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Analysis Of Anthropometric Risk Factor Profile Correlates Of Hypertension

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Abstract

BACKGROUND: *Hypertension is an important risk factor for cardiovascular disease (CVD) and has become a major global burden on public health .Obesity and weight gain has been reported in previous studies as the most important determinants of hypertension. Close link between obesity and hypertension forms part of a broader relationship between body weight and blood pressure (BP) among others.*

OBJECTIVES OF THE STUDY: *This call for a study to a analyse the anthropometric risk factor profile correlates of blood pressure (BP) levels in a representative sample of market women in Juaben.*

MATERIALS AND METHODS: *The study was carried out using questionnaire as well as direct measurement within the period of March/April, 2015.*

RESULTS: *The study recorded high levels of prevalence of all the selected anthropometric risk factor profiles of high blood pressure (hypertension). A prevalence rate of 74% was noted for obesity. Among other variables, the following prevalence rates were recorded: 85.1% for excess WHR, 56% for excess abdominal circumference/girth, 84% for sum of various classes of hypertension for systolic and 48% for diastolic. An analysis of correlations of anthropometric profiles of height and BMI on systolic blood pressure were significantly correlated respectively (r=.417 and r=.366, p-value at 0.01). Contrary to this, statistically insignificant correlations were observed on both systolic and diastolic blood pressures respectively for weight r=.140 and r=.183; waist circumference r=.152 and r=.096; hip circumference r=.244 and r=.105; abdominal circumference/girth r= .082 and r=-.042; heart rate r=.187 and r=.141,* ***p-value at 0.01****). Among anthropometric variables, waist to hip ratio showed statistically insignificant correlation on BMI (r=.083,* ***p-value at 0.01****) whereas weight r=.792; height r= -.405; waist circumference r=.469; abdominal circumference/girth r=.446 were statistically significant on BMI (****p-value at 0.01****) and hip circumference (r=.371,* ***p-value at 0.05****)*

RECOMMENDATIONS: *Against this, this study proposed the following recommendations for consideration; organisation of health talk on weight management practices among market women. There should be an awareness creation on hypertension prevention as well as increased advocacy on vegetable and fruits intake.*

1. Introduction

1.1 Background of the study

Capstone project on analysis of anthropometric risk factor profile correlates of hypertension, a study among market women in Juaben, community of Ghana was to study an in depth relationship of the three discipline studied in a semester and its bearing or practicability on the topic. Three major areas or subjects of consideration in this project are epidemiology, social and behavioural sciences and biostatistics. Epidemiology will focus on prevalence and distribution of major risk factors of hypertension among market women, perhaps social and behavioural sciences will look into the social characteristics of market women such as their age, income level, level of education, occupation and their social lifestyle and its relation to the topic under study. Biostatistics will be applied during collection, analysis and interpretation of project outcome with appropriate statistical techniques to help draw a conclusion that would be a true reflection of the entire population.

Hypertension being the focal point of this project is a disease of complex origin, affecting 972 million people worldwide as reported by Kearney et al., 2005 in his study. He further noted that by 2025, worldwide hyptertension will rise from the present 26.4% to 29.2%. Obesity and weight gain have been identified by numerous authors as being critical determinants of hypertension. (Ferguson et al., 2008; Dalton et al., 2003; Kannel et al., 2000). Body mass index (BMI), as an indicator of obesity, has been found by Field et al., 2001 in his study to be consistently associated with an increased risk of hypertension. Excess intra-abdominal fat is associated with greater risk of obesity related morbidity than is overall adiposity (Chen et al., 2001).

Waist circumference has been reported in previous studies by Han et al., 1997 as one of the best and simple measure of total fat mass and cutanous abdominal fat

Against these background, this project seek to study an anthropometric risk factor profile correlates of blood pressure (BP) levels among a representative market women in a Ghanaian community to justify the global picture of the problem documented by previous authors and to help framing of appropriate intervention.

1.2 Problem statement

"Hypertension is a non-communicable disease and is a leading cause of death worldwide, which is attributable to 60% of the global deaths and responsible for 46% of the global burden of disease (WHO 2001, Murray et al., 1996)". The biggest single killer is coronary heart diseases, followed by other CVDs, cancer and chronic lung disease in that order. Diabetes is a major contributor to deaths from CVDs, but also causes its own unique complications. Common risk factors of these NCDs include smoking, physical inactivity, obesity and diets high in saturated fat and sodium and low in fruit and vegetables intake (Nigel, 2001a). Many developing countries are affected by a double burden of disease; the combination of long established infectious diseases with a rapidly growing new epidemic of chronic NCDs (WHO 2000).

Until recently, risk factors associated with NCDs and the diseases linked to them were basically common among developed countries. Studies from some African countries suggest that in predominantly urban settings, the prevalence of diabetes and hypertension increased markedly over the last ten years to the year 2000 (Nigel, 2001b).

1.3 Rationale of the study

High blood pressure (hypertension) remains an area of high concern to public as well as health services providers. Until recently, High blood pressure (hypertension) was not given much attention as the diseases were noted to be confined to wealthy people. With the increase in trend of the disease among all different social categories of people, attention has begun to rise about major risk factors of the diseases.

In Ghana, particularly Juaben where this project was carried out, available reports indicate that there in an increased rise of hypertension and its related risk factors. There is therefore the need for a critical insight into the situation with particular reference to market women who stand a higher chance of being at risk due to the nature of their work.

1.4. Research questions

- What factors account for development of hypertension
- What is the present levels of risk factors for hypertension
- What can be done to solve the problem of hypertension prevalence

1.5 Objective of the study

The main objective of this study was to analyse the anthropometric risk factors profile correlates on blood pressure among market women in Juaben, a community in Ghana.

Specifically, the study was meant to;

- Identify prevalence of anthropometric risk factor profiles of high blood pressure among market women
- Assess relationship of anthropometric profiles correlates of blood pressure
- Compare levels of risk of hypertension among resident and mobile market women

2. Literature review

2.1 Anthropometric indexes

BMI is an important correlate of blood pressure and hypertension prevalence. By the current World Health Organization (WHO,2000) criteria, a BMI <18.5kg/m^2 is considered underweight, 18.5–24.9 kg/m^2 ideal weight and 25–29.9kg/m^2 overweight or pre-obese and obese with various category as I (30–34.9kg/m^2), class II (35–39.9kg/m^2) and class III (≥40kg/m^2). A BMI greater than 28kg/m^2 in adults is associated with a three to four-fold greater risk of morbidity due to T2DM and CVDs than in the general population (Van Itallie, 1985). The recent increase in overweight and obesity in the United States (Flegal et al., 2002) both in adults and children may explain, in part, the associated increase in hypertension prevalence over the past decade. In the NHANES-III data, obese men and women had a hypertension prevalence ranging from 49% to 64% with increasing degrees of obesity in men and from 39% to 63% with increasing obesity in women versus 27% in normal-weight men and 23% in normal-weight women (Must et al., 1999). According to Paffenbarger et al., 1983, weight gain is also associated with an increase in hypertension incidence and age-related rise in systolic blood pressure. In an analysis of four Chicago epidemiological studies, weight gain was associated with an increase in pulse pressure. Framingham Heart study reported a 5% weight gain to be associated with a 20% to 30% increase in hypertension incidence as documented by Vasan et al., 2001. A study by Winkvist et al., 1997 in Indonesia indicated 11.6% and 14.3% in their studies in the years 1996 and 1997 respectively as being a rate of overweight or obese among their study subjects.

A central distribution of body fat is associated with a higher risk of morbidity and mortality than a more peripheral distribution (Kissebah et al., 1994)

Measurement of waist circumference, (Han et al., 1997; Lean et al., 1995), or waist: hip ratio (WHR) (Han et al., 1997) provide useful indices of abdominal fat accumulation and a better correlation with an increased risk of ill health and mortality. An abdominal girth in excess of 108 cm (40 inches) for men and 98 cm (35 inches) for women or a WHR > 1.0 and 0.85 in men and women, respectively, are the present indicators accepted for being having an excessive abdominal fat accumulation which correlate with a substantially increased risk of metabolic complications (WHO, 2000; Han et al., 1997)

Obesity among Ghanaian adults is very common among elderly as well as females and people living in urban areas. A study involving two urban and one rural community in Greater Accra region showed an overall crude prevalence of obesity (BMI ≥ 30 kg/m^2) of 20.2% and 4.6% for females and males, respectively. Obesity increased with age, peaking in the 55 to 64-year age group (Amoah, 2003)

From a large body of evidence, global epidemic of obesity has resulted mainly from societal factors that promote sedentary lifestyles and consumption of high-fat, energy-dense diets (WHO, 2000).

The Ghana Demographic and Health Surveys (DHS) demonstrate that prevalence of obesity or overweight among adult (non-pregnant) women across the country increased 2.5 fold in ten years from 10% in 1993 to 25.3% in 2003(Ghana Statistical Service, 2004). Crucially, the 2003 DHS data shows that there are more obese women (25.3%) than malnourished women (9%).

2.2 High blood pressure

Blood pressure is considerably lower in children than in adults and increases steadily throughout the first two decades of life. In adults, cross-sectional and longitudinal surveys have shown that systolic and

diastolic blood pressure increase progressively with age. For example, in the WHO MONICA survey, systolic blood pressure increased by about 0.29 to 0.91 mm Hg per year in men and 0.6–1.31 per year in women (Wolf et al., 1997). This increase remains stable and possibly declines after age 50 for diastolic but not for systolic blood pressure, leading to a steep increase in pulse pressure; a key risk factor for cardiovascular outcome (Franklin et al., 1999). These trends have been demonstrated in both genders and most ethnic groups (Hajjar et al., 2003).

Similarly, many studies document an increase in hypertension prevalence with age (Cent 2005). According to a study in Ghana by Charles and Ellis (2006), on pre-hypertension in Ashanti Region, West Africa: An opportunity for early prevention of Clinical Hypertension, documented 40% and 29% as a prevalence of both pre-hypertensive and hypertensive respectively with pre-hypertension being more in non-hypertensive males than non-hypertensive females particularly people aged around 35 years.
In population-based sample studies of United States, mean systolic blood pressure is higher for men than for women during early adulthood, although among older individuals age-related rate of rise is steeper for women. Consequently, among individuals aged 60 or older, mean systolic blood pressure of women is higher than that of men (Hajjar et al., 2006).

2.3 Physical inactivity

Physical inactivity is known to be a major public health problem of concern in 2000 as physical activity levels of people of all ages tended to decrease (CDC 2001). The Centres for Disease and Control (CDC 2001) reported that, among the youth in America aged 12 and 13 years, 69% were regularly active. However, the number dropped to 38% for young people between the ages of 18-21 years. A physically inactive child is more likely to become a physically inactive adult, which could lead to chronic diseases of lifestyle (Frantz et al., 2003). Patterns of inactivity, also known as sedentism, begin early in life, making the promotion of physical activity among children imperative (Summerfield 1998).

The prevalence of physical inactivity among youth worldwide has increased. In the international level, 67% of young children in Canada did not meet the average physical activity guidelines to achieve optimal growth and development (Canadian Fitness and Lifestyle Research Institute 1998). In the United States of America, Guo et al (1994) reported that nearly 50% of American young people aged between 12 and 21 years did not engage in vigorous physically active lifestyles on a daily basis. Among the United Kingdom, London Health Observatory reported that both adults and children in Britain are less active and less fit than previously.

The Allied Dunbar National Fitness Survey (1992) identified UK adult population groups who were sedentary as women aged 16-24 years, middle-aged men and people aged 50 years and over.

In the Health Survey in England 1997, 22% boys and 30% girls were reported as being physically inactive between - 22 - age 10 and 15. In the 16-24 year age group, 39% of the males were reported as inactive and 62% of the females were reported as inactive. In some Sub-Saharan countries, prevalence of physical inactivity has been recorded.

A study in South Africa report from Birth to Twenty (BTT) 2002, indicates that more than 40% of young people do not participate in regular physical activity. The BTT study found that physical activity was less common among girls than boys and among those with lower income and less education

2.4 Sedentary lifestyle

Sedentary life style and low educational attainment have each been linked to the rise in blood pressure with age, low socio-economic status, low occupational class, psycho-social factors such as hostility and time urgency/impatience, job strain, depression (Davidson et al., 2000).

3. Materials and methods

3.1 Study type and design

A cross-sectional study design was adapted to analyse the effect of anthropometric risk factors profile of hypertension among a representative sample of market women in Juaben, a community in Ghana with the use of structured questionnaire on formal interview basis as well as direct physical measurements.

3.2 Sampling techniques and sample size

Purposive sampling techniques was employed to enrolled 50 market women resident in Juaben for more than three months as at the time of the study.

3.3 Study variable

Variables of interest to this study included dependent and independent variables. The dependent variables were: High Blood pressure (hypertension) whiles the independent variable was: age, height, weight, BMI, WHR, abdominal circumference etc.

3.4 Pre-testing

A pilot test of survey questionnaire was carried out on a sample of 5 respondents to ensure control, skills and rate of questionnaire administering for effective correspondence and to help in restructuring of questionnaire. Few corrections were made on the questionnaire after pre-testing exercise.

3.5 Ethical consideration of the study

Verbal Informed consent was also obtained from participants before carrying out the exercise. The aims and processes of the research were fully explained to participants and only consenting individuals were chosen to be interviewed and other measurements taken. Although data was handled by the researcher, confidentiality was guaranteed as respondents were dealt with individually.

3.6 Data collection techniques and tools

Participants were interviewed through a structured questionnaire on formal interview basis. Information obtained included anthropometric measurements of importance including weight of the participants, height, waist and hip circumference and as well as blood pressure measurements using standardized procedures and calculated various indices of obesity including BMI, WHR, and abdominal circumference. Data collection took place on March 2015 and the project report was finalised on April 2015.

3.7 Measurement procedures

3.7.1 Pulse rate and blood pressure measurements: The pulse rate and resting blood pressure were recorded using a Standard Aneroid Sphygmomanometer and a stethoscope (Model : MC-20.EXANOVO® 2008. China)

Procedure

- The participant was made to sit for at least five minutes prior to testing.
- His/her right arm was bare and resting on a table.
- A cuff of appropriate size was wrapped firmly around the upper arm

- The cuff was then inflated.
- On reaching the maximum inflation level, the cuff was deflated gradually and resting blood pressure and resting pulse rate were recorded accordingly.
- Both pulse readings and resting blood pressure was taken three times within about 5 minutes.

3.7.2 Weight: Weight was measured using a scale (Electronic weighing scale).

Procedure

- The participant was asked to remove all excess clothing and made to stand upright on the scale on bare footed
- The participant weight was recorded in kilograms to the nearest whole number.

3.7.3 Height: A tape measure was used to measure the overall height of subjects.

Procedure

- Tape measure was taped against a wall with tape measure 20 cm above ground level.
- The participant was also made to remove his/her shoes, stand feet together and arms at the sides and made to stand with heels, buttocks and upper back against the wall in a complete upright position.
- The measurement from the 20^{th} cm level to highest point on head was measured.
- The overall height was recorder/obtained by adding 20 cm to the remaining height obtained above the bench mark level, all in centimetres.
- The height was then expressed in metres.
- The height in metres was then squared. BMI was then calculated from this expression using the following formula: Body weight (kg)/height $(m)^2$.

3.7.4 WHR /abdominal girth/circumference measurement: With abdomen relaxed, a horizontal measurement was taken at the level of the narrowest part of the torso, just below the twelfth rib using tape measure. Participant was made to stand upright following taking measurement of waist. While participant stood erect and in upright position, a horizontal measurement was taken at the level of maximum circumference of the hips/buttocks.

Procedure

- The participant was made to stand with feet together and arms at the sides.
- Both the waist ,hip and abdominal girth or circumference were measured in centimetres
- The tape measure was horizontally wrapped around the full circumference of the waist and on hip of participant at different times
- Measurement was repeated for three times in each case for consistency.
- Scores were recorded to the nearest centimetres
- The waist-hip ratio was determined.

3.8 Data analysis and presentation

Data was analyzed with SPSS Version 15 and Microsoft Excel 2003 compatible with Microsoft Windows Vista version 2007. Data was analysed for frequency of distribution as well as means and correlations. The results were then presented in the form of tables with interpretations of findings made as possible.

3.9 Limitation of study

The study encountered the following limitations, thought their effect on accuracy and reliability of study results was quite minimal:

- Financial constraints
- Limited time for the study

3.10 Delimitations of the study

The study covered only Juaben community but not Ghana as a whole. Additionally, results of the study were basically confined to only the market women. Limited sample size of the study, as study did not cover the majority of the market women

4. Results and discussion

4.1 Background information

Table 4.1 below presents information on background information of respondents enrolled in the study.

Table 4.1. Background information

Variable	Frequency	Percentage
Age of Respondents		
	14	28
52-68>	25	50
35-51	11	22
18-34		
Marital Status		
Single	3	6
Married	34	68
Divorced	8	16
Widowed	4	8
Separation	1	2
Religious affiliation		
Christian	50	100
Muslim	--	--
Traditionalist	--	--
Highest Level of education		
No Education	34	68
J.S.S	16	32
Employment Category		
Mobile	38	76
Resident	12	24
Income Status		
Minimum(10 GH ¢)	5	10.6
Average (100 ¢)	8	17

Maximum(500 GH¢)	1	2

It is observed from the table that most (50%) of the respondents were within age range of 35-51 whilst few (22%) were within age range of 17-34. With marital status, majority (68%) were classed as married with only 2% being considered separated.

On the basis of religious background, all (100%) the respondents were christians, with no muslim nor traditionalist.

The study also realised that, majority (68%) of respondents had no formal education with 32% having Junior High School as their highest level of education. This high illiteracy level among the respondents will go a long way in negatively influencing their business success, as education plays a significant role in an efficient management of business activities. Due to the nature of the study, all (100%) the respondents were market women, with 78% being involved in mobile type of marketing whereas 24% were engaged in resident type of marketing activities. Correlation analysis showed no association in terms of category of business, be of resident or mobile on anthropometric profiles. On the average, 17% of the respondents received as amount of 60 Ghana cedi per month whilst 10.6% received as low as 10 Ghana cedi per month. This implies that the socio-economic status of the respondents is likely to fall below the average. This intern will mean inability to meet the social and other obligations of the respondents if extra activities are not carried out in addition to the main marketing business.

4.2 Anthropometric profile of respondents.

Table 4.2 below details the anthropometric profiles of respondents.

Table 4.2. Anthropometric profile of respondents

Variables	**Minimum**	**Maximum**	**Mean**	**SD**
Weight (kg)	45.0	145	76	**19.8**
Height (cm)	127	195	159	**0.13**
Body mass Index (kg/m2)	18.1	65.8	30.5	**8.84**
Waist circumference (cm)	73.0	145	101	**8.84**
Hip circumference (cm)	62.0	174	111	**16.6**
Waist to hip ratio	0.65	1.17	0.9	**0.08**
Abdominal circumference/girth(cm)	78.0	143	102	**16.9**
Heart Rate(bpm)	55.0	94	74	**9.21**
Systolic blood pressure (mm Hg)	76.0	180	134	**18.6**
Diastolic blood pressure (mm Hg)	56.0	94	78	**8.83**

It is observed from the table above that, on the average, all the respondents (100%) were within Obesity stage I category as well as excess waist and abdominal adiposity. This makes the entire respondents being at risk of complications associated with being obese which may include high blood pressure and to some extent liver infections.

4.3 Prevalence of body mass index (BMI) categories

By WHO standards, body mass index was calculated as weight divided by height squared (kg/m2), and categorized as: Under weight (<18.5); Normal (18.5–24.9); Overweight (25.0–29.9); Obesity I (30.0–34.9); Obesity II (35.0–39.9) and Obesity III (≥ 40.0). The table below presents information on the prevalence of various categories of BMI of the respondents.

Table 4.3. Prevalence of BMI weight categories

BMI Category	Frequency	Percentage
Under weight	2	4
Normal	11	22
Overweight	12	24
Obesity I	15	30
Obesity II	5	10
Obesity III	5	10
Total	**50**	**100**

From the table above, most (30%) of the respondents were within obesity stage I category, with few (4%) being underweight. This implies that there is the need to intensify lifestyle behaviour modification strategies that target weight reduction, so as to reduce the likelihood future burden among the population.

4.3 Prevalence of waist – hip – ratio (WHR) categories

With reference to WHO standards, the cut off points used to categories waist/ hip ratio as an indicator of excess fat accumulation are; WHR (>0.85) for normal; and WHR (>0.85) for abnormal. This is only applicable to women conditions.

Table 4.4 below depicts information on various prevalence levels of WHR of respondents.

Table 4.4. Prevalence of waist – hip – ratio (WHR) categories

WHR Category	Frequency	Percentage
Normal	7	14.9
Abnormal	40	85.1
Total	**47**	**100**

Waist-to- hip ratio in excess of 0.85 in women is an indication of excess fat accumulation. This will go long way to interfere with some processes of the body, which may include menstruation. Excess fat promotes some hormones release that may interfere with pregnancy, thus the greater proportion of the respondents stand a chance of having pregnancy related abnormalities.

4.3 Prevalence of abdominal circumference/girth (AC/G) categories

By current WHO classification, an abdominal circumference or girth in excess 98 cm (35 inches) for women is currently accepted indicators of excessive abdominal fat accumulation. Table 4.5 below details information on prevalence of abdominal circumference /girth categories of respondents.

Table 4.5. Prevalence of abdominal circumference/girth (AC/G) categories

AC/G Category	Frequency	Percentage
Normal(</=98cm)	22	44
Abnormal(>98cm)	28	56
Total	**50**	**100**

It is observed from the table that most (56%) of the respondents stand at risk of abdominal adiposity.

4.4 Prevalence of hypertension

By adopting World Health Organization (WHO) criteria for classifying blood pressure, the following categories of hypertension both systolic and diastolic are being considered by this study:

Category	SBP	DBP
Optimal	<120	<80
Pre-hypertension	120- <140	80 - <90
Hypertension stage I	140 - <160	90 - <100
Hypertension stage II	≥ 160	≥ 100

Table 4.6 below details information on prevalence of various categories of hypertension for both systolic and diastolic pressure.

Table 4.6. Prevalence of hypertension

Systolic Hypertension			**Diastolic Hypertension**	
Category	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Optimal	8	16	26	52
Pre-hypertension	23	46	19	38
Hypertension stage I	15	30	5	10
Hypertension stage II	4	8	0	0
Total	**50**	**100**	**50**	**100**

It can be deduced from the table that most (46%) of respondents were pre-hypertensive on systolic pressure with (38%) on diastolic pressure. It is also observed that systolic hypertension was quite higher among the respondents that diastolic hypertension. Targeted strategies towards reduction in systolic hypertension among the population will be beneficial, though diastolic pressure also require same attention in order to prevent chronic hypertensive conditions.

4.5 Correlation between anthropometric indices on blood pressure

Table 4.7. Correlations between anthropometric indices on blood pressure

Variables	**SBP**	**DBP**
Weight	.140	.183
Height	.271	.417**
Body mass index	-.029	.366**
Waist circumference	.152	.096
Hip circumference	.244	.105
Waist to hip ratio	-.088	-.080
Abdominal circumference/girth	.082	-.042
Heart Rate	.187	.141

Correlation is significant at the 0.01 level

Table 4.7 above details information on the correlations analysis of various anthropometric indices on systolic and diastolic pressure. It is observed that no significant association were observed among indices on blood pressure, except height and BMI which significantly showed an association with diastolic blood pressure. Though practically, the selected indices do exert an association on blood pressure, there was no significant difference observed with regards to this study.

4.6 Correlation among anthropometric indices

Table 4.8. Correlation among anthropometric indices

Variables	Body mass index
Weight	.792**
Height	-.405**
Waist circumference	.469**
Hip circumference	.371*
Waist to hip ratio	.083
Abdominal circumference/girth	.446**

***Correlation is significant at the 0.01 level*
**Correlation is significant at the 0.05 level*

From the table, almost all the selected indices showed an association with BMI with significant difference except WHR which showed no association with BMI. The association of these indices with BMI implies that, changes in one or more of the indices will present a corresponding effect on the BMI status of the body. For prevention of obesity among the population, management and control of these variables will help reduce incidence of obesity among the population.

5. Conclusion and recommendation

5.1 Conclusion

This study recorded high levels of prevalence of all the selected anthropometric risk factor profiles of high blood pressure (hypertension). A prevalence rate of 74% was recorded for sum of various levels of obesity among market women in Juaben, thus only 4% and 22 % were underweight and normal weight respectively.

Among other variables, the following prevalence rates were recorded: 85.1% for excess WHR, 56% for excess abdominal circumference/girth, 84% for sum of various classes of hypertension for systolic and 48% for diastolic.

An analysis of correlations of anthropometric profiles with hypertension was weakly correlated as observed by this study except height and BMI which significantly showed a strong association with diastolic blood pressure. Among variables, almost all the selected indices showed an association with BMI with significant difference except WHR which showed no association with BMI.

5. Recommendation

Based on the key findings of this study, the following recommendations are proposed for consideration:

- Organisation of health talk on weight management practices among the market women
- There should be an awareness creation on the hypertension prevention.
- Vegetable and fruits intake should be advocated among market women

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QUESTIONNAIRE ON ANALYSIS OF ANTHROPOMETRIC RISK FACTOR PROFILE CORRELATES OF HYPERTENSION.

'A Case Study Among The Market Women In Juaben'.

Paper Code……

DEMOGRAPHIC CHARACTERISTICS	
1. Sex of Respondent	1.Male 2. Female ☐
2. Age of Respondents	
3. What is your marital status	1. Single 2. Married 3. Divorced 4. Widow 5. Separation ☐
4. Highest level of education	1. Never 2. JSS 3. SSS ☐
5. Occupation/Business	
6. Category of Occupation	Mobile Resident ☐
7. Average estimated monthly Income?	
8. Religious affiliation	1. Christian 2. Muslim 3. Traditional ☐
PHYSICAL/ANTHROPOMETRIC MEASUREMENTS	
Weight and Height	
9. Weight measurement	Kilogram(Kg) ☐
10. Height measurement	Centimeters (cm) ☐
11. Are you pregnant? (***For women only***)	1. Yes (***Don't measure waist and HIP circumference***) 2. No ☐
Waist, Hip and Abdomen	
12. Waist circumference (to nearest 0.1 cm)	☐
13. Hip circumference (to nearest 0.1 cm)	☐
14. Abdominal circumference/girth (to nearest 0.1 cm)	☐
Heart Rate (Pulse)	
14. a. Reading 1	Beat per minute ☐
b. Reading 2	Beat per minute ☐

	c. Reading	3	Beat per minute ☐
Blood Pressure			
15.	a. Reading	1	Systolic (mmHg) ☐
			Diastolic (mmHg) ☐
	b. Reading	2	Systolic (mmHg) ☐
			Diastolic (mmHg) ☐
	c. Reading	3	Systolic (mmHg) ☐
			Diastolic (mmHg) ☐