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Introduction

Cardiovascular disease (CVD) has been identified as the leading cause of non-communicable disease (NCD) morbidity and mortality in every world region; and has been projected to be the leading cause of death by 2030.[1] Recent estimates by the World Health Organization (WHO) show that CVD accounts for almost 17 million deaths every year.[2,3] Of these deaths, it has been estimated that hypertension and its complications accounts for 9.4 million.[4] In Africa, the prevalence of hypertension among adults aged 25 and above is 46%; which happens to be the highest compared to the other world regions.[3] Over the past decade and a half, the prevalence of hypertension in Africa particularly in urban societies, is as high as the prevalence observed in many urban settings in developed countries.[5-7] It has been suggested that an increase in morbidity and mortality associated with hypertension in the Africa does not only reflect a high prevalence of the condition, but also gives an indication of inadequate rates of awareness.[8]

It is estimated that the prevalence of hypertension in Ghana ranges from 25% to 48%.[9] The Ministry of Health of Ghana has reported that hypertension is the second leading cause of outpatient morbidity in adults older than 45 years.[10] A recent study among adults living in urban poor communities in Accra reported a hypertension prevalence of 28.3%.[11] The increase in prevalence of hypertension in Ghana (and other developing countries) has been linked to globalization, urbanization and lifestyle changes.[12,13]

An important advancement in hypertension research over the last few decades has been the identification of modifiable risk factors associated with hypertension prevalence.[14] There have been efforts to prevent hypertension and its complications from increasing by addressing issues around these modifiable risk factors. However, despite advances in the primary and secondary prevention of hypertension and more broadly CVD,[15] the prevalence of hypertension in almost every world region has persisted or worsened in many instances; coupled with declining awareness rates. This situation has spurred efforts to study the causes of the modifiable risk factors ('the causes of the causes') which include understanding how social phenomenon determines health outcomes (particularly hypertension). [14]

Risk factors such as smoking, over consumption of alcohol and physical inactivity and its relationship with hypertension and CVDs have been the focus of many studies in this field.[16] Very few studies have documented social determinants such as ethnicity or social relationships and their association with hypertension prevalence and awareness. The impact of the social environment on hypertension prevalence and awareness has become essential because it is necessary to focus efforts on understanding the role of social factors to help address the rising prevalence and incidence of hypertension in Ghana. This study thus, sought to find out the social (and demographic) factors that predict hypertension prevalence among adults living in urban poor areas in Accra, Ghana. We also set out to find out which social variables have an association with hypertension awareness.

Methods

Study Communities

James Town, Ussher Town and Agbogbloshie were the urban poor communities in which the study was conducted. All three communities are characterized by a low socio-economic status, high population density, and a built-up environment with poor sanitary conditions and poor housing structures. James Town and Ussher Town are indigenous communities inhabited mainly by the Ga-Dangme ethnic group. The main economic activities in these communities are fishing and petty trading. Agbogbloshie is an ethnically heterogeneous and migrant community with most inhabitants working as traders and artisans.

This study was part of a broader longitudinal 'Urban Poverty and Health Survey' conducted by the Regional Institute for Population Studies (RIPS). RIPS, with support from the Secretariat of the African Caribbean and Pacific Group of States–European Union (ACP-EU) Cooperation Programme in Higher Education and the International Development Research Centre (IDRC), has established an active research field site in the three communities.

Sampling

The communities were divided into Enumeration Areas (EAs); proportionate to the size of the localities. There were 29 EAs in total; 16 from Ussher Town, 8 from James Town and 5 from Agbogbloshie. In each EA, households were randomly chosen, and each member in a sampled household between the ages of 15-59 responded to the questionnaire. The data were collected using an interviewer-administered questionnaire. Respondents who answered the questionnaire then had their blood pressure (BP) measurements taken by trained field personnel. In total, a representative sample of 974 individuals were eligible to be interviewed out of which 714 individuals had their BP measurements taken. Some respondents refused BP measurements even though they responded to the individual questionnaire.[11]

Inclusion Criteria

Male respondents between the ages of 15 to 59 and female respondents between the ages of 15 to 49 were eligible to answer the questionnaire and by extension had their BP measurements taken.

Exclusion Criteria

Females who were pregnant and those who had given birth in the last 6 months were excluded from the study because of the potential for pregnancy-induced high BP.[17]

Measurements

Blood pressure was measured on a single visit. Field personnel received standard training on BP measurements. BP was measured on the seated participant's arm after a five to ten minute rest using a validated automated BP monitoring device (Microlife Watch BP Home).[18] Three BP measurements were taken at 1 to 2 minute intervals and the average of the three readings was used for the analysis. It is recommended that the average of three BP readings be used in single visit

studies.[19] Hypertension was defined as a BP reading of ≥140/90 mmHg or the use of anti-hypertensive medication or a prior diagnosis of the condition by a health professional.

Awareness of hypertension was defined as a report of a prior diagnosis of hypertension made by a health professional.[20]

Age was categorized into ten-year groups. Educational status referred to the highest level of formal education attained.

Data Analysis

A binary logistic regression was used to assess the social and demographic factors that predict hypertension prevalence; adjusting for levels of physical activity as well as smoking, alcohol consumption, and BMI status. Results for the regression model were expressed as odds ratios with 95% confidence intervals (CIs). We used chi square test to establish statistically significant associations between social variables and awareness of hypertension among those living with the condition. All statistical analyses were performed using SPSS 21 (© Copyright IBM Corporation and other(s) 1989, 2012).

Results

Characteristics of the study participants

The characteristics of the study sample are presented in Table 1. The age group, 15-24 constituted about one third (33.5%) of the entire sample. With regard to education, majority (44%) of the respondents had completed up to middle school (or junior high school). Less than 5% of the study participants had tertiary education. Almost 80% of the respondents were Christians. This is above the proportion of Christians (71.2%) reported in the most recent (2010) population census in Ghana.[21] Very few respondents (7%) were not affiliated to any religious group or body. With regard to ethnicity, more than half (58.9%) of the study participants were Ga-Dangme's. This is expected because two of the communities (James Town and Ussher Town) are indigenous communities and historically have been occupied by this ethnic group. More than three-quarters (77.4%) of the respondents did not belong to any social group. Social groups (example youth associations) are common features in most urban societies in Ghana. A little more than a quarter of the respondents (27%) were not working at the time of study.

Hypertension Prevalence and Awareness

The overall prevalence of hypertension was 28.3%. There was a higher prevalence of hypertension among males (30.4%) than females (26.4%) (Figure 1). The rate of hypertension awareness among those living with the condition was 7.3%. In other words, of those who were defined as having hypertension, only 7.3% of them reported a prior diagnosis of hypertension by a health professional. Among those living with the condition, more females (10.7%) than males (3.9%) were aware of their status (Figure 2).

Table 1. Characteristics of study sample

Characteristic	**Total** (*n*=725)	**Male** (*n*=335)	**Female** (*n*=390)
Age Group			
15-24	243 (33.5%)	112 (33.4%)	131 (33.6%)
25-34	224 (30.9%)	105 (31.3%)	119 (30.5%)
35-44	153 (21.1%)	60 (17.9%)	93 (23.8%)
45-59	105 (14.5%)	58 (17.3%)	47 (12.1%)
Educational status			
No education	42 (5.8%)	12 (3.6%)	30 (7.7%)
Primary	143 (19.7%)	38 (11.3%)	105 (26.9%)
Junior high school	319 (44.0%)	148 (44.2%)	171 (43.8%)
Senior high school	187 (25.8%)	109 (32.5%)	78 (20.0%)
Tertiary	34 (4.7%)	28 (8.4%)	6 (1.5%)
Member of social group			
Yes	164 (22.6%)	93 (27.8%)	71 (18.2%)
No	561 (77.4%)	242 (72.2%)	319 (81.2%)
Locality of residence			
Agbogbloshie	121 (16.7%)	50 (14.9%)	71 (18.2%)
James Town	242 (33.4%)	119 (35.5%)	123 (31.5%)
Ussher Town	362 (49.9%)	166 (49.6%)	196 (50.3%)
Religion			
No religion	51 (7.0%)	30 (9.0%)	21 (5.4%)
Christian	574 (79.2%)	257 (76.7%)	317 (81.3%)
Muslim	79 (10.9%)	38 (11.3%)	41 (10.5%)
Traditional/Spiritualist	21 (21.9%)	10 (3.0%)	11 (2.8%)
Ethnicity			
Akan	190 (26.2%)	79 (23.6%)	111 (28.5%)
Ga-Dangme	427 (58.9%)	216 (64.5%)	211 (54.1%)
Other [Minority groups]	108 (14.9%)	40 (11.9%)	68 (17.4%)
Currently working			
Yes	529 (73.0%)	236 (70.4%)	293 (75.1%)
No	196 (27%)	99 (29.6%)	97 (24.9%)

Values are expressed as n (%)

Figure 1. Prevalence of hypertension

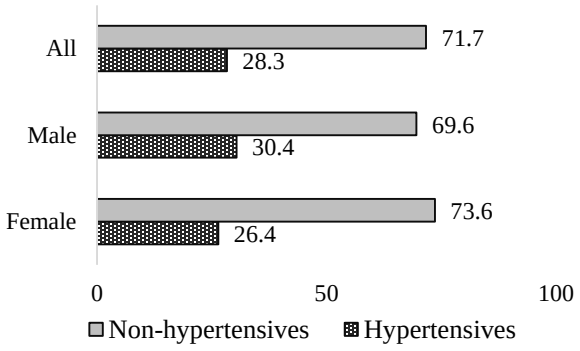
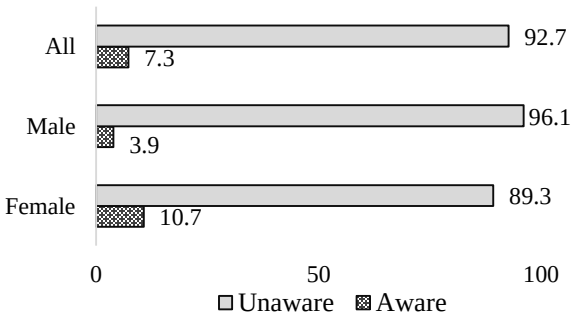


Figure 2. Percent distribution of hypertension awareness among hypertensive individuals.



Predictors of hypertension prevalence

Results of the regression model indicate that age, education, place of residence and current work status predicted hypertension in the study communities; after adjusting for certain lifestyle behaviours (smoking status, alcohol consumption, physical in(activity) and BMI status) (Table 2). With regard to age, the results show that advancement in age increased the odds of developing hypertension. Furthermore, those with tertiary education compared to those with no education had decreased odds of being hypertensive in the study areas. Individuals who were not currently working had increased odds of being hypertensive compared to those who were working (irrespective of the type and nature of the work).

Table 2. Regression model of socio-demographic factors associated with hypertension prevalence

Variable	Odds ratio	95% CI	P
Age Group			
15-24 *(ref.)*			
25-34	1.66	0.95–2.92	*
35-44	2.30	1.22–4.33	**
45 and over	3.04	1.51–6.13	**
Sex			
Female			
Male	1.20	0.77–1.88	
Educational status			
No education *(ref.)*			
Primary	0.56	0.22–1.42	
Junior high school	0.51	0.21–1.22	
Senior high school	0.72	0.29–1.78	
Tertiary	0.33	0.09–1.24	†
Member of social group			
Yes *(ref.)*			
No	1.39	0.87–2.24	
Locality of residence			
Agbogbloshie *(ref.)*			
James Town	1.16	0.90–5.96	***
Ussher Town	1.74	0.78-3.85	
Religion			
No religion *(ref.)*			
Christian	1.29	0.56–2.93	
Muslim	1.85	0.65–5.24	
Traditional/Spiritualist	1.38	0.35–5.50	
Currently working			
Yes *(ref.)*			
No	1.60	0.95–2.68	†
Ethnicity			
Akan *(ref.)*			
Ga-Dangme	0.80	0.49–1.30	
Other [Minority groups]	0.84	0.40–1.76	

'Non-hypertensives' was used as the reference category for hypertension status. Results are expressed as odds ratio and 95% confidence interval adjusted for physical (in)activity, smoking, alcohol consumption, and BMI status. †P< 0.10, *P< 0.05, **P< 0.01 and ***P< 0.001. (*ref.*) is the reference category.

Factors associated with hypertension awareness

A chi-square test was used to determine the social and demographic variables that had an association with hypertension awareness in the study communities. The results indicate that one's place of residence (those living in James Town), sex (females) and age (those 45 years and over) were more likely to be aware of their hypertension (see Table 3).

Table 3. Social factors associated with hypertension awareness in urban poor communities in Accra

Variable	Chi-Square	P value
Place of residence	8.49	0.01**
Sex	3.45	0.05*
Age	21.88	0.00***
Educational level	3.02	0.55
Member of social group	0.45	0.50
Religion	1.32	0.72
Ethnicity	0.55	0.76
Currently working	0.74	0.39

*P< 0.05, **P< 0.01 and ***P< 0.001.

Discussion

The broad mechanisms (i.e. biological and behavioural risk factors, issues regarding treatment as well as low awareness) involved in the development and complications of hypertension are now relatively well understood. Despite this, there are still dramatic increases in hypertension incidence and prevalence especially among disadvantaged groups.[16] This makes it essential to improve knowledge of hypertension determinants.

The prevalence of hypertension in this study was 28.3%. This is much higher than the prevalence of 12.3% found in a study among individuals living in two urban poor communities in Kenya.[22] Furthermore, the awareness rate of hypertension in our study was abysmally low at 7.3%; much lower than the rate of 19.5% found in the study among urban poor dwellers in Kenya.[22] This suggests that residents of the urban poor communities in this study are more susceptible to hypertension complications. This susceptibility is further compounded by the high incidence and prevalence of other disease conditions such as cholera, diarrhea and malaria.

The results indicated that current work status (irrespective of type of occupation) predicted hypertension in the study communities. A population-based study of adults aged 15 and over in Senegal also found this association.[23] This suggest that individuals who are not engaged in any form of employment are most likely to develop symptoms of psychosocial stress due to their inability to gain income. This is likely to increase their chances of being hypertensive.

Additionally, place of residence predicted hypertension prevalence. Several studies have established that there is a neighbourhood effect on disease outcomes.[24,25] This is clearly evident in our study. In our study, living in one community as opposed to the other increased one's chances of developing hypertension. Neighbourhood effect also had an association with hypertension awareness.

Results from our study shows that the level of one's education predicts hypertension prevalence. The same observation was made in a study in Brazzaville, Congo.[26] Hypertension intervention programs in the study communities should focus on individuals with no or minimal formal education.

It is an established fact that hypertension prevalence is associated with advancement in age. This was apparent in our study. Age predicted hypertension prevalence and was also associated with awareness.

Conclusion

Traditional risk factors such as physical inactivity, over consumption of alcohol and smoking has been extensively studied, resulting in an abundance of literature. Relatively fewer studies in Ghana have documented social and demographic determinants and their bearing on hypertension. We make the argument that sociodemographic determinants should not only be juxtaposed with traditional risk factors acting directly on disease outcomes, but also be examined as underlying determinants of hypertension and CVDs in general.[16] Furthermore, sociodemographic determinants act along causal chains to influence the occurrence of traditional risk factors as well as the incidence of hypertension prevalence and awareness.

References

1. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. *Lancet* 2006; 367:1747-57.

2. Causes of Death 2008 [online database]. Geneva, World Health Organization (http://www.who.int/healthinfo/global_burden_disease/cod_2008_sources_methods.pdf)

3. World Health Organization. Global brief on Hypertension. Silent killer, Global public health crisis. Geneva, *WHO* 2013.

4. Lim SS, vos T, Flaxman AD, Danaei G, et al A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010 : a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012; 380: 2224-60.

5. Khor GL. Cardiovascular epidemiology in the Asia-Pacific region. *Asia Pac J Clin Nutr* 2001; 10:76-80.

6. Vorster HH. The emergence of cardiovascular disease during urbanization of Africans. *Public Health Nutr* 2002; 5:239-243.

7. Addo J, Smeeth L, Leon DA. Hypertension in sub-Saharan Africa: a systematic review. *Hypertension* 2007; 50:1012-1018.

8. Addo J, Agyemang C, Smeeth L, de-Graft Aikins A, Edusei AK, Ogedegbe O. A review of population-based studies on hypertension in Ghana. *Ghana Med J* 2012 Jun; 46(2 Suppl):4-11.

9. Bosu WK. Epidemic of hypertension in Ghana: a systematic review. *BMC Public Health* 2010, 10:418.

10. Ministry of Health. The Ghana Health Sector 2006 Programme of Work. 2005.

11. Awuah RB, Anarfi JK, Agyemang C, Ogedegbe G, Aikins Ad. Prevalence, awareness, treatment and control of hypertension in urban poor communities in Accra, Ghana. *J Hypertens* 2014; 32(6):1203-10.

12. World Health Organization (WHO). Global Status Report on Noncommunicable Diseases 2010. Geneva*:* WHO*;* 2010.

13. Yach D, Hawkes C, Gould C, Hofman K. The global burden of chronic diseases. Overcoming impediments to prevention and control. *JAMA* 2004*;* 291:2616-22.

14. Kreatsoulas C, Anand SS. The impact of social determinants on cardiovascular disease. *Can J Cardiol* 2010; 26 Suppl C: 8C-13C.

15. Chow CK, Lock K, Teo K, Subramanian S, McKee M, Yusuf S. Environmental and societal influences acting on cardiovascular risk factors and disease at a population level: A review. *Int J Epidemiol* 2009; 38:1580-94.

16. Lang T, Lepage B, Schieber AC, Lamy S, Kelly-Irving M. Social determinants of cardiovascular diseases. *Publ Health Rev* 2012; 33: 601-22.

17. Siddiqui Q, Anam M, Mahmood KT. Management of pregnancy induced hypertension. *J Pharm Sci Technol* 2010; 2:421–426.

18. Stergiou GS, Tzamouranis D, Protogerou A, Nasothimiou E, Kapralos C. Validation of the Microlife Watch BP Office professional device for office blood pressure measurement according to the International protocol. *Blood Press Monit* 2008; 13(5): 299-303.

19. World Health Organization. WHO STEPS surveillance manual. Geneva: WHO; 2008.

20. Burt VL, Cutler JA, Higgins M, et al. Trends in the prevalence, awareness, treatment and control of hypertension in the adult US population. Data from the health examination surveys, 1960 to 1991.*Hypertension* 1995; 26 (1): 60–69.

21. Ghana Statistical Service (GSS). 2010 Population & housing census. Summary report of final results. *Sakoa Press Limited* 2012.

22. van de Vijver SJ, Oti SO, Agyemang C, Gomez GB, Kyobutungi C. Prevalence, awareness, treatment and control of hypertension among slum dwellers in Nairobi, Kenya. *J Hypertens* 2013, 19:19.

23. Pessinaba S, Mbaye A, Yabeta GA, Kane A, Ndao CT, Ndiaye MB. Prevalence and determinants of hypertension and associated cardiovascular risk factors: data from a population-based, cross-sectional survey in Saint Louis, Senegal. *Cardiovasc J Afr* 2013; 24(5):180-3.

24. Kawachi I, Berkman LF. Neighborhoods and Health. New York: Oxford University Press; 2003.

25. Morland K, Wing S, Diez-Roux A. The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. *Am J Public Health* 2002; 92(11):1761–7.

26. Kimbally-Kaky G, Gombet T, Bolanda JD, Voumbo Y, Okili B, Ellenga-Mbolla B. et al. Prevalence of hypertension in Brazzaville. *Cardiol Trop* 2006; 32:43–46.