SCHOOL OF PUBLIC HEALTH

COLLEDGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

PREVALENCE OF RISK FACTORS FOR HYPERTENSION AMONG SENIOR HIGH SCHOOL STUDENTS IN GA EAST DISTRICT IN GREATER ACCRA, GHANA

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE

2011

DECLARATION

I achieved this work independently under the supervision of Professor Edwin Afari. I declare that except for other people's investigations which have been duly acknowledged, this work is the result of my own original research, and this dissertation, either in whole or part, has not been presented elsewhere for another degree.

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DEDICATION

To the Almighty God who granted me admission into this school and wisdom to produce this piece of work, to my late mother, Madam Theresa Addai, and my unborn child(ren) for inspiring me to greater heights.

ACKNOWLEDGEMENT

I am grateful to all who contributed in diverse ways to make this study a success. I am grateful to the Almighty God, who endowed me with strength and knowledge to produce this dissertation.

The quality of this work was out of the rich guidance of my academic supervisor, Professor Edwin Afari.

I am as well very grateful for the support and care I received from the Director and staff of Ga East Municipal Health Directorate. I acknowledge the support of the Ga East Municipal Education Directorate and Heads of Senior Secondary Schools in Madina Sub-district.

I equally recognize the assistance and encouragements I received from lecturers especially Dr Priscilla Nortey. Lastly I am sincerely grateful to the staff at the Epidemiology Department of the School of Public Health for their support and assistance.

ABSTRACT

Background: Globally, Hypertension is fast becoming the commonest cardiovascular disorder contributing a lot to the morbidity and mortality (WHO, 1996). Although hypertension is a risk factor for other cardiovascular diseases, it has its own risk factors which range from genetic/familial, sex, age, race/ethnicity, level of physical activity, dietary as well as smoking, alcohol intake and obesity/overweight (WHO, 2002). The general objective of this study is to determine the prevalence of risk factors for hypertension among Senior High School (SHS) students in the Ga East District of Ghana.

Methods: A cross-sectional study of 500 SHS students in the Ga East District of Ghana was conducted in June 2010 using a simple random sampling method. Data on demographic characteristics and lifestyles were collected by structured interview through questionnaire. Physical measurements including weight and height (to derive body mass index [BMI]) and blood pressure were taken. Data were entered and analyzed using SPSS version 16.0.

Results: In all, 500 students, with mean age of 17.77 SD 1.54 years, participated in the study. There were prevalences of 6.40% (95% C.I. = 4.25%, 8.55%) and 9.40% (95% C.I. =6.83%, 11.97%) for hypertension and prehypertension respectively. Prevalence of overweight and obesity were 7.60% (95% C.I. = 5.26%, 9.93%) and 2.00% (95% C.I. = 0.77%, 3.23%) respectively. Of them, 56.80% had adequate sports/recreational activities and 63.80% had adequate physical activity for transport. Walking was the main form of physical activity. Of them, 37.60% had ever consumed an alcoholic drink. Of them, 13.00% and 19.40% consumed alcohol within the past 30 days and 12 months

respectively. Even though 86.90% of study participants had ever heard of hypertension, 46.80% had no idea what hypertension was and knowledge of risk factors was poor.

Conclusion:

The prevalence of risk factors determined in the study for hypertension was cause for concern considering the age range and calls for efforts to reverse the trend. There is therefore the need to emphasize lifestyle education and to develop policies and initiatives for the prevention and control of hypertension, so as to ensure a healthy population for the country.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
DBP	Diastolic Blood Pressure
GAR	Greater Accra Region
NHANES	National Health and Nutrition Examination Survey, USA
NHBPEP	National High Blood Pressure Education Program, US
NIH	National Institute of Health, US Dept of Health Services
SHS	Senior High School
SBP	Systolic Blood Pressure
US	United States of America
WHO	World Health Organization

CHAPTER ONE

1. INTRODUCTION

1.1 Background Information

Hypertension, also called high blood pressure, is a chronic medical condition in which the systemic arterial blood pressure is elevated. It is classified as either primary (essential) or secondary. About 90–95% of cases are primary and occur when no medical cause can be found (Carretero and Oparil, 2000). The remaining 5–10% of cases (secondary hypertension) is caused by other conditions that affect organs such as the kidneys, arteries, heart, or endocrine system.

Hypertension often remains asymptomatic until late in its course and it plays a major role in the development of cerebrovascular disease, ischaemic heart disease, stroke, cardiac and renal failure (WHO, 2002; European Heart Network, 2003).

In Ghana and countries in socioeconomic and epidemiological transition, with increasing control of communicable diseases and increased expectation of life, non-communicable life style related diseases are becoming important. Hypertension is becoming the commonest cardiovascular disorder contributing a lot to the morbidity and mortality (WHO, 1996).

Worldwide, hypertension is estimated to cause 7.1 million premature deaths and 4.5% of the global disease burden (WHO, 2002). The prevalence of hypertension in many developing countries is now as high as those seen in the developed countries (Saha et al, 2008). It is widely reported in Africa and also known to be a major factor in the high

mortality of adults in sub-Saharan Africa (WHO, 2002). The prevalence of hypertension in urban Accra was found to be 28.3% (crude) and 27.3% (age-standardized) (Amoah, 2003).

Although hypertension is a risk factor for other cardiovascular diseases, it has its own determining factors which range from genetic/familial, sex, age, race/ethnicity, level of physical activity, socioeconomic, and dietary as well as smoking and alcohol intake (Davidsons, 2002). The cumulative effect of risk factors of hypertension such as diet (especially salt and fat intake), low levels of physical activity, obesity/overweight and excessive alcohol intake is that blood pressure rises steadily with age (WHO, 2002).

There are increasing reports of rise in the prevalence of adolescent hypertension. About 1% of US children and adolescents between the ages of 11 to 18 were diagnosed of hypertension in 1989. This number rose to about 5% in 2002 (NHANES, 2004). The insidious and the steady nature of hypertension in adults indicate that it may have had its roots in childhood and in adolescence but was probably undetected (Agarwal, 1983). In Ghana, there is little data on adolescent hypertension. This study is therefore to evaluate the risk factors and prevalence of hypertension among SHS students in the Ga East district of Greater Accra, Ghana and to provide initial baseline data for future research.

1.2 Problem Statement

Recent studies show that cardiovascular diseases and their risk factors including hypertension are on the rise worldwide. The association between the presence of risk factors of hypertension and progress to the disease has been well documented. Risk factor

identification is an established component of primordial prevention to reduce the incidence of hypertension. Several studies have investigated hypertension in adults (Agyemang, 2006; Zhaoqing et al, 2008). However, not many researchers have assessed the epidemiology of hypertension in adolescents, as they are expected to be at lower risk of developing the disease (NHANES, 2004; Saha et al, 2008). In Ghana, the situation is not any different. Studies have concentrated on the adult population, paying little attention to adolescents.

With a growing problem of hypertension worldwide, there is a concern that hypertension in adolescents may also be on the rise and data on prevalence has thus been considered crucial (Su et al., 2008). Increased blood pressure in childhood has also been found to correlate with hypertension in adulthood (Klumbiene et al., 2000). This emphasizes the need to track blood pressure and its risk factors in the younger population.

1.3 Justification of Study

Most studies on blood pressure in Ghana have concentrated on the adult population, paying little attention to adolescents. This situation is due to a general perception that adolescents are at lower risk of developing the disease. However studies conducted elsewhere on adolescents have revealed quite a significant number of them with hypertension. Therefore similar studies in Ghana can provide useful information about the prevalence of risk factors associated with hypertension in the younger population. Such information will inform policy and intervention strategies for the prevention and control of hypertension in adolescent population.

1.4 Study Objectives

1.4.1 General objective

To determine the prevalence of risk factors for hypertension among SHS students in the Ga East District

1.4.2 Specific objectives

1. To determine the prevalence of hypertension among the SHS students
2. To determine the prevalence of overweight and obesity among the SHS students
3. To assess the level of physical activity among the SHS students
4. To determine the prevalence of alcohol consumption among the SHS students
5. To determine the level of awareness of hypertension among the SHS students

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Definition

High Blood Pressure, also called hypertension is a chronic medical condition in which there is elevation in the pressure with which blood flow through the arteries during contraction and relaxation of the heart. It is classified as either primary (essential) or secondary. About 90–95% of cases is primary and occurs when no medical cause can be found (Carretero and Oparil, 2000). The remaining 5–10% of cases (secondary hypertension) is caused by other conditions that affect organs such as the kidneys, arteries, heart, or endocrine system.

For persons aged 18 years and above, hypertension is defined as systolic blood pressure of ≥140mmHg or a level of diastolic blood pressure of ≥90mmHg (WHO, 1996). Similarly, a person above 18 years is said to be overweight and obese if he/she has a Body Mass Index (BMI) of 25-30 kg/m^2 and a BMI of above 30 kg/m^2 respectively.

2.2 Adolescent hypertension

This clinical definition of hypertension does not apply to persons below age 18 since cardiovascular states in childhood are largely limited to ventricular hypertrophy (Daniels SR et al, 1998).

Hypertension for persons below the age of 18 years is given as blood pressure that is, on 3 different occasions, measured at or higher than the 95th percentile for age, sex, weight and height. Prehypertension is given similarly at 3 or more visits, but as average blood

pressure at or higher than the 90th percentile for age, sex, and height, but less than the 95th percentile. Blood pressure monitoring in US showed that at blood pressure of 120/80 in persons below 18 years of age can be considered hypertensive (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, US, 2004; NHBPEP, 1996; Brookes, 2004; NIH, 2005). The prevalence of prehypertension tends to be greater among young adults, than in older adults (Flynn, 2002), suggesting that individuals with prehypertension progress to hypertension.

In the US, about 1.0% of persons between the ages of 11 to 18 were diagnosed of hypertension in 1989. This number climbed to about 5.0% in 2002 (NHANES, 2004).

Developing countries tend to share in this epidemic. The prevalence of hypertension was 2.9% in a community-based cross-sectional study (Saha et al, 2008) of prevalence of hypertension and variation of blood pressure with age among adolescents in Chetla, India.

Information on prevalence of hypertension in adolescents appears to be scanty in Africa, especially Ghana. In a study among school children in Sousse, Tunisia, Harrabi et al (2006) reported arterial hypertension –both systolic and diastolic hypertension- prevalence of 9.9%, while systolic and diastolic hypertension prevalence was 6.4% and 4.5 % respectively. A similar study in Koji State in Nigeria reported a pre-hypertensive rate of 15.1% to 37.2% for age 13 to 18 years and hypertension prevalence of 5.3% to 37.9 % (Ejike et al, 2010).

2.3 Risk factors of hypertension

2.3.1 Body weight and Body Mass Index (BMI)

Body weight in adolescents is defined in percentile and a BMI of 95th percentile of same age, gender and height is considered overweight (Ogden and Carroll, 2010). Increase in the number of overweight adolescents worldwide is alarming. National surveys in US from 1960 to 1990 revealed that the prevalence in children aged 12-19 have increased from 5% to 11% (Ogden et al, 1997). In South Africa, 17% of their adolescent population was reported as overweight with 4.2% being obese (Reddy et al, 2003). Proportionately more girls were overweight than boys.

A study of childhood Body-Mass Index and the risk of coronary heart disease in adulthood in Copenhagen, Denmark (Baker et al, 2007) revealed that higher BMI during childhood is associated with an increased risk of Coronary Heart Disease (CHD) in adulthood. The associations were stronger in boys than in girls and increased with the age of the child in both sexes. In 5,063,622 person-years of follow-up, 10,235 men and 4318 women for whom childhood BMI data were available were diagnosed of CHD or died of CHD as adults. The risk of any CHD event was positively associated with BMI at 7 to 13 years of age for boys and 10 to 13 years of age for girls. Furthermore, the risk increased with the age of the child.

Increasing body weight is a reliable pointer to increasing risk of hypertension in adolescents. Freedman et al (2007) reported that overweight children and adolescents were 4.5 and 2.4 times likely to have high systolic blood pressure and diastolic blood pressure, respectively.

2.3.2 Family History of Hypertension

It has been estimated that genetics account for about 30 % of variations in blood pressure in the general population and 60% to 70% of hypertension in families (Ward, 1990). A study in Isfahan city, Iran (Kelishadi et al, 2003) conducted to compare the blood pressure in children of hypertensive and normotensive parents showed that mean systolic (SBP), diastolic (DBP) and mean arterial blood pressure (MABP) were significantly higher in children of hypertensive parents than of controls in preadolescents and adolescents. The mean SBP and DBP in children of hypertensive mothers were significantly higher than controls. In fathers, the difference was significant only for SBP. When both parents were hypertensive the mean SBP and DBP of children were higher than for only one hypertensive parent.

A number of genes have been identified to influence blood pressure and are probably located primarily on the kidneys (Din-Dzietham et al, 2007).

2.3.3 Age and Gender

A study among adolescents in Chetla, India (Saha et al, 2008) showed that mean systolic and diastolic blood pressure was higher in males than females. Among males and females, average increase of mean systolic blood pressure was found to be 2.26mmHg and 1.95mmHg per year respectively. Similar trends in high school students are reported in other parts of the world (Reddy et al, 2003; Kelishadi et al, 2003).

In the 14-year follow-up of the randomized, prospective Special Turku Coronary Risk Factor Intervention Project (STRIP) Study (Niinikoski et al, 2009), gradual increase in the systolic BP from 92 mm Hg at 7 months to 110 mm Hg (mean) at 13 years in both

sexes was reported. Diastolic BP increased from 56- 58 mm Hg to 60 - 62 mm Hg from 5-8 years of age to 15 years of age.

Data on the influence of age in adolescent primary hypertension seem to be conflicting. Some studies revealed that adolescent hypertension in age 13 and above remain in the same range for a substantive period (Flynn and Alderman, 2005). Other studies show an increase in prevalence from age 13 to 18 years with more girls than boys (Harabi et al, 2006).

2.3.4 Race/Ethnicity

It is reported in the US that incidence of hypertension in adolescents is affected by race and ethnicity (Sorof et al, 2004). Further studies in US (Ogden et al, 2002) show the prevalence of hypertension (greater than 95th percentile) in adolescents as 4.6% in Mexican Americans, 4.2% in Blacks and 3.3 in Whites. Similar patterns were seen for prehypertension with incidence of 4.1% and 2.4% in African America and Caucasians (Din-Dzietham et al, 2007). Inferences from different data indicate that blacks may be second to Mexicans in susceptibility to hypertension.

2.4.5 Lifestyle and Diet

Lifestyle changes significantly impact hypertension in both adolescents and adult. In adolescents, intake of high energy food, reduction in physical exercise, and sedentary activities such as long period of television viewing and playing video games seem to favour hypertension.

In the randomized, prospective Special Turku Coronary Risk Factor Intervention Project (STRIP) Study (Niinikoski et al, 2009), children at 7 months were randomly allocated into 2 groups: those receiving saturated fat– oriented counseling or a control group. A 14-year follow-up of the trial showed that restriction of saturated fat from infancy until 15 years of age decreases childhood and adolescent blood pressure. Systolic and diastolic blood pressures were 1.0 mm Hg lower in children receiving low-saturated-fat counseling through childhood than in control children.

High intake of sodium increases blood pressure by fluid retention while smoking and drinking alcohol are known to narrow the blood vessels and damage the heart and lead to hypertension over time (Forman et al, 2009). In 1998, the extension of the Trial of Nonpharmacologic Interventions to children and adolescents (TONE), a multi-center clinical trial, reported that lifestyle changes--dietary salt reduction, weight loss, or both together--reduced blood pressures in children and adolescents with hypertension (Stony ,2009).

CHAPTER THREE

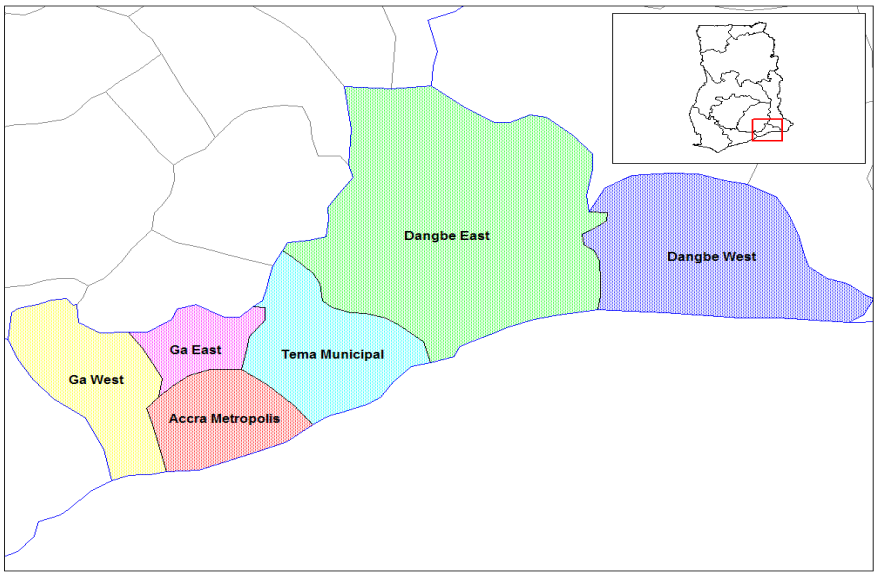
3.0 METHODS

3.1 Study design

It was a cross-sectional study conducted at the Ga East District, Ghana in June, 2011.

3.2 Study Area

Figure 3.1 Location of Ga East District in GAR



The Ga East District of Ghana is one of the six administrative districts in the GAR. It is one of the 28 newly created districts and is located to the northwest of the region. It is geographically a small district bounded on the north by Akwapim South district, on the west by the Ga West district, on the east by the Tema Municipality and on the south by the Accra metropolis.

With a total land size of 166 km sq, it is the third (3rd) most densely populated district in Greater Accra region, with a projected population of 320,853 and a growth rate of 4.0%.

The population is distributed by age and sex as follows: children aged 14 years and below- 34.5%, women aged 15 – 49 years – 28.5%, men aged 15 – 49years -27.5% and population aged 50+ - 9.5%.

It is currently made-up of four sub-districts namely; Madina sub-district, Taifa sub-district, Dome sub-district and Danfa /Abokobi /Pantang sub-district. The population is distributed by sub-districts as follows: Madina (37.0%), Danfa /Abokobi / Pantang (14.0%), Taifa (23.0%) and Dome (26.0 %). There are thirty four communities comprising mixed settlements, urban, peri-urban and rural areas. Eighty-two percent (82.0%) of the entire district settlement is urban.

There are 13 Senior High Schools (SHS); 11 private and 2 public, 1 single sex and 12 mixed. The SHS are distributed among the sub-districts as follows: Madina sub- district (11 SHS), Danfa /Abokobi / Pantang sub- district (1 SHS), Taifa sub- district (none) and Dome sub- district (1 SHS). For the 2009/2010 academic year, there were 7200 SHS students; 64% male and 36% female.

The district has about forty two (42) health facilities, made up of public, private and quasi government. Public facilities constitute 13.3 % (6), 1 quasi government, 1 CHAG and the remaining 81.4 % (35) are private facilities. All the public health facilities provide only out-patient services. More serious cases are referred to hospitals outside the district.

3.3 Variables

3.3.1 Dependent Variables

The dependent variables are Body Mass Index (BMI), Systolic and diastolic blood pressure.

3.3.2 Independent Variables

The independent variables considered are age, sex, height, weight, alcohol consumption, physical activity and family history.

3.4 Sampling

3.4.1 Study population

The study population was male and female SHS students aged 14-25 in the 11 SHS in Madina Sub-district (6,335). A study unit was a student attending one of the sampled SHS.

3.4.2 Sample size

Computation was made by inputting parameters into OpenEpi Version 2 statistical software (www.openepi.com). The sample size was computed to be 500 of study population size of 6335 using prevalence of 50% for maximum sample size at confidence level of 95%. 10% allowance was added for non response.

3.4.3 Sampling method/procedure

Out of the four sub-districts under Ga East district, the Madina sub-district was chosen by convenience due to limitations in study resources and duration for the study. Madina sub-

district was further divided into four (4) sectors. One (1) SHS was randomly selected from each sector by grouping SHS into the sectors, writing their names, folding them up, mixing them thoroughly in their respective sectors and then picking one from each sector. This was followed by the sampling of 500 study units by selecting every 12th unit after the first unit had been chosen randomly using a sampling frame of the combined nominal rolls of the four SHS.

3.5 DATA COLLECTION TECHNIQUES AND TOOLS/INSTRUMENTS

3.5.1 Ethical Issues

A subject/study unit was a person aged 14-25 attending one of the selected SHS. The study was cleared ethically by the Ghana Health Service Ethical Review Committee Accra, Ghana.

Informed consent for participation in the study was sought from study participants and their parents/guardians through signing consent forms which was explained to them. Consent was also sought from the District Directors of Health and Education and the Heads of the SHS. Posters detailing information about the study were placed at vantage points in the schools.

Participation in this study was entirely voluntary. Students had the right to refuse to participate and this did not affect their rights in anyway. They were at liberty to withdraw from this study at any stage during the interview.

There were no financial benefits or risks in participating. By participating in this study, they got to know whether they had a health problem of high blood pressure or overweight. If this was found to be the case, they were counseled and then referred to the

school health authorities or nearby health facility. Participants were advised to go for regular follow up of blood pressure. The costs associated with the referral care were not borne by the study. The questions were not very sensitive. However, whenever participants felt uncomfortable answering some of them, there were at liberty to choose not to answer them.

Study materials were given unique identification number for each participant. All materials related to the study were stored in locked cabinet in the PI's office. Only members of the research team had access to the data.

All the information collected was treated in strict confidence and were used for the intended purpose only. They would not be identified by name in any dissemination reports or publications resulting from this study.

3.5.2 Training of interviewers/ field volunteers

To standardize survey measurements and procedures, the interviewers/field volunteers were trained using specially prepared survey manuals, data collection materials, equipment and checklists. They were taken through physical measurement guidelines to ensure uniformity and correct use of techniques.

3.5.3 Pre-testing and review of instruments/tools

Pre-testing was conducted at a SHS in another district, the Ga West district to allow for modifications and fine tuning of procedures before the start of the actual survey.

3.5.4 Data collection

Data was collected by physical measurements and a structured interview through questionnaire, anthropometry and blood pressure readings. The questionnaire is structured alongside the core component of Steps One and Two of the WHO STEPS instrument for chronic disease risk factor surveillance and thus responses by study participants were used to measure and analyze risk factors.

3.5.4.1 Anthropometry

Anthropometric measurements were assessed for each participant using standard procedures. Participants wore light clothing and removed their shoes before stature and body weight was assessed. Stature was measured to the nearest 0.1 cm using a wooden scale, and body weight was measured to the nearest 0.01 kg using a standard balance scale. Body mass index was calculated as weight in kilograms divided by height in meters squared. Students were classified as follows:

Table 3.1 BMI Classification

	Under 18 years (percentile)	18 years and above (kg/m^2)
Underweight	$<5^{th}$	< 18.5
Normal	$<5^{th}$ - 90^{th}	18.5 – 24.99
Overweight	90^{th} - 95^{th}	25-29.99
Obese	$>95^{th}$	≥ 30

Percentiles were read from CDC Growth charts (2000) www.cdc.gov/growthcharts; D.McCarthy (2001).

3.5.4.2 Measurement of Blood Pressure

The measurements were taken using digital sphygmomanometers (Richter, Germany) in the sitting position in conjunction with a stethoscope placed over the brachial artery below the bottom edge of the cuff.

Systolic BP and diastolic BP were measured at the end of the interview, on the right arm of the seated student with his / her legs uncrossed and the arms extended over a table at the level of the heart. Three measurements were taken at the interval of five minutes each and the mean values were used for data analysis.

In order to allay the anxiety and fear of the children, the nature of the procedure was explained in depth to study participants. Students were also classified as hypertensive if they were taking antihypertensive medication or had been diagnosed with hypertension previously.

Students were classified as follows:

Table 3.2 Blood Pressure Classification

	Under 18 years (percentile)	18 years and above (mmHg)
Hypotension	SBP &/or DBP < 5^{th}	SBP <90 or DBP <60
Normal	SBP& DBP < 90^{th} - 5^{th}	SBP= 90-140 , DBP=60-90
Prehypertension	SBP or DPB of 90th to < 95^{th}	SBP =120-139 or DBP=80-89
hypertension	SBP &/or DBP > 95^{th}	SBP > 140 &/or DBP> 90

Percentiles were read from CDC Growth charts (2000) www.cdc.gov/growthcharts; D.McCarthy (2001).

3.6 DATA PROCESSING AND ANALYSIS

Data was analyzed using SPSS software version 16.0. Continuous variables were presented as mean values and standard deviation. Categorical variables were presented as frequencies. Associations between categorical variables were tested by the use of Chi-square test. Continuous variables were tested using the t-test. Significance was set at a level of $p<.05$.

3.7 LIMITATIONS OF STUDY

1. The study involved only SHS students in some selected schools in the Madina sub district. Therefore, the results of the study cannot exactly be generalized to the whole of the Ga East district. However, the Madina sub district hosts eleven out of the 13 SHS in Ga East district and no marked socio-ecnomic differences were observed between sub districts. SHS in the Madina sub district therefore provide a fair representation of SHS students in Ga East district.

2. The 4th year students were writing their final examinations, that is the West African Senior Secondary Certificate Examinations (WASSCE,) as such school authorities did not allow them to participate in the study. This did not however affect the study or outcome of the results since the required sample for the study was obtained. Class to which students belonged proved to be a risk factor for hypertension in this study. Inclusion of the 4th year students would have added more to strength to this finding.

3. Diet, smoking and family history were not assessed in this study. Considering the importance of these risk factors for hypertension, it recommended that further studies be done to assess their contribution to hypertension in the study population.

CHAPTER FOUR

4.0 RESULTS

4.1 Demographic Characteristics

A total of 500 subjects were interviewed. Sex distribution was as follows: 36.2% (181) were males and 63.8% (319) were females. Among the study participants were 39.2% (196) SHS 1 students, 48.6% (243) SHS 2 students and 12.2% (61) SHS 3 students.

Age ranged between 14 and 24 years. The mean age of the study population was approximately 18 (17.77 SD 1.54 years). The median age of study participants was 18.00. Study participants within the age group 14 -19 constituted the majority (86.2%) of the study population (Table 4.1). Of that age group, 45.2% (226) of them were under 18 years of age.

Table 4.1: Prevalence of hypertension among SHS students by age, sex and class Madina sub-district 2011

Characteristics	Number examined n (%)	Hypertension prevalence n (%)	Prehypertension prevalence n (%)
Age			
14-19	431 (86.2)	29 (6.7)	41 (9.5)
20-25	69 (13.8)	3 (4.4)	6 (4.4)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**
Sex			
Male	181 (36.2)	14 (7.7)	16 (8.8)
Female	319 (63.8)	18 (5.6)	31 (9.7)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**
Class			
SHS 1	196 (39.2)	8 (4.1)	15 (7.7)
SHS2	243 (48.6)	23 (9.5)	25 (10.3)
SHS 3	61 (12.2)	1 (1.6)	7 (11.5)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**

Definitions

Hypertension - SBP &/or DBP >95th percentile (under 18 years), SBP > 140 mmHg &/or DBP>90 mmHg (18 years and above)

Pre-hypertension - 90th percentile ≤ SBP &/or DPB <95th percentile (under 18 years), SBP =120-139mmHg &/or DBP=80-89 mmHg (18 years and above)

Table 4.2 Prevalence of risk factors of hypertension among SHS students, Madina sub-district 2011

Characteristics	Number examined n (%)	Hypertension prevalence n (%)	Prehypertension prevalence n (%)
BMI			
Underweight	13 (2.6)	0 (0.00)	0 (0.00)
Normal	439 (87.8)	25 (5.7)	42 (9.6)
Overweight	38 (7.6)	6 (15.8)	4 (10.5)
Obese	10 (2.0)	1 (10.0)	1 (10.0)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**
Physical Activity			
Adequate sports/recreation	284 (56.8)	12 (4.2)	15 (5.3)
Inadequate sports/recreation	216 (43.2)	20 (9.3)	32 (14.8)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**
Adequate walking/cycling for transport	319 (63.8)	15 (4.7)	20 (6.3)
Inadequate walking/cycling for transport	181 (36.2)	17 (9.4)	27 (14.9)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**
Alcohol use			
Those who had ever consumed alcohol	188(37.6)	15 (8.0)	22 (11.7)
Those who had never consumed alcohol	312(62.4)	17 (5.5)	25 (8.0)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**
Consumers within past 12 months	97 (19.4)	23 (23.7)	31 (32.0)
Non-consumers within past 12 months	403 (80.6)	9 (2.2)	16 (4.0)
Total	**500**	**32 (6.4)**	**47 (9.4)**
Consumers within past 30 days	55 (11.0)	31 (56.4)	22 (40.0)
Non-consumers within past 30 days	445 (89.0)	1 (0.2)	25 (5.6)
Total	**500 (100.0)**	**32 (6.4)**	**47 (9.4)**

4.2 Hypertension

The overall prevalence of hypertension was 6.4% (32/500) at 95% confidence interval (95% CI 4.25%, 8.55%). Prevalence of hypertension by sex was male 7.7% and female 5.6%, by age group was 14-19 years 6.7% and 20-25 years 4.4% and by class was 4.1% SHS 1, 9.5% SHS 2 and 1.6% SHS 3 respectively.

The prevalence of prehypertension was 9.4% (47/500) at 95% confidence interval (6.83%, 11.97%). Prevalence of prehypertension by sex was male 8.8% and female 9.7%, by age group was 14-19 years 9.5% and 20-25 years 4.4% and by class was 7.7% SHS 1, 10.3% SHS 2 and 11.5% SHS 3 respectively.

The mean and median DBP was 58.86mmHg SD11.50 and 58.00 mmHg respectively. DBP ranged from 40.00 to 167.00 mmHg. The mean and median SBP was 118.16 mmHg SD16.26 and 116.00 mmHg respectively. SBP ranged from 58.00 to 193.00 mmHg.

4.3 Overweight and Obesity -Body Mass Index (BMI)

The prevalence of overweight was 7.6% (38/500) at 95% confidence interval (5.26%, 9.93%). The prevalence of obesity was 2.0% (10/500) at 95% confidence interval (0.77%, 3.23%).

Table 4.3: Association of Hypertension with Age, Sex, Class and Risk factors

Characteristics	Non hypertension	Hypertension	Total	Prevalence ratio	P-value
Weight					
Normal Weight	439	25	464	0.28	0.084
Abnormal Weight	29	7	36		
Age					
14-19	402	29	431	1.55	0.453
20-25	66	3	69		
Sex					
Male	167	14	181	1.37	0.358
Female	301	18	319		
Class					
SHS 1	188	8	196	-	0.026
SHS2	220	23	243		
SHS 3	60	1	61		
Physical Activity					
Adequate sports/recreation	272	12	284	0.46	0.92
Inadequate sports/recreation	196	20	216		
Adequate walking/cycling for transport	304	15	319	0.50	0.63
Inadequate walking/cycling for transport	164	17	181		
Alcohol use					
Those who had ever consumed	173	15	188	1.46	0.97
Those who had never consumed	295	17	312		
Consumers within past 12 months	74	23	97	10.617	0.60
Non-consumers in past 12 months	394	9	403		
Consumers within past 30 days	24	31	55	250.82	0.417
Non-consumers within past 30 days	444	1	445		

4.4 Physical activity

School activities were grouped as vigorous-, moderate-intensity or not. Vigorous-intensity activity was explained as activity that caused large increases in breathing or heart rate such as carrying or lifting heavy loads, digging or construction work for at least 10 minutes continuously as part of their schooling. Slightly less than half (47.8%) of study participants were involved in vigorous-intensity activity. Moderate-intensity activity was explained as activity that caused small increases in breathing or heart rate such as brisk walking for at least 10 minutes continuously as part of their schooling. About a third (38.8%) of study participants were involved in moderate-intensity activity.

Physical activity for transport was grouped as either adequate or not. Adequate physical activity for transport was described as walking or bicycle riding for at least 10 minutes a day. Slightly lower than two-thirds (63.8%) of study participants had adequate physical activity for transport.

Sports, fitness or recreational activities were grouped as vigorous-, moderate-intensity or not. Vigorous-intensity sports, fitness or recreational activities were explained as activities that cause large increase in breathing or heart rate like running or football for at least 10 minutes continuously. Slightly higher than half (52.6%) of study participants had some vigorous-intensity sports, fitness or recreational activities. Moderate-intensity sports, fitness or recreational activities were explained as activities that cause a small increase in breathing or heart rate such as cycling, swimming or volleyball for at least 10 minutes. Slightly higher than half (56.8%) of study participants had moderate-intensity sports, fitness or recreational activities. Adequate recreation/sports/fitness activity was

described as at least moderate-intensity sports, fitness or recreational activities that cause a small increase in breathing or heart rate for at least 10 minutes.

4.5 Alcohol consumption

Alcohol consumption among study participants was grouped as those who had ever consumed any alcoholic drink such as beer, wine, spirits, akpeteshie, pito, palm wine or bitters (37.6%), those who had consumed an alcoholic drink within the past 12 months (19.4%) and those who had consumed an alcoholic drink within the past 30 days (13.0%).

4.6 Awareness of hypertension

Majority (86.9%) of study participants had ever heard of hypertension. Their sources were the media (33.0%), friends/family (23.0) and health workers/educators (30.9%). However, only 27.4% associated it with blood pressure and the heart. Surprisingly, 46.8% had no idea what hypertension was.

Majority (54.4%) rightly reported that hypertension could affect anybody. However, 35.6% of study participants had no idea who hypertension could affect and 8.2% reported that it affects only adults.

Many (43.4%) had no knowledge of any of the risk factors of hypertension. Others were able to indicate alcohol consumption (19.8%), diet related (16.6%), low physical activity (11.6%) and tobacco use (8.4%).

About a third (29.8%) had no idea if hypertension was preventable. Many (61.6%) of respondents reported correctly that hypertension was preventable. When asked further how they thought hypertension could be prevented, 58.4 % had no idea. Only 37.6% were able to correctly indicate at least one way of prevention as follows; regular medical checkup (12.8%), diet related (12.0%), reducing alcohol intake (6.2%) and physical exercise (3.4%).

CHAPTER FIVE

5.0 DISCUSSION

Tle levels of hypertension, pre-hypertension and risk factors underscored a public health need in the study population. The study revealed the importance for interventions to address this public health need as well as follow up interventions to address this need as they mature in age.

5.1 Hypertension

Prevalence of hypertension in this study (6.4%) was consistent with prevalence reported in other studies; 5.00% in the US (NHANES, 2004) and 5.30% to 37.90% in Nigeria (Ejike et al, 2010). It was higher than 2.90% reported in a study in India (Saha et al, 2008) and lower than 9.90% reported in a study in Tunisia (Harrabi et al, 2006). There might be some differences due to the age distribution of the participants.

Risk factor for hypertension in the study population was determined to be the class to which students belonged. However, the classes were not of equal sizes due to uneven sampling. There is therefore the need for a further analysis of the different classes taking into consideration the uneven sampling. There is also the need to closely assess the different classes to determine what factors exactly makes them important in hypertension.

Prevalence of pre-hypertension (9.4%) in this study was lower than the 15.10% to 37.20% reported in a study in Nigeria (Ejike et al, 2010). Proportionately, pre-hypertension increased from SHS 1 to SHS 3 (7.7% of SHS 1, 10.7% of SHS 2 and 11.5% of SHS 3).

Pre-hypertension was consistently higher than hypertension across age group, sex and class. This was consistent with the assertion that the prevalence of prehypertension tends to be greater among young adults, than in older adults (Flynn, 2002).

The prevalence is expected to rise as was observed in the US, where about 1% of persons between the ages of 11 to 18 were diagnosed of hypertension in 1989 but this number climbed to about 5% in 2002 (NHANES, 2004) partly because it expected that individuals with prehypertension progress to hypertension in the absence of effective interventions.

The study did not support age, body weight, sex, physical activity and alcohol use as risk factors hypertension in the study population. Considering that pre-hypertension was consistently higher than hypertension across age group, sex and class, a follow-up study would be appropriate. It is expected that a follow up study would reveal many other risk factors as it takes years for hypertension to emerge and the study population is relatively young.

5.2 Overweight and Obesity -Body Mass Index (BMI)

Prevalence of overweight in this study (7.6%) was consistent with prevalence of 5.00% to 11.00% reported in a study in the US (Ogden et al, 1997). This is worrying since the US reports among the highest overweight prevalences globally. This identifies body weight among the age category as public health need that needs prompt attention.

It was however lower than 17.00% reported in a study in South Africa (Reddy et al, 2003). Prevalence of obesity in this study (2.0%) was lower than 4.20% reported by

Reddy et al (2003) in South Africa. Overweight was consistently higher than obesity across age group, sex and class.

This study did not provide evidence in support of the positive correlation between BMI and hypertension. Twenty-five (78.1%) out of the 32 study participants diagnosed of hypertension had normal weight. Perhaps hypertension in this study resulted from other risk factors in addition to overweight and obesity.

5.3 Physical activity

Surprisingly, adequate physical activity was reported in less than two-thirds (63.8%) of study participants. Even less (56.8%) reported adequate sports/recreational activities. This is uncharacteristic of the age group of study participants and suggests poor participation in sports, fitness or recreational activities as well as increased mechanization of transport. It was not surprising because two of the SHS sampled had no recreational grounds and no tangible arrangements for recreation and sports. The situation was not much different in the other two SHSs sampled as one had only a dilapidated basketball court while the last had a small piece of land improvised as a football field. There is a gross fixation on classroom work in the SHS to the detriment of sports and recreation. This needs to be reversed.

5.4 Alcohol consumption

Slightly higher than one-third (37.6%) of study participants had ever consumed an alcoholic drink. This suggests that the study population is very much exposed to alcohol consumption. Not surprisingly, drinking bars were very common and so easily accessible in the sub-districts. It was also observed that the proportion of alcohol consumers

decreased with time in this population, 19.4% within 12 months and 13.0% within 30 days. Probably, many experimented with alcohol and majority was able to quit or suspend the habit over time. Age restrictions to use of alcohol needs to be enforced. The contribution of peer pressure or negative peer influence in alcohol use may be considered.

5.5 Awareness of hypertension

Knowledge on the risk factors of hypertension and prevention was poor. There is still some perception that hypertension is a problem of only adults. Ignorance of hypertension and risk factors puts the study population at more risk of hypertension. There is the need for modification in content and target populations of hypertension campaigns.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

This study, conducted among SHS students in Ga East District of Greater Accra Region of Ghana, documented the prevalence of hypertension and its risk factors. The study has shown disturbing prevalence of risk factors of hypertension among SHS students compared to other studies. These comparisons are subject to methodological differences and differences in the study population.

The levels of hypertension were found to be of public health concern among the SHS students. Of additional concern was that consistently prevalence of pre-hypertension was higher than that of hypertension across all the variables. This suggests that the prevalence of hypertension could increase over time if followed longitudinally.

Opportunities for recreational and sports were minimal with concentration on classroom work. Physical activity was reduced to only walking to and from class. Slightly higher than one-third (37.6%) of study participants had ever consumed an alcoholic drink. This was rather high considering the age groups.

Awareness or knowledge of hypertension and its risk factors was rather poor, making students more at risk of hypertension.

These findings show that hypertension among this group of SHS students had assumed public health importance.

6.2 RECOMMENDATIONS

The study revealed the importance for interventions to address this public health need as well as follow up interventions to address this need as they mature in age.

The findings show that hypertension among SHS students has assumed public health importance, requiring surveillance, preventive policies and promotion of lifestyle modifications in schools. This places a huge responsibility on the Ga East Municipal Health and Education Directorates as well as the Ghana Health and Education Services.

The Health Directorate/Service, among others, needs to counsel students on risk factors of hypertension, promote recreational activities and improve on sports facilities in schools, monitor enforcement of age restrictions on purchase and use of alcohol and also mount surveillance on trends of hypertension among SHS students. There is a requirement for entry medical examination into SHS. This provides a good opportunity to monitor hypertension in SHS students. However, very little follow up monitoring after this initial medical examination is done.

The Education Directorate/Service, among others, needs to also forge closer collaboration with local and health authorities to monitor hypertension among students, monitor enforcement of age restrictions on purchase and use of alcohol and promote recreational activities and advocate for the improvement of sports facilities in schools. The health needs of the study population did not seem to be of much priority to school authorities. There was hardly any evidence of health posts within school premises as well as obvious absence of health workers in the school set up.

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APPENDIX A

QUESTIONNAIRE
PREVALENCE OF RISK FACTORS OF HYPERTENSION AMONG SHS STUDENTS IN GA EAST DISTRICT

Identifiers

1. Respondent ID [ ] [ ] [ ]
2. Respondent name
……
……
3. Interviewer ID [ ] [ ] [ ]
4. Center [ ] [ ] [ ]
5. Date of completion of the instrument
[ ][ ] [ ][ ] [ ][ ][ ][ ]
dd / mm/ yyyy

Consent

6. Consent has been read and obtained
1. Yes [ ] 2. No [ ] If No end
7. Interview language
1. English [ ] 7. Other
…….

Demographics

8. Sex 1. Male [ ] 2. Female [ ]
9. Age (yrs) [ ] [ ]
10. Level in SHS 1. SHS 1[ ] 2. SHS 2 [ ] 3. SHS 3[ ]

Knowledge

10. Have you ever heard of hypertension or High Blood Pressure?
1. Yes [ ] 2. No [ ]
11. Where did you hear it?
1. Media [ ] 2. Friends or Family members [ ] 3. Health worker/educator [ ]
7. Others, specify……
12. What do you know about hypertension?
……
……
……
77. Don't know [ ]
13. Hypertension affects
1. Only male [ ] 2. Only female [ ] 3. Young [ ] 4. Adults [ ] 5. All [ ] 77. Don't know [ ]
14. What risk factors (causes of) for hypertension do you know of?
1. Physical Activity [ ]2. Alcohol Consumption [ ] 3. Diet [ ] 4. Tobacco Use [ ]

7. Others, please specify……
77. Don't know [ ]

15. Do you think these risk factors are preventable?
1. Yes [ ] 2. No [ ] If No go to Question 12

16. How do you think hypertension can be prevented? Please explain
……
……
……
……
……

Tobacco Use

17. Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes?
1. Yes [ ] 2. No [ ] If No go to Question 21

18. Do you currently smoke tobacco products **daily**?
1. Yes [ ] 2. No [ ]

19. How old were you when you **first started** smoking daily?
Age (years) [ ] 77. Do not know [ ]

20. On average, **how many** of the following do you smoke each day?
1. Manufactured cigarettes [ ] 2. Hand-rolled cigarettes [ ]
7. Other…….

Alcohol consumption

21. Have you **ever** consumed an alcoholic drink such as beer, wine, spirits, akpeteshie, pito, palm wine or bitters?
1. Yes [ ] 2. No [ ] If No go to Question 29

22. Have you consumed an alcoholic drink within the past 12 months?
1. Yes [ ] 2. No [ ] If No go to Question 29

23. In the past 12 months, how frequently have you had at least one alcoholic drink?
1. Daily [ ] 2. 5-6 days per week [ ] 3. 1-4 days per week [ ]
4. 1-3 days per month [ ] 5. Less than once a month [ ]

24. Have you consumed an alcoholic drink within the **past 30 days**?
1. Yes [ ] 2. No [ ] If No go to Question 29

25. In the past 30 days, how many occasions have you had at least one alcoholic drink?
Number [ ][ ] 77. Do not know [ ]

26. During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion?
Number [ ][ ] 77. Do not know [ ]

27. During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?
Number [ ][ ] 77. Do not know [ ]

28. During the past 30 days, how many times did you have for **men**: **five or more** for **women**: **four or more** standard alcoholic drinks in a single drinking occasion?
Number [ ] [ ] 77. Do not know [ ]

Diet

29. In a typical week, how many days do you eat fruit?
Number [ ] [ ] 77. Do not know [ ]
30. How many servings of fruit do you eat on one of those days?
Number [ ] [ ] 77. Do not know [ ]
31. In a typical week, how many days do you eat vegetables?
Number [ ] [ ] 77. Do not know [ ]
32. How many servings of vegetables do you eat on one of those days?
Number [ ] [ ] 77. Do not know [ ]

Physical activity

Work

33. Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, pounding Fufu, digging or construction work]* for at least 10 minutes continuously?
1. Yes [ ] 2. No [ ]
34. In a typical week, on how many days do you do vigorous-intensity activities as part of your work?
Number of days [ ] [ ] 77. Do not know [ ]
35. How much time do you spend doing vigorous-intensity activities at work on a typical day?
Hours: minutes [ ] [ ]: [ ] [ ] 77. Do not know [ ]
36. Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously?
1. Yes [ ] 2. No [ ]
37. In a typical week, on how many days do you do moderate-intensity activities as part of your work?
Number of days [ ] [ ] 77. Do not know [ ]
38. How much time do you spend doing moderate-intensity activities at work on a typical day?
Hours: minutes [ ] [ ]: [ ] [ ] 77. Do not know [ ]

Travel/Transport

39. Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?
1. Yes [ ] 2. No [ ]
40. In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?
Number of days [ ] [ ] 77. Do not know [ ]
41. How much time do you spend walking or bicycling for travel on a typical day?
Hours: minutes [ ] [ ]: [ ] [ ] 77. Do not know [ ]

Recreation/ Leisure

42. Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously?

1. Yes [ ] 2. No [ ]

43. In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?

Number of days [ ] [ ] 77. Do not know [ ]

44. How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?

Hours: minutes [ ] [ ]: [ ] [ ] 77. Do not know [ ]

45. Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, *[cycling, swimming, volleyball]* for at least 10 minutes continuously?

1. Yes [ ] 2. No [ ]

46. In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?

Number of days [ ][ ] 77. Do not know [ ]

47. How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?

Hours: minutes [ ] [ ]: [ ] [ ] 77. Do not know [ ]

History of Raised Blood Pressure and Diabetes

48. Have you ever had your blood pressure measured by a doctor or other health worker?

1. Yes [ ] 2. No [ ]

49. Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?

1. Yes [ ] 2. No [ ]

50. Have you ever had your blood sugar measured by a doctor or other health worker?

1. Yes [ ] 2. No [ ]

51. Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?

1. Yes [ ] 2. No [ ]

52. During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?

1. Yes [ ] 2. No [ ]

Physical Measurements

Blood Pressure

53. Blood Pressure Reading 1

Systolic (mmHg) [ ][ ][ ] Diastolic (mmHg) [ ][ ][ ]

54. Blood Pressure Reading 2

Systolic (mmHg) [ ][ ][ ] Diastolic (mmHg) [ ][ ][ ]

55. Blood Pressure Reading 3

Systolic (mmHg) [ ][ ][ ] Diastolic (mmHg) [ ][ ][ ]

Body Mass Index

56. Height (cm) [ ] [ ] [ ]. [ ]
57. Weight (Kg) [ ] [ ] [ ]. [ ]
58. Is weight too large for scale? Yes [ ] No [ ]
59. For females, are you pregnant? Yes [ ] No [ ]
60. Waist circumference (cm) [ ] [ ] [ ]. [ ]

THANK YOU

APPENDIX B

CONSENT FORM - PARTICIPANT

Study title: Prevalence of risk factors for hypertension among Senior High School students in Ga East District in Greater Accra, Ghana

Principal Investigator: Ahenkan Adu Gyamfi Poku

Address: School of Public Health, University of Ghana, Legon

Hello, my name is …….. and I am conducting this interview on behalf of Ahenkan Adu Gyamfi Poku, an Master of Public Health student of the School of Public Health, University of Ghana.

This study seeks to know if hypertension, also called high blood pressure, is on the increase or decrease in Senior High School (SHS) students and try to understand why it is on the increase or decrease. You are being invited to participate in the study because you attend a SHS in Ga East district, Ghana and we would ask you to consider taking part in this study.

If you agree to participate in this study, I will ask you a few questions about yourself, your daily activities and habits. I will measure your blood pressure, weight and height. This will take about 20 minutes of your time and your participation in the study ends after this interview. If you agree to participate, you will be one of 399 SHS students who will also be participating in this study in Ga East district, Ghana.

Participation in this study is entirely voluntary. You have the right to refuse to participate and this will not affect your rights in anyway. You are also at liberty to withdraw from this study at any stage during the interview. I would however encourage you to participate fully.

There are no direct benefits or risks in participating. You will not be paid or compensated for your participation. However, the information that we obtain will help us to know if hypertension is on the increase or decrease in Senior High School (SHS) students and try to understand why it is on the increase or decrease. By participating in this study, you

know whether you have a health problem of high blood pressure or overweight. If this is found to be the case, you would be counseled and then referred to health facility. The cost associated with the referral care will not be borne by the study. The questions are not very sensitive. However, you may feel uncomfortable answering some of them and you can choose not to answer them.

All the information collected from you will be treated in strict confidence and will be used for the intended purpose only. You will not be identified by name in any dissemination reports or publications resulting from this study.

The Ghana Health Service Ethics Review Committee has reviewed and given approval for this study to be conducted.

Do you have any questions for me?

If you have any further questions regarding this study you may contact Ahenkan Adu Gyamfi Poku on telephone number 0540599970.

I have been adequately informed about the purpose, procedures, potential risks and benefits of this study. I have had the opportunity to ask questions and any questions that I have asked have been answered to my satisfaction. I know that I can refuse to participate in this study without any loss of benefit to which I would have otherwise been entitled. I understand that if I agree to participate I can withdraw my consent at any time without losing any benefits or services to which I am entitled. I understand that any information collected will be treated confidentially. I freely agree to participate in this study.

Name of participant: ……..

Signature or Right thumb print: ……..

Date: ……..

APPENDIX C

CONSENT FORM – PARENT/GUARDIAN

Study title: Prevalence of risk factors for hypertension among Senior High School students in Ga East District in Greater Accra, Ghana

Principal Investigator: Ahenkan Adu Gyamfi Poku

Address: School of Public Health, University of Ghana, Legon

Hello, my name is …….. and I am conducting this interview on behalf of Ahenkan Adu Gyamfi Poku, an Master of Public Health student of the School of Public Health, University of Ghana.

This study seeks to know if hypertension, also called high blood pressure, is on the increase or decrease in Senior High School (SHS) students and try to understand why it is on the increase or decrease. You are being invited to participate in the study because you attend a SHS in Ga East district, Ghana and we would ask you to consider taking part in this study.

If you agree to allow your ward to participate in this study, I will ask him/her a few questions about his/herself, his/her daily activities and habits. I will measure his/her blood pressure, weight and height. This will take about 20 minutes of his/her time and his/her participation in the study ends after this interview. If you agree to participate, he/she will be one of 399 SHS students who will also be participating in this study in Ga East district, Ghana.

Participation in this study is entirely voluntary. He/she has the right to refuse to participate and this will not affect his/her rights in anyway. He/she is also at liberty to withdraw from this study at any stage during the interview. I would however encourage you to participate fully.

There are no direct benefits or risks in participating. He/she will not be paid or compensated for his/her participation. However, the information that we obtain will help us to know if hypertension is on the increase or decrease in Senior High School (SHS)

students and try to understand why it is on the increase or decrease. By participating in this study, he/she would know whether he/she has a health problem of high blood pressure or overweight. If this is found to be the case, he/she would be counseled and then referred to health facility. The cost associated with the referral care will not be borne by the study. The questions are not very sensitive. However, he/she may feel uncomfortable answering some of them and he/she can choose not to answer them.

All the information collected from him/her will be treated in strict confidence and will be used for the intended purpose only. He/She will not be identified by name in any dissemination reports or publications resulting from this study.

The Ghana Health Service Ethics Review Committee has reviewed and given approval for this study to be conducted.

Do you have any questions for me?

If you have any further questions regarding this study you may contact Ahenkan Adu Gyamfi Poku on telephone number 0540599970.

I have been adequately informed about the purpose, procedures, potential risks and benefits of this study. I have had the opportunity to ask questions and any questions that I have asked have been answered to my satisfaction. I know that I can refuse to participate in this study without any loss of benefit to which I would have otherwise been entitled. I understand that if I agree to participate I can withdraw my consent at any time without losing any benefits or services to which I am entitled. I understand that any information collected will be treated confidentially. I freely agree to allow my ward participate in this study.

Name of parent/guardian: ……..

Signature or Right thumb print: ……..

Date: ……..