

# Prevalence and knowledge of hypertension among people living in rural communities in Ghana: a mixed method study

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## Abstract

**Background:** Knowledge and understanding of hypertension and its associated health risks remain inadequate despite increasing trend of hypertension prevalence. This study was conducted to assess the prevalence, knowledge and perceptions of hypertension in rural communities in Ghana.

**Methods:** A mixed method study involving 534 subjects was employed. Data was collected in six communities from May to December 2014 with structured questionnaires and interview guides. A logistic regression analysis was conducted to estimate the influence of the socio-demographic factors on knowledge of hypertension. Qualitative data was thematically analyzed.

**Results:** The mean systolic blood pressure (BP) was higher in men than women (127.42mmHg versus 124.42mmHg). The proportion of hypertensives was 21.4% and was higher among men in all age categories. Knowledge on some risk factors of hypertension was extremely low. Having formal education was associated with higher odds of knowledge of hypertension (Adjusted odds ratio [AOR]; 95% confidence interval [CI]=2.28; 1.25-4.16). Several misconceptions such as the use of agro-chemicals, fertilizers and excess vitamins were identified as causes of hypertension.

**Conclusion:** This study demonstrates an increased prevalence of hypertension, knowledge gaps and misconceptions surrounding hypertension in rural communities in Ghana. This evidence is useful in streamlining interventional programmes aimed at improving knowledge and prevention of hypertension.

**Keywords:** Hypertension, knowledge, prevalence, rural communities, Ghana, blood pressure.

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## Introduction

Hypertension remains a major public health challenge and it is identified as the leading risk factor for cardiovascular morbidity and mortality<sup>1-3</sup>. It accounts for one-third of the global preventable premature deaths annually<sup>4,5</sup>. In 2006, hypertension was documented as the primary cause of death in over 56,000 deaths and as a contributing factor in an additional 250,000 deaths out of the

2.4 million deaths in the United States alone<sup>6</sup>. There is an estimated increase in the prevalence of hypertension by 17% in the next decade, with the greatest increase in the African region if effective preventive measures are not implemented<sup>7</sup>, making it a major health problem in developing countries<sup>8,9</sup>.

In Ghana, hypertension is the second leading cause of outpatient morbidity in adults older than 45 years, and trends in hypertension prevalence and incidence continue to grow<sup>10</sup>. The prevalence of hypertension in rural and urban Ghana ranges from 19% to 48%<sup>11</sup> and some studies from rural settings reported 24% or higher<sup>12-15</sup>. In the Asutifi South district of Ghana, hypertension is consistently ranked among the top ten Out-Patient Department (OPD) cases with prevalence rising from 4.23% in 2008 to 6.07% in 2012<sup>16</sup>. Factors which drive this wave in the sub-region, including but not limited to changes in dietary patterns and sedentary lifestyles,<sup>17</sup> could be prevented if knowledge of these factors are high among the general populace.

Knowledge gaps are important barriers in the effective prevention and treatment of hypertension<sup>18,19</sup>. In the advent of scarce resources to improve management and control of hypertension, there is the need to focus attention on preventive measures, which target behavioural change through education and awareness creation. Several models have proposed knowledge as important for health behaviours and sustained behavioural changes<sup>20-22</sup>. Although these models may differ in content and perspective, they stress the importance of evaluating the perceptions, attitudes, beliefs, and outcome expectations of individuals as crucial means to understand observed behaviours and to guide behavioural change. Knowledge of a disease condition influences patient's attitude and practice, and improves compliance with treatment and subsequent reduction in prevalence<sup>23</sup>.

Patients' knowledge and understanding of the potential health risks associated with hypertension, and the potential positive effects of lifestyle modification are inadequate<sup>24,25</sup>. A study by Rizwana et al<sup>26</sup> reported a huge gap in knowledge of modifiable risk factors of hypertension. A study in a sub-urban Nigerian community<sup>27</sup> also showed low levels of knowledge of hypertension, with only 18% of respondents having knowledge of risk fac-

tors of hypertension. Other studies from the sub region have shown similar results<sup>28</sup>.

Factors such as lack of formal school education, communication gaps, and inaccessibility to routine health education programme have been noted to hamper the knowledge of hypertension, especially among rural and minority populations<sup>29</sup>. Despite the growing evidence of increasing burden of hypertension and other risk factors of cardiovascular diseases (CVDs) in Ghana and similar parts in the sub-Saharan region, there is little evidence of in-depth understanding and knowledge, perceptions and practices of hypertension especially in rural areas. Majority of the previously conducted studies used only quantitative methods to explore knowledge level and perception of hypertension, with little in-depth exploration of patients' views, understanding and perception of hypertension. Documenting the depth of knowledge of hypertension among this population is necessary to successfully guide health promotion programmes. This study employed a mixed methods approach to provide converging evidence on the level of knowledge and prevalence of hypertension in rural Ghana.

## **Materials and methods**

### **Study setting**

This was a cross-sectional study, which employed both qualitative and quantitative methods. The inclusion of a qualitative method helped to assess the in-depth understanding of knowledge and perceptions, which will be difficult to elucidate with quantitative tools, and by so doing provide much stronger evidence.

The study was conducted in the Asutifi South District in the Brong Ahafo Region of Ghana. The district has an estimated population of 53,584 with men and women constituting 28,285 (53%) and 25,299 (47%) respectively<sup>30</sup>. The major economic activity in the district is peasant farming. It is one of the known food baskets and also contributes a large proportion of cocoa and other tree crop production in Ghana.

### **Study population and sample**

The study population were farmers aged 25 years and above. The inclusion criteria were; having lived in the community for not less than six months and voluntarily consenting to participate in the study. Participants who

had resided in the community for less than six months were excluded. Two out of four sub-districts; Hwidiem and Nkaseim sub-districts were selected for the study. Six communities were selected; three from each sub-district. These were Amanfrom, Atta-ne-Atta and Woromso from Hwidiem sub-district and Apenimadi, Ohiatua, and Mmosiaso from Nkaseim sub-district. In the selected communities, the required respondents were selected first by clustering the communities into four, using the four cardinal points. Households were then selected using a sampling interval of 1:4. In the selected households, respondents were sampled using the lottery method where pieces of papers with inscriptions “Yes” and “No” were written for picking. Respondents who picked “Yes” and consented to participate in the study were enrolled. A total of 506 and 28 subjects were involved in the quantitative and qualitative data collection respectively.

## **Data collection and statistical analysis**

### **Qualitative study**

Focus group discussions (FGDs) involving two (2) groups of six participants of same gender and two groups of eight, comprising of both men and women. Interviews and discussions were conducted and audio-taped in the local language, translated to English and then transcribed. Interviews were carried out in quiet and discreet locations in the communities, using a digital voice recorder. Coherency and grammatical errors in the transcripts were edited and coded for analysis. Data was coded with the help of NVIVO software for qualitative research<sup>31</sup> and analyzed thematically. The codes were stored within nodes in the software. We further identified duplications in the codes and then explored possible connections between various themes, with the use of electronic memos in the software. The various themes identified were grouped under the knowledge of causes, prevention and sources of information on hypertension.

### **Quantitative study**

Data was collected using structured questionnaires with open-ended and closed questions. These were used to obtain information on socio-demographic characteristics (age, sex, education level, occupation, marital status and

religion) and knowledge, sources of information, risk factors and prevention of risk factors of hypertension. Blood pressure was measured at a seated position using sphygmomanometer and a stethoscope. Three different measurements were taken and the average used. Hypertension was defined as having systolic/diastolic blood pressures of  $\geq 140/90$  mm Hg.

The outcome variable was awareness of hypertension and the explanatory variables were socio-demographic characteristics (age, gender, education, relationship status and religion). Data were analyzed by descriptive and inferential statistics using STATA 11 software<sup>32</sup>. Bivariate associations were tested using Pearson chi-square. A logistic regression analysis was conducted to estimate the association between the socio-demographic factors and knowledge of hypertension. All statistical analyses were significant at 95% confidence level.

## **Results**

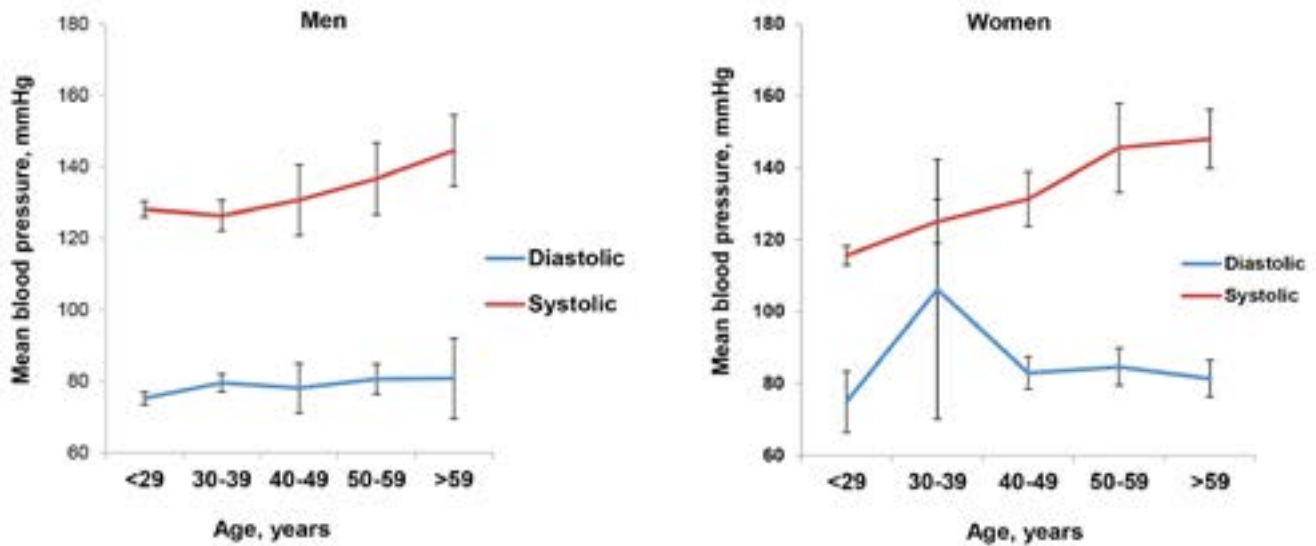
### **Background characteristics**

The mean age (standard deviation, SD) of the respondents was 39 years (14.5) and almost half were aged between 25 and 34 years. Majority, 58.4% were women and almost 50% had basic education. Only 1.6% had tertiary education and 39% had no formal education. Most of the respondents were employed. 74.4% of respondents were married, 15.5% were single and 4.8% and 5% were divorced and widowed respectively. About 82% were Christians. Among participants for the FGDs, 56% had basic education while 33% had no formal education.

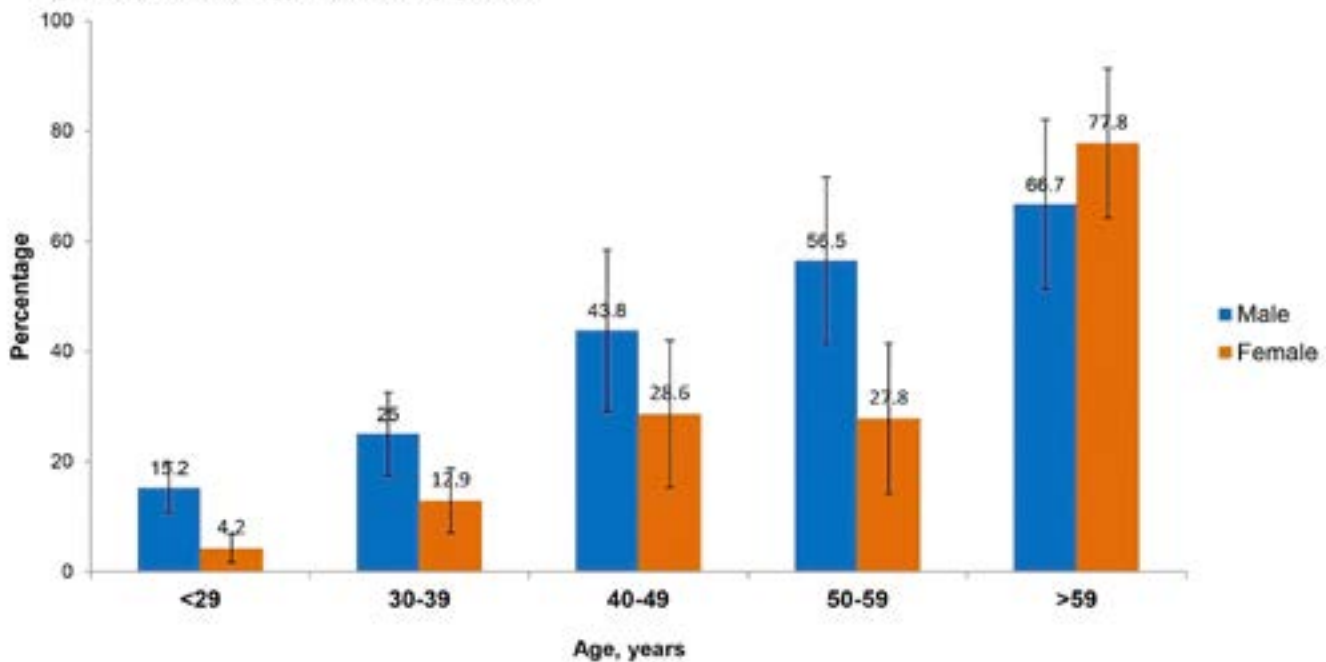
### **Prevalence of hypertension**

The mean diastolic (SD) and systolic pressures (SD) were 81.52mmHg (63.38) and 126.57mmHg (20.16) respectively. The mean systolic pressure was higher among men compared to women (127.42 mmHg versus 124.42 mmHg) and it increased with increasing age in men and women, Fig 1. About 20.2% had systolic pressures above 140 mmHg and the proportion of hypertensives was 21.4%. The proportion of hypertensive increased with increasing age in both sexes and it was higher among male respondents in all age categories, with the exception of those older than 59 years, Fig 2.

**Fig 1 Mean diastolic and systolic pressures by age group**



**Fig 2 Proportion of hypertension by gender**



### Knowledge about Hypertension

Table 1 presents respondents' awareness and knowledge of causes, symptoms and prevention of hypertension. Majority (87.2%) had heard about hypertension and about 79% believed poor diet could cause hypertension. Knowledge on the influence of inactivity and weight gain on hypertension was extremely low (11% and 3% respectively).

Respondents' knowledge on the importance of physical exercise and stress reduction in the prevention of hypertension was equally very low (4.3% and 2.7% respectively). More than 50% agreed to palpitation as a symptom of hypertension whereas 26.5% indicated dizziness. More than 90% visited the health facility when their BP was high. On the other hand, 3.9% and 1.2% visited the herbalist and prayer camp respectively. The most cited source of information about hypertension was the media (57.3%), followed by health staff (32.7%).

**Table 1 Knowledge and sources of information on hypertension**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Heard about blood pressure (n=492)</b>		
– Yes	429	87.2
– No	63	12.8
<b>Causes of high blood pressure (n=462)</b>		
– Dieting	365	79.0
– Inactivity	51	11.0
– Weight gain	14	3.0
– Genetics	13	2.8
– Drugs related	19	4.2
<b>Prevention of hypertension (n=484)</b>		
– Exercise	21	4.3
– Checking diet	350	72.3
– Check BP regularly	67	13.8
– Taking enough rest	13	2.7
– Reducing stress	12	2.7
– Other	20	4.1
<b>Symptoms of high BP (n=480)</b>		
– Dizziness	127	26.5
– Palpitation	272	56.7
– Fatigue	81	16.8
<b>Been told by health staff BP is high (n=480)</b>		
– Yes	70	14.6
– No	410	85.4
<b>First action after being told of hypertension (n=145)</b>		
– Nothing		
– Visited health facility	74	51.0
– Visited herbalist	64	44.1
– Went to see pastor	5	3.5
– Bought drugs from chemist	1	0.7
	1	0.7
<b>Place people seek care when BP is high (n=491)</b>		
– Health facility	465	94.7
– Herbalist	19	3.9
– Prayer camp	6	1.2
– Chemist	1	0.2
<b>Where usually seek care (n=491)</b>		
– Health facility	464	94.5
– Herbalist	16	3.3
– Prayer camp	1	0.2
– Chemist	10	2.0
<b>How often visit source of healthcare (n=486)</b>		
– Once a while	243	50.0
– Very often	73	15.0
– Often	31	6.4
– Rare	139	28.6
<b>Sources of information on hypertension (n=452)</b>		
– Media	259	57.3
– Health staff	148	32.7
– Friends	28	6.2
– Herbalist	12	2.7
– Church or mosque	5	1.1

The level of awareness did not differ much by hypertension status. Awareness of hypertension was almost equal between hypertensives and non-hypertensives in men (84.6% versus 85.8%) and was slightly higher in hypertensives than non-hypertensives in women (91.8% versus 86.8%). The level of awareness however differed significantly by the level of education, with awareness being higher among respondents with formal education

(90.6% versus 81.5%), Table 2. The adjusted odds ratios (AOR) shows higher odds of being aware of hypertension among those with formal education compared to those with no formal education (AOR; 95%CI=2.28; 1.25-4.16). The level of awareness was also significantly lower among those divorced or widowed, compared to those who were married or cohabiting. The significance was however attenuated in the adjusted model, Table 2.

**Table 2 Influence of background characteristics on knowledge of hypertension**

Variables	N (%)	%	OR [95%CI]	AOR [95%CI]
<b>Awareness</b>				
<b>Age</b>				
– <35	249 (49.2)	88.3	1.00	1.00
– 36-45	129 (25.5)	83.9	0.69 [0.37, 1.28]	0.74 [0.38, 1.42]
– 46-55	46 (9.1)	95.7	2.91 [0.67, 12.65]	3.12 [0.67, 14.53]
– 56-65	42 (8.3)	88.1	0.98 [0.36, 2.69]	1.04 [0.35, 3.11]
– >65	40 (7.9)	79.5	0.51 [0.21, 1.22]	0.80 [0.28, 2.29]
<b>Gender</b>				
– Male	203 (41.6)	85.5	1.00	1.00
– Female	285 (58.4)	87.7	1.21 [0.71, 2.06]	1.54 [0.84, 2.85]
<b>Education</b>				
– No formal	196(39.0)	81.5	1.00	1.00
– Formal	306(61.0)	90.6	2.20 [1.29, 3.76]**	2.28 [1.25, 4.16]**
<b>Religion</b>				
– Muslim/other	91 (18.0)	86.8	1.00	1.00
– Christian	415 (82.0)	89.2	0.80 [0.38, 1.69]	0.73 [0.33, 1.60]
<b>Marital status</b>				
– Married/cohabiting	376 (74.7)	89.3	1.00	1.00
– Single	78 (15.5)	81.8	0.54 [0.28, 1.04]	0.59 [0.29, 1.23]
– Divorced/widowed	49 (9.8)	79.6	0.47 [0.22, 1.00]*	0.48 [0.19, 1.23]
*P<0.05; **p<0.01      OR=Odds Ratio      AOR=Adjusted Odds Ratio				

## Results from qualitative sub-study

### Causes of hypertension

In the qualitative sub-study, some respondents understood the causes of hypertension as related to diet and lack of exercise. They explained that:

*‘The foods that we eat and the time that we eat cause high blood pressure. Foods like fatty meats cause blockages of the blood vessels so that the heart is not able to pump blood to the body and it causes problems like hypertension’* (male group, 58 years).

*‘[...] Again our diet; late night eating. Someone will pound ‘fufu’ in the evening and eat and sleep immediately after eating without any exercise. All these do not help but bring problems like high blood pressure’* (Female, mixed group, 41 years).

### Agro-chemical and fertilizer cause hypertension: misconceptions on causes of hypertension

The use of agro-chemicals in farming and eating certain kinds of foods were some of the major misconceptions presented by respondents as causes of hypertension

throughout the discussions. Some participants explained that:

*‘[...] We have learnt some things from the white man where we use some chemicals for crop production. The white man protects himself when using such chemicals but when we are using it we don’t protect ourselves so the hairs on the skin have small pores where these chemicals pass into our bodies and bring about high BP’* (male group, 55years)

*‘[...] Everything is fertilizer now and ammonia and these chemicals are poisonous to us. Now that we eat we don’t see but after two to three years it begins to manifest and by age 40 to 50 years you’ve developed high blood pressure’* (male group, 47 years).

*‘[...] When you eat unhygienic foods you get high BP but when you eat hygienic foods, you will not get high BP’* (female group, 35 years).

*‘What causes the condition (BP) is the ‘kontomire’ (palava source) that we eat. The excess vitamins that we consume; if we consume more of it every day then we can develop high blood pressure’* (mixed group, female, 59 years).

Other related misconceptions included drinking water from old fridges and blood being in excess in the body. Some participants disclosed;

*‘[...] It is believed that old refrigerators can cause high blood pressure due to variation in temperature. When we put water into a fridge and it freezes and it is not drunk while cold but put down to get hot and put back for refreezing before drinking, it could cause high blood pressure’* (FGD, male group).

*“[...] I know high BP is when your blood is in excess and you go to the hospital you are able to donate blood to other people who are in need of blood”* (male, mixed group, FGD).

A male participant from the mixed group even believed gonorrhoea causes hypertension:

*“[...] ... a lot! They say gonorrhoea can also cause hypertension”* (male, 57 years).

### **Knowledge on prevention of hypertension**

The importance of diet and exercise on the risk of hypertension was universal knowledge among the respondents. Some respondents were also of the opinion that adhering to health professionals’ advice could help prevent hypertension. Some participants disclosed;

*‘They say when we watch our diet well we can protect ourselves from getting high BP. Again, if we exercise regularly, then we can protect ourselves from high BP’* (female, mixed group, 37 years).

*‘[...] We should sleep early; we should not eat fresh and fatty meat. We should eat more smoked fish like ‘nseawa’ (smoked herrings)’* (female, mixed group, 29 years).

*‘Taking proper care of yourself like your diet or every morning you engage in exercise like jogging and also avoiding alcohol consumption and excessive thinking will help you protect yourself from high blood pressure’* (male group, 40 years).

In relation to the stated causes, some respondents believed that avoiding contact with agro-chemicals and minimizing the use of fertilizer in agriculture could help prevent hypertension.

Further on importance of exercise in preventing hypertension, almost all participants in the FGDs were of the view that their farm work was inadequate to exercise their body in order to prevent non-communicable diseases like hypertension. Participants suggested other forms of exercise. A participant said;

*‘Jogging, running and playing soccer is good to stay healthy and prevent the condition’* (female group, 36 years).

### **Detection of hypertension**

Most participants disclosed that one could know he/she

is hypertensive when he/she feels numbness in the hands and feet, the heart beats faster and easily gets tired when walking. Some participants noted:

*‘[...] The hands usually becomes numb and the legs or the entire body becomes numb and when you touch something you are not able to grasp it properly. This is because the blood are not able to flow freely in the blood vessels because are blocked’* (mixed group, male, 61 years).

*‘If a person get high blood pressure, his heart beats faster. He misses a heartbeat upon hearing a message and he easily gets tired upon walking few distance’* (female group, 54 years).

Other participants were however of the view that hypertension is not easily detectable unless one visits the facility and he/she is examined by health workers, who can tell whether one is hypertensive or not.

*‘Sometimes you cannot tell the changes in your body by yourself unless you go to the hospital where the doctors will check your blood pressure and confirm high blood pressure’* (male group, 39 years).

*‘When you go to the hospital and you are checked with a machine, it will tell whether you have high blood pressure or not’* (male group 32 years).

### **Sources of health information about hypertension**

The health worker was a major source of information on hypertension. A male respondent from the mixed group explained:

*“I think how we manage to hear is from the doctors (health workers). Say, when we are sick, the directions and instructions that they tell us to follow. [...] We follow their explanation it helps us to know what you will do to get blood pressure”* (59 years).

*“Most of the information is normally taken from physicians. They often tell us “do not eat this, do not do this” and we take cues from that”* (Male group, 38 years).

On the other hand, some participants got information on hypertension from herbal medicine sellers and from the electronic media. They disclosed;

*‘[...] Like my brother said, at times those herbal medicine sellers at the information center are the ones who make us know about such diseases so they help us get information on the air waves concerning how to protect ourselves’* (male group, 53 years).

*‘I also heard it in the news on radio and TV discussion when they make an advertisement or a campaign about it that it [...]’* (male, mixed group, 59 years).

A follow up question on source of health care when one is hypertensive revealed that most of the respondents prefer the health facility as a general source of health care and also when they feel or are diagnosed of hyperten-

sion. Some participants however believed in herbal medications.

*‘[...] The bible teaches us to use the herbs of the plant for medicine. Our old woman at home has herbal medications for high BP which are very good so I think I like herbal treatment’* (male, mixed group, 61 years).

## Discussion

### Prevalence of Hypertension

This study revealed a high prevalence of hypertension in the district. About 21% of the farmers were found to be hypertensive. This somewhat parallels the crude prevalence of hypertension reported in many previous studies. This included a cross-sectional study by Amoah<sup>33</sup> on the community prevalence of hypertension in the Greater Accra region. In contrast, other studies from other developing countries have reported high prevalence of hypertension<sup>12,14,15,34</sup>. These prevalence rates could even be higher if effective preventive measures are not instituted<sup>35-37</sup>. There is currently an increasing prevalence of hypertension in developing countries, with rates getting closer and in some settings even higher than the average prevalence reported in developed countries<sup>38</sup>.

Age and gender are underlying risk factors for hypertension and cardiovascular diseases in general and have been an integral part of almost all recent established risk algorithms for cardiovascular diseases. Generally, risk of hypertension is higher in men and increases with increasing age<sup>15,39,40</sup> and this was not different from what was observed in this study. However, in contrast with this study outcome, some studies have reported a higher prevalence of hypertension in women<sup>41-43</sup>. The increasing wave of hypertension prevalence in this setting, in contrast to what existed about half a century ago,<sup>44</sup> could be related to urbanization, lifestyles changes such as increased tobacco consumption<sup>45</sup>, dietary changes and sedentary lifestyles<sup>17,46</sup>. With limited resources for effective treatment and control of hypertension, there is an urgent need to increase the momentum of preventive interventions including efforts to improve awareness and knowledge of hypertension in such areas. Improved level of knowledge and understanding will help early detection of high blood pressure, which is important to avert many damaging conditions<sup>47,48</sup>. A proper assessment and understanding of knowledge and practices (KAP) is therefore essential, especially in the area of chronic conditions such as hy-

pertension, for which prevention and control necessitate a lifelong adoption of healthy lifestyles.

### Knowledge and Practices related Hypertension

In this study, awareness of hypertension was high. Some respondents also demonstrated good knowledge of the causes and prevention of hypertension with most of them citing unhealthy diet as the major cause of hypertension in both the qualitative and quantitative studies. Few respondents in this study had high knowledge level on modifiable risk factors of hypertension. This is consistent with previous studies, which reported high awareness of hypertension but low knowledge gaps leading to low level of comprehensive knowledge of hypertension<sup>26,29,49</sup>. Similarly, a study in rural Nigeria<sup>28</sup> reported a general lack of knowledge about modifiable CVD risk factors. Common risk factors stated in that study included tobacco use, stress, excessive salt intake and lack of exercise. Other studies from the sub-region,<sup>28,50</sup> also reported low level of comprehensive knowledge of hypertension.

Several misconceptions of the causes of hypertension were exhibited in the qualitative study, with some respondents alluding hypertension to agro-chemicals in farming, eating unhygienic foods, greeting someone with high BP, blood being in excess in the body and drinking cold water from old fridges. This shows that there is the need for increased public health education on hypertension and its causes in this area and other similar settings. These negative perceptions of hypertension would hardly translate to positive health behaviors and therefore the need to demystify them. These misconceptions about the causes of hypertension among study respondents suggest little or no education on hypertension or a possible misinformation.

Access to quality health information improves knowledge on management and control of hypertension<sup>51</sup>. In rural environments, the Community Health Worker (CHW) is the chief source of health information and care. Most respondents in this study cited the media and health worker as main source of health information. Others also cited herbal medicine peddlers as their source of information. There is however a tendency that these herbal sellers have little knowledge of the epidemiology of disease conditions and most often might thwart information to promote their medicines. An effective health promotion intervention in this setting is therefore suggested.



### **Educational level and Knowledge of hypertension**

This study found an association between educational level and knowledge of hypertension. Although educational attainment has been improving over the years in Ghana, a chunk of rural folks still remain uneducated, compared to those in urban settings<sup>52</sup>. Awareness of hypertension was significantly higher among the educated. This is consistent with findings from previous studies,<sup>29,53,54</sup> all of which reported a positive correlation between education and knowledge level of hypertension. This could be partly due to differences in mass media exposure in Ghana, which has been shown to be low among the uneducated<sup>52</sup>. This has been attributed to less ownership of radio and television sets among the uneducated (most likely to be poor). This section of the population is also less likely to utilize health services. Educational interventions should be well structured to improve uptake among both the educated and uneducated.

### **Limitations of the study**

This study might have suffered some response biases, as it was difficult validating responses. It was however presumed that participants were honest and gave answers that were a true reflection of what was happening in the study communities. Again, questionnaires and interview guide were administered in the local language and some terms could not be translated appropriately, which may have misled the findings. It is believed that the use of mixed methods; qualitative and quantitative could have validated findings through triangulation and thus making these findings reliable.

### **Conclusion**

This study has unveiled important barriers to hypertension prevention; lack of appropriate information about hypertension and misconceptions. The study further identified a positive enabler; high level of awareness which is useful in realigning existing interventions to prevent and control hypertension in rural settings.

### **Ethical consideration**

The Committee on Human Research Publications and Ethics (CHRPE) of Kwame Nkrumah University of Science and Technology (KNUST) granted ethical approval for this study. Permission was again sought from the Dis-

trict Health Directorate. The intent and procedures of the study were explained to participants, who gave written consent before enrolment in the study.

### **Competing interests**

Authors declare that there are no competing interests.

### **Authors' contributions**

PAB and GT designed the study. GT collected the data and was analysed by DB. DB and DYQ wrote the first draft of the manuscript. All authors reviewed and accepted the final manuscript for publication.

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