	144(60.0)
Normal	46(53.5)	40(46.5)	86(35.8)
High	3(0.3)	7(0.7)	10(4.2)

*Low - None/ <1 teaspoon; normal- 1 teaspoon; High- >1 teaspoon.

Table 4. Alcohol intake and smoking behaviour

Alcohol intake and Smoking behaviour	Male n(%)	Female n(%)	Total n(%)
Past alcohol intake			
None	18(34.6)	34(65.4)	52(21.7)
Low	39(63.9)	22(36.1)	61(25.4)
Normal	33(48.5)	35(51.5)	68(28.3)
High	39(66.1)	20(33.9)	59(24.6)
Present alcohol intake			
None	44(35.5)	80(64.5)	124(51.6)
Low	33(58.9)	23(41.1)	56(23.3)
Normal	40(74.1)	14(25.9)	54(22.5)
High	2(33.3)	4(66.7)	6(2.50)
Smoking behavior			
Non smokers	41(25.9)	117(74.1)	158(65.8)
Past smokers	57(95.0)	3(5.0)	60(25.0)
Current smokers	20(95.2)	1(4.8)	21(8.8)

Low- None/ < 1 bottle of beer/ < 1 glass of wine/ 1 tot (25 ml) of liquor or gin;

Alcohol intake and cigarette smoking behavior among respondents are described in Table 4. Respondents who had high alcohol consumption in the past constitute 24.6% of the sample population. Only 2.5% reported current high alcohol intake. Respondents who had either smoked in the past or smoked currently were 33.8% of the sample population. Majority of past and current smokers was found among male respondents (95.0%, 95.2%) than female respondents (5.0%, 4.8%) respectively.

Table 5 shows that 29.0% of respondents who had high salt intake recorded high blood pressure. Among respondents who had high alcohol consumption in the past, 43.1% had high blood pressure. Table 5 also shows that half (50.0%) of the present smokers had high blood pressure. Among past smokers, 35.0% had high blood pressure. Of the sedentary respondents, 52.0% had high blood pressure. Salt intake ($p=0.031$) and smoking habit ($p=0.015$) were significantly associated with blood pressure among the respondents.

The anthropometric distribution of the respondents is shown in Table 6. Based on BMI, 10.4% of respondents were overweight/obese. Majority (84.0%) of the overweight/obese respondents were females. Overweight/obesity was 8.7% in females and 1.7% in males. Based on WHR, 45.4% of respondents were obese with majority (84.4%) being females. Obesity defined by WHR was 38.3% in females and 7.10% in males.

Figure 1 shows that 40.8% were inactive or sedentary, 58.3% of the respondents were moderately active and 0.9% were active.

Table 5. Lifestyle characteristics of respondents by blood pressure

Lifestyle characteristics	N	NORMAL		Both n(%)	HIGH		Both n(%)	P-Value
		Male n(%)	Female n(%)		Male n(%)	Female n(%)		
Salt intake/day								
Low	90	22(24.4)	18(20.0)	40(44.4)	20(22.2)	30(33.3)	50(55.6)	0.031*
Normal	88	39(44.3)	25(28.4)	64(72.7)	8(9.1)	16(18.2)	24(27.3)	
High	62	23(37.1)	21(33.8)	44(71.0)	7(11.3)	11(17.7)	18(29.0)	
Total	240	84(35)	64(26.7)	148(61.7)	35(14.6)	57(23.8)	92(38.3)	
Past Alcohol Consumption								
None	52	15(28.8)	17(32.7)	32(61.5)	9(17.3)	11(21.1)	20(38.4)	0.053
Low	61	15(24.6)	23(37.7)	38(62.3)	11(18.0)	12(19.7)	23(37.7)	
Normal	68	25(36.8)	13(19.1)	38(55.6)	14(20.6)	16(23.5)	30(44.1)	
High	59	17(28.8)	16(27.1)	33(55.9)	8(13.6)	18(30.5)	26(44.1)	
Total	240	78(31.6)	69(28.0)	147(59.5)	41(16.6)	59(23.9)	100(40.5)	
Smoking Habit								
Non Smokers	154	22(14.3)	67(43.5)	89(57.8)	15(9.7)	50(32.5)	65(42.2)	0.015*
Past Smokers	60	37(61.7)	2(3.3)	39(65.0)	20(33.3)	1(1.7)	21(35.0)	
Present Smokers	26	13(50.0)	0(0.0)	13(50.0)	12(46.2)	1(3.8)	13(50.0)	
Total	240	72(30.0)	69(28.8)	141(58.8)	47(19.6)	52(21.7)	99(41.3)	
Physical Activity								
Sedentary	98	18(18.4)	29(29.6)	47(48)	17(17.3)	34(34.7)	51(52.0)	0.091
Moderately Active	140	60(42.9)	40(28.6)	100(71.4)	22(15.7)	18(12.9)	40(28.6)	
Active	2	1(50.0)	0(0.0)	1(50.0)	1(50.0)	0(0.0)	1(50.0)	
Total	240	79(32.9)	69(28.8)	148(61.7)	40(26.3)	52(21.7)	92(38.3)	

*P-values are significant at 0.05.

Table 6. Anthropometric distribution of respondents

Anthropometry	Male n(%)	Female n(%)	Total N(%)
BMI			
Underweight	26(53.1)	23(46.9)	49(20.4)
Normal weight	89(53.6)	77(46.4)	166(69.2)
Overweight/Obese	4(16.0)	21(84.0)	25(10.4)
WHR			
<0.85 (normal)	102(77.9)	29(22.1)	131(54.6)
≥0.85 (high)	17(15.6)	92(84.4)	109(45.4)

Underweight- BMI <18.5 kg/m²; normal weight- BMI = 18.5-24.9 kg/m²; overweight- BMI = 25-29.9 kg/m²; Obese- BMI ≥30 kg/m². WHR ≥ 0.85 were classified obese.

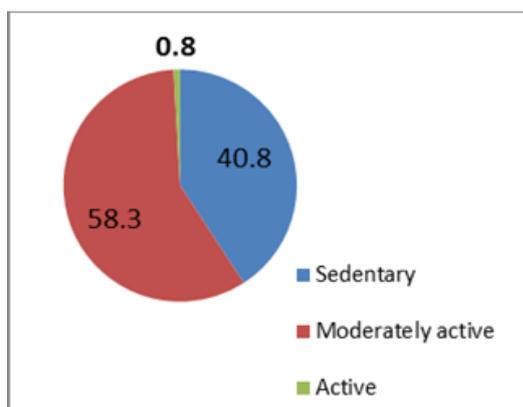


Figure 1. Physical activity levels of respondent

Shown in Table 7 are the predictors of hypertension among the respondents. Salt intake, alcohol consumption, past smoking behaviour, physical activity, obesity and socioeconomic status were significant determinants of hypertension among the respondents. Respondents who smoked in the past were more than two times more likely to be hypertensive than non-smokers (OR=2.541, P=0.043). High alcohol consumers were about two times more likely (OR=1.657, p=0.040) to have hypertension than low consumers. Respondents who added salt at table were about twice more likely to be hypertensive than respondents who added no salt at table (OR=2.094, p=0.007). Respondents who reported normal salt intake were about three times more likely to be hypertensive than those who took low salt (OR=2.833, p=0.002). Respondents with high salt intake were about four times more likely to have high blood pressure than those who took low salt (OR = 3.839, p = 0.037). Respondents who were moderately (OR =0.804, p= 0.032) and highly active (OR= 0.361, p= 0.014) were less likely to be hypertensive than those who were sedentary. Obese respondents were about twice more likely (OR=2.311, p=0.019) to have hypertension than normal weight respondents. The likelihood of respondents with low socioeconomic status to develop hypertension was about twice that of those with high socioeconomic status (OR = 2.211, p = 0.029). Moreover, respondents with middle socioeconomic status were at increased likelihood of having hypertension than those with high socioeconomic status (OR =1.200, p= 0.009).

Table 7. Predictors of hypertension among the respondents

Variable	OR	95% CI		P-Value
		Lower	Upper	
Age				
60-69	1.00			
70-79	1.304	0.420	1.968	0.809
≥80	2.775	0.367	5.680	0.600
Sex				
Male	1.00			
Female	1.287	0.432	2.259	0.976
Marital Status				
Single	1.00			
Married	1.749	0.347	8.621	0.498
Widow/Separated	2.328	0.435	12.452	0.323
Education				
High	1.00			
Middle	0.923	0.264	3.227	0.900
Low	0.925	0.623	3.260	0.904
Socioeconomic status				
High	1.00			
Middle	1.200	0.059	0.674	0.009*
Low	2.211	0.052	0.851	0.029*
Self-reported salt intake/day				
Low	1.00			
Normal	2.833	5.029	7.160	0.002*
High	3.839	7.104	27.064	0.037*
Salt behavior at table				
Add no salt	1.00			
Add salt	2.094	0.251	0.709	0.007*
Check food labels				
Check	1.00			
Does not check	1.513	1.092	2.762	0.062
Alcohol consumption				
Low	1.00			
Normal	1.253	0.182	0.504	0.054
High	1.657	0.615	2.011	0.040*
Smoking Habit				
Non-smokers	1.00			
Past smokers	2.541	4.017	7.506	0.043*
Present smokers	1.903	2.913	3.381	0.319
BMI				
Underweight	1.00			
Normal weight	0.902	0.420	1.968	0.809
Overweight/Obese	1.447	0.367	5.680	0.600
WHR				
<0.85(Normal)	1.00			
≥0.85(High)	2.311	1.145	4.664	0.019*
Physical Activity				
Sedentary	1.00			
Moderately Active	0.804	3.072	5.837	0.032*
Active	0.361	1.581	4.392	0.014*

*P-value is significant at 0.05; overweight and obese put together due to their relatively small sample sizes.

4. Discussion

There was a high prevalence of hypertension among the study participants (38.3%). It was found in this study that the rate of cigarette smoking either past or present was 33.8% among the respondents. Smoking was significantly associated with high blood pressure among the respondents. This study also found that respondents with past smoking behavior were more than twice likely to be hypertensive than non-smokers. Several studies have reported strong association between smoking and hypertension [19,20]. Smokers had greater risk of hypertension compared to non-smokers [19]. It was also found that blood pressure and heart rates of normotensive smokers persistently increased and were higher during the times of smoking than the non-smoking periods, indicating the negative effect of smoking on blood pressure [20]. Cigarette smoke is known to be associated with atherosclerosis [21,22], contributing to high blood

pressure. This could partly explain the high rate of hypertension among the study participants.

A significant proportion of the study participants had high alcohol consumption (24.6%) in the past. Participants who had high alcohol consumption in the past had a higher likelihood of being hypertensive than those who consumed less. Some studies have shown that alcohol facilitate the development of hypertension [23,24]. Both blood pressure and heart rate increased significantly in healthy normotensive men after drinking 40 grams of red wine or beer [25]. Nanchadal [26] also observed that the risk of hypertension increased in people who drank more than 15 units of alcohol a week. Similar studies have found that consuming more than 210g alcohol a week induced hypertension [27], especially drinking every day or drinking without food [24,28].

Respondents' attitude related to salt tends to favour high dietary sodium intake. A significant proportion of the respondents add salt at table. Majority of the participants in this study do not check food label for sodium. Also, significant proportion used sodium containing artificial spices in food. These are monosodium based products which could contribute to their total sodium intake. Studies elsewhere have demonstrated the negative effect of salt on blood pressure [29]. High sodium intake was found to increase systolic blood pressure among healthy normotensive adults [29]. High salt consumption was also found to contribute to hypertension, renal disease, cerebrovascular disease and impairment in the elasticity of arteries [30]. Salt intake was also reported to contribute to a progressive rise in blood pressure with increasing age [31].

Physical activity level was found to be significantly associated with blood pressure in this study. Majority of the respondents were sedentary. It was found that active respondents were less likely to be hypertensive than sedentary respondents. Earlier studies have reported that regular exercise has blood pressure lowering effect. An inverse relationship was found between daily activity and incidence of hypertension among middle-aged Japanese men [32]. Increased physical activity helps to maintain a healthy body weight which is an important risk factor for hypertension. The high sedentary behaviour among the respondents could contribute to the high rate of obesity. Obese respondents were about twice more likely to be hypertensive than non-obese respondents in this study.

Findings from this study show that participant with low socioeconomic status were more likely to be hypertensive than those with higher socioeconomic status. People with low socioeconomic status in a poor rural community such as the Bongo district could have limited access and ability to afford quality healthcare. This could lead to hypertensive individuals not attending clinic and as a result being undiagnosed and untreated. Also the economic stress of making ends meet among the study participants, who are elderly people, could also contribute to increased likelihood of hypertension among individuals with low socioeconomic status in this study. This could also partly explain the high prevalence of hypertension among the participants.

In summary, there was a high prevalence of hypertension among the study participants. The determinants of hypertension among the participants in this study are high salt intake, high alcohol consumption,

past smoking habit, sedentary behaviour, obesity and low socioeconomic status. These findings are consistent with previous report among African population [9]

There are limitations to the study. The study used questionnaire to collect data from the respondents. However, the participants were elderly people aged 60 years and above who may have developed memory challenges due to old age. This could introduce bias in the study findings. Also, the small sample size could limit the statistical power and generalisability of the study.

5. Conclusion

In conclusion, there was a high prevalence of hypertension among the respondents. Past smoking habit, high salt intake, high alcohol intake, physical inactivity, obesity and socioeconomic status were the significant determinants of hypertension among the elderly people in the Bongo district of Ghana. Even though the small sample size limits the generalisability of the study, findings from the study provide a baseline evidence for larger studies among residents in the Bongo district, and other rural communities in Ghana. It could also serve as an impetus for public health policy formulation for prevention and early diagnosis of hypertension among elderly people in the Bongo district and other resource poor rural communities in Ghana.

Statement of Competing Interests

The authors have no competing interests.

Author Contributions

All authors worked closely together to plan and execute the study.

Nyefene Joe Dare: supervised data collection, data analysis, literature search and write-up.

Collins Afriyie Appiah: literature search, data analysis and write-up

Christina Nti: design of study, literature search and write-up

Matilda Steiner-Asiedu: design of study, literature search and write-up

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