

Burden of hypertension in Ghana – Analysis of awareness and screening campaign in the Ashanti Region of Ghana

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Abstract

Objectives: Hypertension is a major risk factor for cardiovascular mortality globally and in Ghana. May Measurement Month (MMM) is a global awareness and screening campaign initiated by the International Society of Hypertension.

Methods: Participants were recruited by opportunist sampling in the Ashanti region of Ghana. The blood pressures of participants were measured three times and the mean of the last two readings was used for the analysis. Simple and multiple logistic regression was used to determine the predictors of hypertension.

Results: The MMM 2018 awareness and screening campaign enrolled 5054 participants with a mean age of 39.4 ± 14.7 years. There were 2553 (50.6%) males, 987 (20.1%) of respondents had never checked their blood pressure and 676 (13.9%) had a prior history of hypertension. The prevalence of hypertension was 37.4%. We found that 589(66.8%) of 822 respondents with high blood pressure did not have a history of hypertension. Respondents with a known history of hypertension on medication were 442 (65.9%) and 219(68.0%) of 322 respondents on medication had uncontrolled hypertension. The predictors of high blood pressure in a multiple logistic regression were increasing age (OR = 1.05 CI 1.05–1.06, $p < 0.001$), history of alcohol intake (OR = 1.33 CI 1.04 –1.70, $p = 0.02$), overweight (OR = 1.4 CI 1.14–1.76, $p = 0.001$) and obesity (OR = 1.32, CI 1.01–1.74, $p = 0.047$).

Conclusion: There is a high prevalence of hypertension in the Ashanti region in Ghana. Most participants with hypertension were not aware and the majority of those with hypertension on medications were uncontrolled. This calls for more education and screening of hypertension to decrease cardiovascular mortality.

Keywords

Hypertension, Ashanti region, May Measurement Month, Ghana, blood pressure

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Introduction

Hypertension is the leading cause of premature death and cardiovascular diseases worldwide with higher prevalence especially in low- and middle-income countries (LMIC). Hypertension occurs in 1.04 billion (31.5%) people in LMICs as compared to high-income countries of 349 million (28.5%) people.¹ The prevalence of hypertension is projected to increase by 60% in the adult population by 2025 mainly from the increasing prevalence in LMIC.² Hypertension, also termed a 'silent killer' presents with complications associated with increased morbidity and mortality. The impact of hypertension precedes overt symptoms and most present with complications. Hypertension is a major risk factor for stroke, myocardial infarction, heart failure, chronic kidney disease and atherosclerosis.³ There is evidence to show that controlling high blood pressure is associated with lower cardiovascular morbidity and mortality.^{3,4}

The cause of hypertension is unknown in most cases but the risk factors include physical inactivity, obesity, increased alcohol consumption and high salt intake as a result of changing lifestyle, westernization and demographic shifts thus increasing the prevalence of hypertension in Sub-Saharan Africa.⁵ Hypertension in recent times, has become a major public health problem in Sub-Saharan Africa with an estimated 10–20 million people living with hypertension in Sub-Saharan Africa.⁵

Population-based studies in Ghana reveal an increasing prevalence of hypertension with an associated increase in cardiovascular morbidity and mortality.⁶ Despite the increasing prevalence of hypertension, many people are still unaware of their blood pressures or the complications of hypertension. The Ghana Demographic and Health Survey (GDHS) in 2014 revealed that the overall prevalence of hypertension was 13% out of which less than half (45.6%) of respondents knew their hypertension status with 23.8% of respondents with hypertension having controlled blood pressure.^{7,8}

Globally, several initiatives and campaigns have been structured to increase public awareness of hypertension as a step to control hypertension and reduce its associated morbidity and mortality. The International Society of Hypertension (ISH) in 2017 initiated the global campaign called May Measurement Month (MMM). Each year several volunteers in over 100 countries measure the blood pressure of people in their countries to educate and screen about one per cent of the population during the Month of May.^{9,10}

The Ashanti region of Ghana joined the MMM campaign in 2018 to increase hypertension awareness and educate on the need for the populace to check their blood pressure regularly. Those found with hypertension were then provided with medical advice to improve their blood pressure to reduce cardiovascular morbidity and mortality.

Methods

Study design and site

The MMM campaign in 2018 included a global cross-sectional survey of adult participants aged 18 years and above. Ghana was one of the 89 countries that participated in this global study. This community-based opportunistic study was conducted in the Kumasi metropolis of the Ashanti region of Ghana. The Ashanti region is the most populated of the 16 regions of Ghana with an estimated population of 4,780,380 accounting for 19.4% of Ghana's total population.¹¹ It is centrally located in the middle belt of Ghana. Its capital is Kumasi, the economic and commercial hub of the region and the second-largest city in the country. Kumasi is located about 270 km north of Accra, the nation's capital. It has a population density of 5552 persons per square kilometer.¹¹

The study was conducted from 1st to 31st May 2018 during the MMM campaign period. The screening sites included areas of mass public gathering including religious, social and political events during May. Some MMM volunteers also visited some homes as well as workplaces, shops and markets to educate and measure the blood pressure of participants. About 300 volunteers were involved in the campaign.

Study population

The study involved adults aged 18 years and above who consented to participate in the awareness and screening campaigns as well as the study. Participants were recruited by opportunistic sampling by the MMM volunteers.

Data collection, processing and analysis

Volunteers were trained on how to administer the questionnaire, use the MMM application software for data collection and how to measure blood pressures accurately using Omron sphygmomanometers made available by the ISH. They were also trained on how to measure weight and height and calculate the body mass index (BMI). The volunteers served as data collectors for the study. The MMM investigators in Ghana were made up of a team of researchers and healthcare professionals. The volunteers used had a minimum of secondary level of education and were mostly medical and nursing students.

Data collected included demography, medical history and where possible weight and height, measured using a weight scale and stadiometer respectively. Blood pressure measurements of participants were taken three times and the average of the last two used for the analysis. Those with less than three readings were not included in the analysis.

Table 1. Demographic and baseline characteristics of participants surveyed n = 5054.

Variable	Number of respondents	Response rate (%)	N (%)/ Mean \pm SD
Male Gender	5043	99.78	2553 (50.6)
Age (years)	5052	99.96	39.4 (14.7)
Black race	5036	99.64	4993 (99.2)
Outdoor measurement	4993	98.79	4187 (83.9)
Participants who have never checked blood pressure	4902	96.99	987 (20.1)
Participants who have checked BP in last 12 months	3815	75.48	2644 (69.3)
Known history hypertension	4878	96.52	676 (13.9)
Participant who were Pregnant	2421	47.90	69 (2.8)
Participant who were Fasting	4861	96.18	877 (18.0)
History of Diabetes Mellitus	4624	91.49	138 (3.0)
History of Smoking	4837	95.71	114 (2.4)
Alcohol intake never/rarely	4850	95.96	3942 (81.3)
One or more per week	4850	95.96	369 (7.6)
1–3 times per month	4850	95.96	539 (11.1)
History of Myocardial infarction	4850	95.96	68 (1.4)
History of Stroke	4778	94.54	35 (0.73)
Weight (Kg)	3718	73.57	68.5 \pm 12.5
Height (m)	3718	73.57	164.6 \pm 9.0
Body mass index BMI) (Kg/m ²)	3707	73.35	25.3 \pm 4.6
Body Mass Index categories	3707	73.35	-
Underweight (BMI <18 kg/m ²)	3707	73.35	138 (3.7)
Healthy weight	3707	73.35	1729 (46.6)
Overweight (BMI >25 kg/m ²)	3707	73.35	1311 (35.4)
Obese (BMI >30 kg/m ²)	3707	73.35	529 (14.3)
First Systolic Blood pressure measurement (mmHg)	5054	100.00	129.3 \pm 20.1
Second Systolic Blood pressure measurement (mmHg)	3703	73.27	127.9 \pm 19.6
Third Systolic Blood pressure measurement (mmHg)	3022	59.79	127.0 \pm 18.6
Average systolic Blood Pressure	3022	59.79	127.6 \pm 18.4
First diastolic Blood pressure measurement (mmHg)	5054	100.00	81.7 \pm 13.0
Second diastolic Blood pressure measurement (mmHg)	3703	73.27	80.9 \pm 13.0
Third diastolic Blood pressure measurement (mmHg)	3022	59.79	80.4 \pm 12.7
Average diastolic Blood pressure recordings	3022	59.79	80.8 \pm 12.2
Average Heart rate (Beats/min)	2987	59.10	79.9 \pm 11.2
Participants with BP measurement \geq 140/90 mmHg	3022	59.79	911 (30.2)
Prevalence of hypertension	3207	63.45	1199 (37.4)
Known hypertensive on medication	671	13.28	442 (65.9)
Participants on medications with uncontrolled BP	322	6.37	219 (68.0)
Participants with high blood pressures from our study who were not aware	882	17.5	589 (66.8)
Participants with high blood pressures from our study who were aware	882	17.5	293 (33.2)

BP, blood pressure;.

It is worth noting that in some instances, data collection was incomplete. As such, there was missing data for some variables which were not included in the analysis. We therefore used the term ‘respondents’ for participants who responded to a specific question to account for the variations in denominators in some of the variables collected.

Hypertension was defined as a systolic blood pressure \geq 140 mmHg, and/or a diastolic blood pressure \geq 90 mmHg based on the 2nd and 3rd blood pressure readings or with a history of hypertension with or without anti-hypertensive therapy. All participants with high blood pressure readings were counseled and referred to the

nearest hospital for further evaluation and treatment. They were also counseled on lifestyle modifications and dietary counseling to help decrease their blood pressure to decrease cardiovascular mortality.

Data analysis

The data was cleaned and analyzed using Stata/SE 14.0 statistical software (StataCorp. 4905 Lakeway Drive Station, Texas 77845, USA). Descriptive statistics were analyzed for all variables and expressed as means and standard deviation for continuous variables when normally distributed.

Those with high blood pressure readings were compared with those with normal blood pressure measurements. Multiple logistic regression was also performed to establish the predictors of high blood pressure measurements after the simple logistic regression to adjust for confounders and a p-value of less than 0.05 was considered statistically significant.

Ethical considerations

Ethical approval was obtained nationally from the ethics review committee of the Ghana Health Service in Accra-Ghana before the commencement of the national MMM campaign. This study posed minimal or no anticipated risks to participants since it was a non-invasive study, with no identifying information collected. There was no cost to the participant nor was there compensation to participate in this study. Participants had the opportunity to be counseled on how to prevent and control hypertension.

Results

The MMM global hypertension campaign in the Ashanti region of Ghana in 2018 recruited 5054 participants with a mean (SD) age of 39.4 ± 14.7 years. There were some missing variables due to the varying number of respondents for some variables as shown in Table 1.

There were 2553 (50.6%) males. The majority, 4993 (99.2%) of participants were black and 4187 (83.9%) of the participants had their blood pressures measured outdoors during the campaign. We found that 987 (20.1%) of respondents had never checked their blood pressure

and 676 (13.9%) of respondents had a prior history of hypertension.

Participants who had high blood pressure measurements during the survey were 911 (30.2%) of 3022 participants with three measurements taken. Of the 676 respondents with a history of hypertension, 442 (65.9%) respondents were on antihypertensive medications, however, 219 (68%) of the respondents on medication still had poorly controlled blood pressures.

We found a total of 1199 (37.4%) participants with hypertension, defined as a systolic blood pressure ≥ 140 mmHg, and/or a diastolic blood pressure ≥ 90 mmHg or with a history of hypertension with or without antihypertensive therapy. We found that 589 (66.8%) of respondents with high blood pressure measurements did not know they had hypertension. The mean systolic blood pressure of all participants was 127.6 ± 18.4 mmHg and the mean diastolic blood pressure was 80.8 ± 12.2 mmHg.

The mean (SD) BMI of respondents was 25.3 ± 4.7 kg/m², 35.4% were overweight with a BMI of ≥ 25 kg/m² but less than 30 kg/m² and 14.3% were obese with a BMI of ≥ 30 kg/m² as shown in Table 1.

Those with hypertension were significantly older than those without hypertension (47.5 ± 14.8 vs 35.6 ± 13.6 , respectively, $p < 0.001$). Those with hypertension had higher BMI than those without hypertension (28.3 ± 5.8 vs 25.3 ± 4.9 $p < 0.001$) as shown in Table 2.

The predictors of high blood pressure in a multiple logistic regression were increasing age (OR = 1.05, 95% CI 1.05–1.06, $p < 0.001$), alcohol intake (OR = 1.33 95% CI 1.04 –1.70, $p = 0.02$), overweight (OR = 1.4, 95% CI

Table 2. Comparing participants with hypertension to those without hypertension n = 3022.

Variable	High blood pressure (911)	Normal blood pressure (2111)	95% Confidence interval	P value
Mean age (years)(u \pm SD)	47.5 \pm 14.8	35.6 \pm 13.6	10.82–13.00	<0.001
Male Gender n(%)	458 (50.3)	1011 (47.98)	0.94–1.28	0.237
Pregnant n (%)	10 (2.2)	40 (3.7)	0.26–1.23	0.146
Fasting n (%)	182 (20.7)	398 (19.4)	0.88–1.32	0.429
History of smoking n (%)	19 (2.2)	50 (2.5)	0.49–1.53	0.655
History of Alcohol n (%)	188 (21.4)	376(18.4)	0.99–1.47	0.060
Those who have measured BP n(%)	763 (85.8)	1574 (76.2)	1.53–2.34	<0.001
Known history of hypertension n(%)	293 (33.2)	168 (8.16)	4.51–6.96	<0.001
Hypertension on medication	219 (25.2)	103 (5.0)	4.94–8.28	<0.001
Mean systolic BP (mmHg) u \pm SD	147.8 \pm 16.3	118.8 \pm 10.9	27.94–29.93	<0.001
Mean diastolic BP (mmHg) u \pm SD	93.5 \pm 11.1	75.4 \pm 7.8	17.42–18.82	<0.001
Body mass index (Kg/m ²) u \pm SD	26.5 \pm 4.9	24.8 \pm 4.5	1.24–2.02	<0.001
Obesity n(%)	170 (21.5)	225 (12.4)	1.53 2.41	<0.001
Overweight and obesity n(%)	476 (60.1)	801 (44.3)	1.59–2.25	<0.001
History of Diabetes n (%)	48 (5.7)	46 (2.3)	1.64–3.92	<0.001
History of Heart attack n(%)	24 (1.8)	29 (1.4)	1.08–3.50	0.014
History of Stoke n (%)	16 (1.8)	11 (0.5)	1.50–8.30	0.001

n, number; SD, standard deviation; BP, blood pressure; Kg, kilogram.

1.14–1.76, $p=0.001$) and obesity (OR = 1.32, CI 1.01–1.74, $p=0.047$) after a simple logistic regression after adjusting for positive confounders of history of diabetes, myocardial infarction, history of stroke, as shown in Table 3.

Discussion

This is the first report of the MMM campaign in the most populated region of Ghana, the Ashanti region. The Ashanti region participated for the first time in the global blood pressure awareness and measurement campaign in May 2018 with over 5000 participants with the help of more than 300 volunteers. We found that the proportion of participants with hypertension was 37.4% in the survey. About two-thirds of participants with hypertension were unaware and about two-thirds of those with a known history of hypertension were on medication. Of those on medication, only about a third had their blood pressures controlled. Predictors of hypertension among participants were increasing age, alcohol intake, overweight and obesity.

Our prevalence was slightly higher than the global average of 33.4% in 2018¹⁰ and the Ghana national average of 34.1% in 2018.¹² The Ashanti region is the most populated region in the country and very cosmopolitan with a rapidly changing lifestyle.¹¹ The high intake of salt, poor eating habits, sedentary lifestyles and increased alcohol intake may have increased the prevalence of hypertension.^{5,13–15} Most of the participants had their blood pressures recorded outdoors when going about their regular activities which may likely be associated with stress and the possibility of high readings.¹⁶

Over two-thirds of our participants with high blood pressure from this study were unaware of their condition. This is comparable to the global figure of 59.5% according to

MMM 2018.¹⁰ This highlights the need for such educational and screening campaigns to ensure early detection of the ‘silent killer’ to decrease morbidity and mortality associated with hypertension. Weak health systems, limited public health educational programs, and poor health-seeking behavior could account for such phenomenon.^{8,17,18} The asymptomatic nature of hypertension is largely responsible for the late presentation and lack of screening amongst Ghanaians. In addition, misinformation by alternative medicine providers in the region diverts the attention of the masses from seeking appropriate health care.¹⁹ Furthermore, known side effects associated with some antihypertensive medications, such as impotency prevents some men from getting their blood pressures checked for appropriate orthodox medications.^{13,20–22}

We also found out that a fifth of our respondents had never checked their blood pressure with a mean age of about 40 years. Our campaign afforded people an opportunity to get their blood pressures checked. This reiterates the low awareness of hypertension and the need for the populace to be educated and get their blood pressure checked regularly to decrease cardiovascular mortality.⁶ It also highlights the need for such campaigns to be supported by political leaders of all countries to help decrease complications of hypertension such as stroke, myocardial infarction, heart failure and chronic kidney disease.²

The predictors of hypertension in the Ashanti region were increasing age, history of alcohol intake, overweight and obesity. Advancing age is a known risk factor for hypertension.^{5,6,23} Ageing is associated with hypertension as a result of atherosclerotic changes in the ageing vessel, increase in total peripheral resistance and progressive decline in renal function.^{4,23,24} The mean age of participants in the Ashanti region was lower than the global average of 45.3 years and it is, therefore, worrying to have a higher prevalence of hypertension in the Ashanti region. This means we have more people with hypertension in the lower age group. It may be possible that some of our patients could have underlying chronic kidney disease which happens to be a major cause of secondary hypertension in Ghana.^{3,4} The prevalence of chronic kidney disease is now 13.3% in Ghana and occurs also in relatively younger people in Ghana and sub-Saharan Africa as compared to other high-income countries.^{5,25}

Obesity was associated with hypertension as shown in other studies.^{7,8} Obesity has also been well established as a major risk factor for essential hypertension.^{1,8,26} It has also been linked to numerous adverse health-related states particularly cardiovascular diseases, overall quality of life and early death.^{26–28} Increased weight was also found to predict hypertension as most people have now become increasingly sedentary and do not exercise enough to maintain a healthy weight.⁸

Participants with a known history of hypertension and on antihypertensive medications were still more likely to

Table 3. Predictors of hypertension by multiple logistic regression.

High blood pressure readings	Odds ratio	Std. err	Z score	95% CI	P value
Age	1.05	0.0036	15.58	1.04–1.06	<0.001
Alcohol intake	1.33	0.1670	2.32	1.04–1.70	0.021
Overweight	1.41	0.1552	3.18	1.14–1.75	0.001
Obese	1.32	0.1867	1.99	1.00–1.74	0.047
History of diabetes	1.28	0.3225	1.01	0.78–2.10	0.313
History of myocardial infarction	1.49	0.4910	1.22	0.78–2.84	0.223
History of Stroke	2.34	1.1500	1.74	0.89–6.12	0.082

have high blood pressure measurements. Poor blood pressure control has been attributed to a variety of factors, notable amongst them is poor adherence to medication which is the major reason responsible for reduced treatment efficacy despite the notable advances in treatment.²⁹ Poor compliance to antihypertensive can be attributable to the use of alternative medicine particularly herbal medicine use which is very common in the region, forgetfulness, lack of knowledge of the condition, pill burden, fear of adverse effects of medications.²⁰

It is of national interest and concern that the most populated region of the country has recorded such a high prevalence, low awareness and poor control of hypertension in our survey which is one of the largest hypertension screening exercises in the country. There is an urgent need to increase awareness, screen for early detection and make available quality essential medicines for the treatment of hypertension in Ghana.

Our study had several limitations. Though the sampling size was large, opportunistic sampling was used and therefore prone to bias and not make our results representative of the entire population. Volunteer (participant) bias was also possible as most people with hypertension could have used this as a means to check their blood pressures and hence the higher prevalence. Most of the measurements were taken outdoors and some did not get the requisite three blood pressure readings as expected when dealing with large crowds. We were unable to follow up with patients with hypertension for possible causes of secondary hypertension as this was just a one-time survey. We, therefore, recommend follow up in such studies for the cause of hypertension and to ensure the blood pressures are subsequently controlled.

Conclusion

The prevalence of hypertension is high in the Ashanti region of Ghana. Most people were not aware they had hypertension and the majority of those with hypertension were not controlled. This calls for more education on hypertension to decrease the morbidity and mortality of cardiovascular diseases. Awareness creation, regular blood pressure screening and adherence counseling are recommended to win the fight against the 'silent killer'.

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Contributorship

All authors contributed to planning and data collection. EKT, OON, YAB, GO and SOK drafted the initial manuscript. GJA, EXA, FAK, KAB and MOA analyzed the data. All others contributed in review and additional contribution to the write up. All authors approved of the final version of manuscript and can affirm the accuracy and integrity of the work. EKT and OON take responsibility for this article as a whole.

Data availability

The data used to support the findings of this study are available from the corresponding author on request.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical approval

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