

Lifestyle Risk Factors in Hospital Attendants in Kumasi, Ghana: Cross-Sectional Study

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Abstract

Majority of noncommunicable diseases have strong association and are causally linked with four behavioral risk factors and these are the harmful use of alcohol, unhealthy diet, physical inactivity and tobacco use. The objective for this study was to determine the prevalence of alcohol consumption, smoking, physical activity, fruit and vegetable consumption among the participants and to determine the relationship between these risk factors and measures of obesity like body mass index, waist to hip ratio and waist circumference. This was a cross-sectional study undertaken in the outpatient clinics of Komfo Anokye Teaching Hospital (KATH) and a total of 424 patients were recruited. These were patients aged 20 years and over who were reporting for the first time to KATH. A questionnaire was administered (including the WHO STEPwise approach to Surveillance questionnaire) after obtaining informed consent, anthropometric measurements were then taken and blood investigations including fasting blood glucose were undertaken. The prevalence of current smoking was 3% while the prevalence of alcohol consumption was very high with 43% of participants having ever consumed alcohol and with 42% having consumed alcohol in the past 12 months. The proportion of participants who consumed fruits was 48% while 89% consumed vegetables. In all 66% were involved in some form of physical activity (work, moving from one place to another, recreation, sport or leisure time activity). In conclusion, these lifestyle factors were common among these participants. There is the need to promote the healthy aspects of these risk factors among these patients.

Keywords

Alcohol, Tobacco, Smoking, Fruit, Vegetable, Physical Activity, Systemic Hypertension, Diabetes Mellitus

1. Introduction

Noncommunicable diseases (NCDs) include cardiovascular diseases (CVD), diabetes mellitus (DM), chronic respiratory diseases, cancer, digestive diseases, renal diseases, musculoskeletal conditions, neurological and mental health disorders. NCDs cause millions of morbidity and mortality each year, many of which are preventable and premature. Out of the 57 million deaths that were reported in 2008 globally, NCDs accounted for 63% and was the leading cause of deaths. One-third of these deaths occurred in people younger than 60 years and 80% occurred in developing countries [1]. In the

developing countries, NCDs have been linked to increasing urbanization and a change in lifestyle from the traditional way of living to a more modernised, westernised lifestyle [2].

A few major risk factors account for much of the morbidity and mortality from chronic NCDs. The most important risk factors are high blood pressure, physical inactivity, high levels of cholesterol in the blood, unhealthy dietary habits (including inadequate intake of fruit, vegetables and excessive salt, fat, and sugar intake), overweight or obesity, smoking and other tobacco use, excessive alcohol consumption and exposure to environmental pollution. Five of these risk factors are closely related to diet and physical activity. Because they are closely related to each other, these risk factors often cluster in

individuals. In one study among Africans, only 5 risk factors (current/former tobacco smoking, self-reported hypertension and diabetes, abdominal obesity, and lipoprotein ApoB/ApoA-1 ratio) accounted for 89% of the risk for an initial myocardial infarction while the first 4 risk factors accounted for 83% [3].

Majority of NCDs are linked causally and have strong association with four behavioral risk factors and these are the harmful use of alcohol, unhealthy diet, physical inactivity and tobacco use. These four risk factors cause four key metabolic/physiological changes hyperlipidaemia, hyperglycaemia, overweight/obesity and high blood pressure and these changes in turn results in NCDs. Globally the leading risk factor for NCDs is raised blood pressure causing 13% of global attributable deaths and is followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%) and overweight and obesity (5%) [4].

NCDs are to a large extent preventable through correction, reduction and prevention of these risk factors, especially of the four behavioral risk factors, unhealthy diet, physical inactivity, tobacco use and the harmful use of alcohol. By adopting healthy lifestyle changes, WHO estimates that up to 80% of NCDs can be prevented and about 40% of cancers are preventable [1]. Beaglehole *et al.* in a recent Lancet article proposed five priority prevention interventions for NCDs and these are based on a set of criteria including cost-effectiveness, outcome-effectiveness, and feasibility of scale-up. The first four are population-wide methods to reduce key risk factors: accelerated tobacco control, salt reduction, promotion of healthy diets and physical activity, and reduction in harmful use of alcohol. The fifth is to reduce cardiovascular disease risk by providing and increasing access to essential drugs and technologies [5].

In 2008 two major surveys were undertaken in Ghana. These were the Global School-Based Student Health Survey (GSHS) 2008 and the 2008 Ghana Demographic and Health Survey (GDHS). The GSHS was part of WHO STEP wise approach to Surveillance (STEPS) which is a simple, standardized method for collecting, analyzing and disseminating data in WHO member countries while the GDHS was part of the global Demographic and Health Surveys (DHS) programme which is funded by U.S. Agency for International Development (USAID). These were national surveys which were designed to produce a representative sample of the nation and data collection took place between September and November 2008. The survey questionnaires were similar but not identical in certain aspects [6, 7]. Coincidentally in 2008 we carried out our study in lipids among hospital attendants at Komfo Anokye Teaching Hospital (KATH) and as part of the study we administered the STEPS questionnaire on alcohol consumption, smoking, physical activity, fruit and vegetable consumption [8, 9]. In this article we report the findings from this questionnaire and situate these findings in the results of the GSHS and GDHS. Our main objective for this current study was to determine the prevalence of alcohol consumption, smoking, physical activity, fruit and vegetable consumption among these participants and

to determine the relationship between these risk factors and measures of obesity like body mass index (BMI), waist to hip ratio (WHR) and waist circumference (WC).

2. Materials and Methods

This cross sectional study was conducted between April 2008 and January 2009, at the Directorate of Medicine and the Polyclinic Directorate of KATH. Subjects eligible for inclusion in the study were patients 20 years and above who had visited the directorate within the period, who had received treatment on out-patient basis and who were willing to take part in the study after the rationale for the study had been thoroughly explained to them. Patients less than 20 years of age, those who refused to give informed consent, patients with liver cirrhosis and those who were unable to stand for weight and height measurement were not recruited in the study.

Questionnaires were administered to participants, after which physical examination were performed by one of the authors. Hip and waist circumferences were measured to the nearest 0.5cm using a plastic tape measure, height was measured to the nearest 0.5cm and weight to the nearest 0.1kg after participants had removed their footwear, using a standardized combined manual scale and stadiometer (Asimed MB 201T Plus from Aparatos Y Sistemas De Medida, S. A). Participants were asked to sit for 5 minutes, after which their pulse rate and blood pressure were measured with an automatic blood pressure machine (OMRON M7 sphygmomanometer, Omron Matsusaka Co. Ltd, Matsusaka City, Mie Ken, Japan) using the appropriate cuff size. Three readings were taken 1 minute apart, but the mean of the last two readings was used in the data analysis having discarded the first one. Biochemistry tests including fasting blood glucose (FBG) were done using a BT3000 auto analyzer, manufactured by Biotechnical Instruments S. P. A Rome Italy.

The following definitions were adopted for this study:

- 1 Systemic hypertension is systolic blood pressure (SBP) \geq 140 and or diastolic blood pressure (DBP) \geq 90mmHg [10].
- 2 Overall Obesity is Body Mass Index \geq 30 kg/m² [11].
- 3 Central Obesity or High WHR is WHR $>$ 0.9 for males and $>$ 0.8 for females [11].
- 4 High WC is WC \geq 94cm in men or \geq 80cm in women [11].
- 5 Diabetes mellitus (DM) is fasting venous blood glucose \geq 6.1mmol/L or being on drug or diet therapy for DM [12, 13].

For the purpose of analyzing the physical activity data, a number of variables were created. "Work $>$ 10 Min" was created for participants' whose work involve walking for more than 10 minutes at a time, "Work Vigorous" was created for those whose "work involve vigorous activity, like (heavy lifting, digging or construction work) for at least 10 minutes at a time", "Work Moderate" was created for those whose "work involve moderate-intensity activity, like brisk walking (or carrying light loads) for at least 10 minutes at a time" and "Work Day" for how long the typical work day was for the participant. "Walk $>$ 10 Min" was created for those who "walk or use a bicycle (pedal cycle) for at least 10 minutes

continuously to get to and from places”, “Sport > 10 Min” created for those whose“(recreation, sport or leisure time) involve physical activity lasting more than 10 minutes at a time”, “Sport Vigorous” for those who in their “(leisure time), do vigorous activities like (running or strenuous sports, weight lifting) for at least 10 minutes at a time” and “Sport Moderate” for those who in their “(leisure time), do moderate-intensity activities like brisk walking,(cycling or swimming) for at least 10 minutes at a time. “Active” was for any participant who was engaged in at least one of these physical activities.

The data collected, were analyzed using Microsoft Excel 2010 and Stata version 8.0 statistical package. Pearson Chi-square test was used in comparing discrete variables after the percentages were calculated. The student t- test was used for the continuous variables using the calculated mean and standard deviation for these continuous variables. Univariate and multivariate logistics regression analysis was carried out for various variables controlling for age, sex, hypertension and DM in the multivariate analysis. P-values of less than 0.05 were considered statistically significant.

The study was approved by the Committee of Human Research, Publication and Ethics of KATH and School of Medical Sciences, Kwame Nkrumah University of Science

and Technology. Each participant gave formal consent by signing or thumb printing an informed consent form after the study was thoroughly explained to them.

3. Results

There were 424 participants in this study, 261 (62%) females and 163 (38%) males giving a female: male ratio of 1.6:1 [8, 9]. The mean (standard deviation) age for the participants was 50 (14) years with no significant age difference between the males and females (Table 1). Weight was similar in the sexes but the men were taller so their BMI was significantly lower than the women. Both SBP and DBP, WHR and FBG were similar in men and women. WC was significantly lower in men compared to women. The prevalence of BMI \geq 30, high WC and high WHR were higher in the women than the men.

Seventy-seven (18%) of the participants had neither hypertension nor DM, 94 (22%) had only DM, 109 (26%) had only hypertension and 144 (34%) had both DM and hypertension. There were therefore 239 (56%) participants with DM (including those with hypertension) and 254 (60%) participants with hypertension (including those with DM).

Table 1. The characteristics of participants by sex.

	Male	Female	All	p
	Mean (SD)	Mean (SD)	Mean (SD)	t or χ^2 test
Number (%)	163 (38.4)	261 (61.6)	424	
Age (years)	48.6 (14.3)	50.6 (13.2)	49.8 (13.7)	0.15
Age range (years)	21 - 88	20 - 83	20 - 88	
Weight (kg)	68.9 (12.0)	68.3 (14.5)	68.5 (13.6)	0.65
Height (m)	1.68 (0.06)	1.58 (0.06)	1.62 (0.07)	<0.0001
BMI (kg/m ²)	24.3 (3.7)	27.3 (5.5)	26.1 (5.1)	<0.0001
WC (cm)	86.5 (10.8)	91.1 (13.6)	89.3 (12.8)	<0.001
Hip circumference (cm)	95.9 (7.6)	101.3 (12.3)	99.2 (11.0)	<0.0001
WHR	0.90 (0.07)	0.90 (0.11)	0.90 (0.09)	0.89
SBP (mmHg)	134 (22)	132 (22)	133 (22)	0.26
DBP (mmHg)	84 (12)	84 (12)	84 (12)	0.95
FBG (mmol/L)	7.86 (4.41)	8.22 (4.50)	8.08 (4.46)	0.42
BMI \geq 30 (%)	9 (5.5)	84 (32.2)	93 (21.9)	<0.001
HIGH WHR (%)	82 (50.3)	230 (88.1)	312 (73.6)	<0.001
High WC (%)	44 (27.0)	203 (77.8)	247 (58.3)	<0.001
DM (%)	92 (56.4)	147 (56.3)	239 (56.4)	0.98
Hypertension (%)	93 (57.1)	161 (61.7)	254 (59.9)	0.34

Table 2 shows the results on smoking in these participants. The prevalence of smoking was low for current smoking (3%), current daily smoking (1%) and past daily smoking (5%). The prevalence of all these 3 measures of smoking was high in men compared to women, though current smoking was not up

to statistical significance. Mean age of starting smoking was 20 (4) years and was similar in men and women. The only female who had smoked in the past could not give the age she stopped smoking and the duration. There was no report of the use of smokeless tobacco.

Table 2. Smoking by sex.

	Male	Female	All	p
	Mean (SD)	Mean (SD)	Mean (SD)	t or χ^2 test
Number (%)	163 (38.4)	261 (61.6)	424	
Current Smokers (%)	9/163 (5.5)	2/261 (0.8)	11/424 (2.6)	<0.01
Current Daily Smokers (%)	6/9 (66.7)	0/2 (0)	6/11 (54.6)	0.09
Start Age (Years)	20.1 (2.5)	19.5 (7.8)	20.0 (3.5)	0.84
Past Daily Smokers (%)	19/154 (12.3)	1/259 (0.4)	20/413 (4.8)	<0.001
Stop Age (Years)	45.6 (12.8)	NA	45.6 (12.8)	NA
Stop Duration (Years)	19.6 (10.2)	NA	19.6 (10.2)	NA

Participants' results on alcohol consumption are shown in Table 3. The prevalence of alcohol consumption was very high with 43% of participants having ever consumed alcohol and with 42% of these having consumed alcohol in the past 12 months. Alcohol consumption was also more common in men

than women with 48% of men having consumed alcohol in the past 12 months compared to 35% in women. The frequencies of alcohol consumption as well as the average consumption per day were also higher in men.

Table 3. Alcohol consumption by sex.

	Male	Female	All	p
	Number (%)	Number (%)	Number (%)	χ^2 test
Number (%)	163 (38.4)	261 (61.6)	424	
Ever Consumed Alcohol	104 (63.8)	80 (30.7)	184 (43.4)	<0.001
Consumed Alcohol Last 12 Months	50/104 (48.1)	28/80 (35.0)	78/184 (42.4)	0.08
HF > 5/Week	12/50 (24.0)	1/28 (3.6)	13/78 (16.7)	0.02
HF 1-4/Week	6/50 (12.0)	0/28 (0)	6/78 (7.7)	0.06
HF 1-3/Month	14/50 (28.0)	4/28 (14.3)	18/78 (23.1)	0.17
HF < 1/Month	18/50 (26.0)	23/28 (82.1)	41/78 (52.6)	<0.0001
On Average/Day (Mean (SD))	2.3 (1.6)	1.4 (0.8)	2.0 (1.5)	<0.01

HF - How Frequently a participant has had at least one alcohol drink in the past 12 months.

The nutrition results are reported in Table 4. The proportion of participants who consumed fruits was 48% while 89% consumed vegetables and there were no sex differences. Thirty five participants (8%) did not consume either fruits or vegetables while 195 (46%) consumed both fruits and vegetables.

Consumption of fruits on 0-2 days a week was reported by 61.3% of men and 69.3% of women, 20.9% of men and 13.8% women, ate fruits 3-6 days a week while 17.8% of men and 16.9% of women consumed fruits on a daily basis (7 days). Majority of the participants (74.3% women vs 67.5% men) took 0-2 servings of fruits on a day while 18.8% of women and 20.2% of men had 3-4 servings of fruits a day when fruits are consumed. Only 6.9% of women and 12.3% of men consumed the recommended 5 or more servings of fruit a day.

Most of the participants reported low consumption of

vegetables during a typical week; 39.9% of men and 29.5% of women eat vegetables 0-2 days a week. Consumption of vegetables on a daily basis (7 days) was reported by 21.5% of men and 31.4% of women while 39.1% of women and 38.7% of men consumed vegetable 3-6 days a week. Only 0.6% of men and 2.3% of women consumed the recommended 5 or more servings of vegetables a day. 0-2 servings of vegetables a day was consumed by 88.3% of men and 80.5% of women forming the majority while 11.1% of men and 17.2% of women consumed 3-4 servings of vegetables on a typical day.

All the women prepared their meals at home and this was significantly higher than the 95% of men who did the same. Use of vegetable oil in cooking was very common (95%) and this was higher in women (98%) compared to the 92% in men. The commonest fuels used in cooking were gas, charcoal and firewood, in that order.

Table 4. Consumption of fruits and vegetables by sex.

	Male	Female	All	p
	Number (%)	Number (%)	Number (%)	χ^2 test
Number (%)	163 (38.4)	261 (61.6)	424	
Fruits	84 (51.5)	123 (47.1)	207 (48.4)	0.38
0 - 2 Days/Week	100 (61.3)	181 (69.3)	281 (66.3)	0.09
3 - 6 Days/Week	34 (20.9)	36 (13.8)	70 (16.5)	0.06
7 Days/Week	29 (17.8)	44 (16.9)	73 (17.2)	0.80
0 - 2 Servings/Day	110 (67.5)	194 (74.3)	304 (71.7)	0.13
3 - 4 Servings/Day	33 (20.2)	49 (18.8)	82 (19.3)	0.71
5+ Servings/Day	20 (12.3)	18 (6.9)	38 (9.0)	0.06
Vegetables	141 (86.5)	236 (90.4)	377 (88.9)	0.21
0 - 2 Days/Week	65 (39.9)	77 (29.5)	142 (33.5)	0.03
3 - 6 Days/Week	63 (38.7)	102 (39.1)	165 (38.9)	0.93
7 Days/Week	35 (21.5)	82 (31.4)	117 (27.6)	0.03
0 - 2 Servings/Day	144 (88.3)	210 (80.5)	354 (83.5)	0.03
3 - 4 Servings/Day	18 (11.1)	45 (17.2)	63 (14.9)	0.08
5+ Servings/Day	1 (0.6)	6 (2.3)	7 (1.7)	0.19
Prepare Meals	154 (94.5)	261 (100.0)	415 (97.9)	<0.001
Vegetable Oil	142/154 (91.6)	254/261 (97.7)	396 (95.4)	0.02
Fuel Gas	71 (44.1)	125 (47.9)	196 (46.5)	0.38
Fuel Charcoal	62 (38.5)	98 (37.6)	160 (37.9)	0.92
Fuel Wood	16 (9.9)	35 (13.4)	51 (12.1)	0.27
Fuel Others	14 (8.6)	3 (1.1)	17 (4.0)	<0.001

The work of 77 participants (18%) involved walking for more than 10 minutes at a time. (Table 5) Out of these 77 participants a significantly higher proportion of men were involved in work involving vigorous activity as well as work involving moderate-intensity activity. The mean hours of work involving vigorous activity and moderate activity was also significantly higher in the men. The mean hours of the workday was 8.7 (2.1) hours for the men and this was also significantly longer compared to the 8.1 (7.9) hours for the women.

Two hundred and fifty three (60%) of the participants walked or used a bicycle for at least 10 minutes continuously to get to and from places. The mean hours for this activity was

7.5 (10.3) hours and there were no significant difference between the sexes. Only 47 (11%) participants were involved in recreation, sport or leisure time with physical activity lasting more than 10 minutes at a time. Twelve were involved in vigorous activities while 37 were involved in moderate-intensity activities. In all 278 (66%) were involved in some form of physical activity (work, moving from one place to another, recreation, sport or leisure time activity), with a significantly higher proportion of men being physically active. The mean hours of activity per week was 25.4 (38.5) for men which was significantly longer compared to the 17.4 (27.0) in the women.

Table 5. Physical activity by sex.

	Male	Female	All	p
	Mean (SD)	Mean (SD)	Mean (SD)	t or χ^2 test
Number (%)	163 (38.4)	261 (61.6)	424	
Work > 10 Min (%)	36/163 (22.1)	41/261 (15.7)	77/424 (18.2)	0.10
Work Vigorous (%)	24/36 (66.7)	18/41 (43.9)	42/77 (54.6)	0.05
Work Vigorous (Hours/Week)	45.5 (12.7)	29.6 (18.6)	38.7 (17.3)	<0.01
Work Moderate (%)	27/36 (75.0)	38/41 (92.7)	65/77 (84.4)	0.03
Work Moderate (Hours/Week)	40.8 (21.4)	25.9 (18.9)	32.1 (21.1)	<0.01
Work Day (Hours/Day)	8.7 (2.1)	8.1 (7.9)	8.3 (2.1)	<0.01
Walk > 10 Min (%)	101/163 (62.0)	152/261 (58.2)	253/424 (59.7)	0.45
Walk > 10 Min (Hours/Week)	6.4 (7.9)	8.3 (11.6)	7.5 (10.3)	0.16
Sport > 10 Min (%)	32/163 (19.6)	15/261 (5.8)	47/424 (11.1)	<0.001
Sport Vigorous (%)	10/32 (31.3)	2/15 (13.3)	12/47 (25.5)	0.19
Sport Vigorous (Hours/Week)	6.9 (13.5)	2.0 (1.4)	6.1 (12.4)	0.63
Sport Moderate (%)	24/32 (75.0)	13/15 (86.7)	37/47 (78.7)	0.36
Sport Moderate (Hours/Week)	4.1 (9.3)	2.6 (2.3)	3.5 (7.4)	0.57
Active (%)	118/163 (72.4)	160/261 (61.3)	278/424 (65.6)	0.02
Active (Hours/Week)	25.4 (38.5)	17.4 (27.0)	20.8 (32.6)	0.04

When all the risk factors were considered in the positive sense (that is no current smoking, no alcohol consumption in the past 12 months, consumption of fruits, consumption of vegetables and physical activity) only one person had only one of these positive risk factors. (Table 6) Thirty nine participants

(9%) had two of the favorable risk factors, 105 (25%) had three, 168 (40%) had four and 111 (26%) had all the five favorable risk factors. There were no significant sex differences in all these categories of risk factors.

Table 6. Number of risk factors by sex.

	Male	Female	All	p
	Number (%)	Number (%)	Number (%)	χ^2 test
Number (%)	163 (38.4)	261 (61.6)	424	
1 Risk Factor	0 (0)	1 (0.4)	1 (0.2)	0.43
2 Risk Factors	20 (12.3)	19 (7.3)	39 (9.2)	0.08
3 Risk Factors	43 (26.4)	62 (23.7)	105 (24.8)	0.54
4 Risk Factors	59 (36.2)	109 (41.8)	168 (39.6)	0.25
5 Risk Factors	41 (25.1)	70 (26.8)	111 (26.2)	0.70

In univariate and multivariate logistics regression analysis consumption of fruits, vegetables and sport > 10 min were not associated with BMI \geq 30, high WHR and high WC. (Table 7) Work > 10 min was associated with BMI \geq 30, high WHR and high WC before and after adjusting for age, sex, DM and hypertension. Walk > 10 min and active were associated with

BMI \geq 30 and high WHR but not high WC in univariate analysis. In multivariate analysis only the association with BMI \geq 30 remained significant. Consumption of fruits was associated with sport > 10 min and active while consumption of vegetables was associated with walk > 10 min and active.

Table 7. Univariate and multivariate logistic regression analysis.

Outcome Variable	Dependent Variable	OR	CI	P	OR	CI	P
		Unadjusted			Adjusted		
Fruits	BMI \geq 30	1.09	0.69 – 1.72	0.71	1.24	0.76 – 2.02	0.39
	High WHR	1.06	0.69 – 1.63	0.26	1.56	0.92 – 2.62	0.10
	High Waist circumference	0.98	0.67 – 1.44	0.91	1.23	0.77 – 1.96	0.39
Vegetables	BMI \geq 30	0.73	0.37 – 1.44	0.36	0.59	0.28 – 1.26	0.18
	High WHR	1.33	0.69 – 2.57	0.39	1.46	0.67 – 3.18	0.34
	High Waist circumference	1.04	0.56 – 1.92	0.91	0.93	0.45 – 1.94	0.85
Work > 10 Min	BMI \geq 30	0.35	0.16 – 0.75	<0.01	0.37	0.17 – 0.83	0.02
	High WHR	0.53	0.31 – 0.89	0.02	0.54	0.29 – 1.01	0.05
	High Waist circumference	0.47	0.28 – 0.77	<0.01	0.47	0.26 – 0.86	0.01
Walk > 10 Min	BMI \geq 30	0.55	0.35 – 0.88	0.01	0.57	0.35 – 0.93	0.02
	High WHR	0.58	0.37 – 0.91	0.02	0.63	0.37 – 1.08	0.09
	High Waist circumference	0.80	0.54 – 1.19	0.28	0.90	0.56 – 1.44	0.65
Sport >10 Min	BMI \geq 30	0.68	0.31 – 1.52	0.35	1.37	0.56 – 3.34	0.49
	High WHR	0.60	0.32 – 1.14	0.12	1.46	0.66 – 3.22	0.35
	High Waist circumference	0.65	0.36 – 1.20	0.17	1.62	0.76 – 3.43	0.21
Active	BMI \geq 30	0.52	0.33 – 0.83	<0.01	0.60	0.37 – 0.99	0.05
	High WHR	0.57	0.35 – 0.93	0.02	0.73	0.41 – 1.27	0.26
	High Waist circumference	0.71	0.47 – 1.07	0.10	0.93	0.57 – 1.51	0.77
Fruits	Work > 10 Min	0.90	0.55 – 1.48	0.69	0.88	0.53 – 1.45	0.62
	Walk > 10 Min	1.29	0.87 – 1.90	0.20	1.24	0.84 – 1.84	0.29
	Sport > 10 Min	3.08	1.58 – 6.03	<0.01	2.95	1.48 – 5.87	<0.01
Vegetables	Active	1.68	1.12 – 2.52	0.01	1.62	1.08 – 2.45	0.02
	Work > 10 Min	1.09	0.49 – 2.44	0.83	1.06	0.47 – 2.39	0.89
	Walk > 10 Min	1.80	0.98 – 3.31	0.06	1.87	1.00 – 3.47	0.05
	Sport > 10 Min	1.94	0.58 – 6.51	0.28	2.15	0.62 – 7.38	0.23
	Active	2.00	1.07 – 3.65	0.03	2.09	1.12 – 3.90	0.02

4. Discussion

These lifestyle factors are the time tested non-pharmacological approach for controlling most of the CVD risk factors including hypertension, diabetes, obesity and hyperlipidaemia. In this study smoking, alcohol intake, consumption of fruits and vegetables and physical activity were examined. Drinking of alcohol was common but smoking was uncommon in this population. Physical activity, consumption of fruits and vegetables were also common but the uptake of these activities was not up to the recommended levels. Further, a little over a quarter of the participants had all the favourable risk factors examined (that is no current smoking, no alcohol consumption in the past 12 months, consumption of fruits, consumption of vegetables and physical activity). The remaining three quarters had between two and four of these favourable risk factors with the exception of one participant who had only one of these favourable risk factors.

From second-hand smoke and direct tobacco use, about 6 million deaths occur from tobacco use every year. Smoking is estimated to cause nearly 10% of CVDs, 42% of chronic respiratory diseases and about 71% of lung cancers [1]. Apart from NCDs smoking is an important risk factor for communicable diseases such as lower respiratory tract infections and tuberculosis [14]. As a “best buy” for tobacco WHO recommends “protecting people from tobacco smoke and banning smoking in public places, warning about the

dangers of tobacco use, enforcing bans on tobacco advertising, promotion and sponsorship and raising taxes on tobacco” [1].

The prevalence of smoking in our study was low and this is consistent with other studies in Ghana [15-18]. In the GDHS smoking was more common among men than in women (7.3% vs 0.2%). Men in their 30s and 40s were more likely to smoke than younger men, while men in the rural areas were more likely to smoke cigarettes than urban men. The prevalence of smoking in the Ashanti region was 5.3% for men and 0.2% for women [6]. This was similar to the findings from our study. In 2009 Owusu-Dabo *et al.*, also found in Ashanti Region where our study was conducted that 4% of adults smoked and that the smokers were male dominant (9% males vs 0.3% females) [18].

In this study, the mean age of starting smoking was 20 (4) years and was similar in men and women. Earlier in 1984 Pobe *et al.*, presented the profile of the Ghanaian smoker as “an urban male cigarette user who starts in adolescence and at 20–29 years he finds himself in the age group with the highest prevalence rate” [15]. A 2010 study has reported that tobacco companies are enrolling the youth into smoking through aggressive marketing strategies in low and middle income countries such as Ghana [19]. In the GSHS 1.9% male students and 0.9% female students (overall 1.5%) smoked cigarettes on one or more days in the 30 days prior to the study and 45.4% of these tried their first cigarette at 13 years or younger [7].

About 3.8% of all deaths in the world were caused by the harmful use of alcohol [20]. NCDs such as liver cirrhosis,

cancers and CVDs account for more than half of these deaths. The relationship between cerebrovascular disease and coronary artery disease and alcohol consumption is complex and depends on both the pattern of alcohol consumption and the amount of alcohol consumed. However there is a direct relationship between the risk of CVDs, liver disease and some cancers and higher levels of alcohol consumption. WHO as a "best buy" for alcohol recommends "restricting access to retail alcohol, enforcing bans on alcohol advertising and raising taxes on alcohol" [1].

The prevalence of alcohol consumption was very high with 42% of the participants having consumed alcohol in the past 12 months and this was higher than the findings of GDHS which also showed that alcohol consumption was more common in men than in women (35% vs 18%) and that the men who consumed alcohol drank more frequently than women. The GDHS also found that in both sexes the proportion who consumed alcohol increased with increasing age and in the Ashanti region the proportion of men who consumed alcohol was 33.0% while that of women was 12.9% [6]. From the GSHS the prevalence of current alcohol use (i.e., drinking at least one drink containing alcohol on one or more of the past 30 days) among students was 12.6% in females, 17.4% in males and 15.3% overall [7].

Almost 5.3% of all global death each year is as a result of insufficient physical activity [20]. Compared to people who engage in at least 30 minutes of moderate intensity physical activity on most days of the week, those with insufficient physical activity have a 20% to 30% increased risk of all-cause mortality. The risk of depression, breast and colon cancer, diabetes and CVDs including high blood pressure and stroke is reduced by regular physical activity. The risk of ischaemic heart disease is reduced by 30%, that of breast and colon cancer by 21-25% and that of diabetes by 27% by engaging in 150 minutes of moderate physical activity each week. Physical activity is also important in weight control [21]. For physical activity, WHO recommends as a "best buy" "promoting public awareness of physical activity, including through the mass media" [1].

In the seven days preceding the GDHS 50% of men and 30% of women were engaged in vigorous activity that lasted at least 15 minutes for three or more days. Men aged 30-34 and women 45-49 were more likely to report being engaged in vigorous activity while men aged 45-49 and women age 20-29 were less likely to do so. In the Ashanti region, 28.7% of women and 46.7% of men were engaged in some form of vigorous activity that lasted at least 15 minutes during the week before the survey for three or more days [6]. In the GSHS physical activity of students "for all seven days for a total of at least 60 minutes per day during the past seven days" prior to the study was determined. The prevalence of the above defined physical activity was 21.2% in males, 15.6% in females and 18.7% overall [7]. Our study determined physical activity in a variety of ways (work, moving from one place to another, recreation, sport or leisure time activity) and so the finding of two-thirds of participants (72% men vs 61% women) involved in at least one of these activities cannot be compared

directly with the findings of these two nationwide studies. What our study shows however is that the commonest physical activity was walking from one place to the other while sporting or leisure time physical activity was the least common. Further our findings was consistent with the observation from the other studies that physical activity was more common in men than in women.

Daily (7 days) consumption of fruits was reported by 21% of men and 28% of women, 40% of men and 35% women, ate fruits 3-6 days a week while 36% of men and 34% of women consumed fruits 0-2 days a week in the GDHS. In Ashanti region the figures were 7 days (32% men vs 30% women), 3-6 days a week (36% men vs 38% women) and 0-2 days a week 32% for both men and women. Urban participants were more likely to consume fruits than rural dwellers. When the number of servings of fruits were considered the consumption was found to be low with less than 1% of men and only 3% of women consuming the recommended 5 or more servings of fruit a day. Most of the participants (78% women vs 87% men) took 0-2 servings of fruits on a day while 18% of women and 11% of men had 3-4 servings of fruits a day when fruits are consumed [6]. Our study shows that number of days in which fruits were consumed was less than in the GDHS however the number of servings of fruits consumed on a day was slightly higher than in the GDHS. In the GSHS "65% of students overall, usually ate fruit, such as oranges, pineapple, watermelon, banana, guava, pear, sweet apple, mangoes, or pawpaw, one or more times per day during the past 30 days" with females (70.2%) significantly more likely to consume fruits than males (61.1%) [7].

Also from the GSHS, "overall, 78.8% of students usually ate vegetables, such as kontomire, garden eggs, lettuce, cabbage, okra, alefu, bira, ayoyo, or bean leaves, one or more times per day during the past 30 days and male participants (76.6%) were significantly less likely than female participants (81.4%) to eat vegetables one or more times per day during the past 30 days. Additionally, female students (22.5%) were significantly more likely than male students (18.0%) to eat fruits and vegetables one or more times per day during the past 30 days. Overall, 20.0% of students usually ate fruits and vegetables five or more times per day during the past 30 days [7].

The finding on consumption of vegetables from our study was low and similar to the GDHS. In the GDHS, 24% of women and 30% of men consumed vegetables on a daily basis (7 days), 41% of women and 44% of men, 3-6 days a week while 34% of women and 25% of men eat vegetables 0-2 days a week. Older participants and urban dwellers were more likely to eat vegetables on a daily basis and the difference was more pronounced in men than women. On a typical day the number of servings of vegetables consumed was also low. 1% of men and 2% of women consumed the recommended 5 or more servings of vegetables a day. 3-4 servings of vegetables a day was consumed by 11% of men and 16% of women while 86% of men and 82% of women consumed 0-2 servings of vegetables on a typical day [6].

The risk of CVDs, stomach cancer and colorectal cancer is

reduced by the adequate consumption of fruits and vegetables. Consumption of low energy food such as fruits and vegetables prevent obesity compared to high energy processed food. “Promoting public awareness about diet, including through mass media” is WHO’s recommended “best buy” for diet [1].

There were no significant association between consumption of fruits or vegetables and the measures of obesity that is BMI \geq 30, high WHR and high WC. Consumption of fruits and vegetables is known to prevent overweight and obesity and in the Nurses’ Health Study with 74,063 women participants, fruits and vegetables consumption prevented weight gain and reduced the risk of obesity [22]. The most likely explanation for our findings is that the variable which measured consumption of fruits and vegetables included any participant who consumed any amount of fruits and vegetables irrespective of the servings per day and the number of days of consumption. And since most of the participants’ consumption was below the recommended consumption this may explain our findings. The measures of physical activity (Work > 10 min, Walk >10 min, Sport >10 min and Active) were to a large extent all associated with lower BMI, WHR and WC though not all of them were up to statistical significance. This supports the observation that increased physical activity promotes weight reduction and prevents obesity and overweight. There were significant associations between physical activity and consumption of fruits and vegetables, showing that those who were physically active were likely to consume more fruits and vegetables. This is a desirable finding since the combination of these two healthy lifestyle factors would go a long way to produce healthy benefits in these participants.

Other studies using the WHO STEP wise approach to Surveillance questionnaire have been undertaken elsewhere though the results of these lifestyle factors have not been reported. [23-29] WHO also has a website for the country reports of various countries which have undertaken nationwide studies. [30] The relationship between these lifestyle factors and socioeconomic status is well established in high-income countries and other studies have explored extensively the relationship in low-income and lower-middle-income countries. [31-33]

5. Conclusion

In conclusion this study has shown how prevalent these lifestyle factors are among these hospital attendants and how similar the prevalence is to the nationwide studies. There is therefore the need to promote these healthy non-pharmacological approaches for controlling these CVD risk factors among these patients especially those with diabetes and hypertension. Consumption of alcohol should be reduced to the recommended (less than 7 units in women and less than 14 units in men) in those who drink alcohol and complete cessation of smoking encouraged among the smokers. Increased consumption of fruits and vegetables to the daily recommended of five or more servings should be encouraged among the patients as well as encouraging all to

increase physical activity to the recommended physical activity of 30 minutes on at least three days per week.

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