THE PREVALENCE OF THE COMMON RISK FACTORS OF NON-COMMUNICABLE DISEASES IN SIERRA LEONE

Executive Summary

There is sufficient anecdotal evidence that the prevalence of Non-Communicable diseases (NCDs) such as hypertension, diabetes mellitus, cardiovascular diseases, stroke, and cancer is on the increase in Sierra Leone. These diseases are strongly associated with common lifestyle risk factors such as smoking, alcohol consumption, a diet rich in fats, sugars and salts; and physical inactivity. If these risk factors are not prevented today, we will be faced with a double disease burden tomorrow; as there is already a high burden of communicable diseases in Sierra Leone. A good number of the NCDs can be avoided by adopting policies that discourage smoking and promote healthy eating and physical activity. Therefore there is still a window of opportunity to control these risk factors at the population level if we are to avoid the double disease burden. However, evidence-based NCD policies cannot be formulated if we do not know the prevalence of these risks factors. Thus, the current survey was conducted with the overall objective of determining the prevalence of the major risk factors of NCDs nationwide. It was anticipated that the data generated will be utilized to: (a) formulate evidence-based policies and programs that will promote healthy life style so as to prevent the occurrence of NCDs; (b) inform policy changes within the Ministry of Health and Sanitation so as to guide in allocating resources for the prevention and surveillance of the common risk factors of NCDs; (c) establish and maintain a comprehensive surveillance system on NCDs in Sierra Leone; and (d) establish baseline levels of the risk factors of NCDs in the population and monitor future trends

A cross sectional population based survey utilizing the multi-stage cluster sampling strategy was used; with chiefdom sections, enumeration areas and households serving as primary, secondary and tertiary sampling units respectively. A total of 5,483 individuals aged 25-64 years of both sexes who were willing and normally resident in the designated study area were recruited into the survey. The WHO stepwise approach to surveillance was adapted for this study focusing on the core and expanded modules of steps 1 and 2. Specifically, the core modules of step 1 which include record of the basic demographic data, tobacco smoking, consumption of alcohol, fruit and vegetable; and physical activity were done. In addition, all expanded modules of step 1 which describe the breakdown of the demographic data (e.g., ethnicity and employment status); collect information on ex-smokers and smokeless tobacco; capture information on drinking with meals and drinking in the past 7 days; collect information about oil and fat consumption and meals outside a home; capture sedentary behaviour; and describe blood pressure and diabetes history; were also covered. Similarly, the survey covered all core modules of step 2 which measure the height, weight, waist circumference and blood pressure of respondents; and all expanded modules of step 2 which measure hip circumference and heart rate. The WHO stepwise approach to surveillance of chronic diseases survey tool (questionnaire) was appropriately adapted,

entered into personalize digital analyzers (PDAs); and was subsequently administered to one eligible individual (who was selected by the Kish method) within each selected household. The data collected was edited and coded as per the step surveillance manual and entered into the WHO recommended EpiData software version 3.1. The data was analyzed and graphed using EpiInfo software version 3.4.3 and graph pad prism version 5.1 respectively.

A total of 5,483 respondents of both sexes were recruited into the study with a response rate of 91%. The majority of the respondents were mendes followed by temnes and limbas. Fifty–five percent of the respondents had no formal schooling with a significant proportion being females. A significant proportion of the respondents were married. Moreover, a significantly small proportion of the respondents were either government employees (5%) or non-government employees (4%); with a rest being either self employed (44%) or unpaid (46%).

The study also revealed that 34% of the respondents do currently use tobacco products with 26% engaged in smoking tobacco products such as cigarettes, cigars or pipes of tobacco; and 8% smokeless tobacco. Significant higher male respondents were both current tobacco smokers (43% vs. 11%) and daily smokers (40% vs. 8%) as compared to females; with no age group specific significant difference. The average age of commencing tobacco smoking was 21 years; with 92% and 96% of the male and female daily smokers smoking at least six manufactured tobacco respectively. 74% and 69% of the respondents were exposed to ETS at home and workplace respectively.

The proportion of respondents who currently drink alcohol such as bear, whisky, omole or local beverages (i.e. those who drank alcohol in the past 30 days prior to the survey), was 17% with a significant high male preponderance (24% vs. 11%). On the other hand significantly higher female respondents were lifetime abstainers (76% vs.59%). In addition, a significant proportion of the current drinkers who consumed alcohol on 4 or more days in the past 7 days prior to the survey were males. 19% of the male and 15% of the female current drinkers had 5 or more- and 4 or more- alcoholic drinks during this period respectively. The proportion of males who drank 20 or more drinks in the past seven days was similar to females who drank 15 or more drinks. Moreover, a significant proportion of the current drinkers were engaged in category I drinking and most of them never or sometimes drank with meals. Furthermore, 5% of all respondents drank alcohol in the past 12 months prior to the survey. Among this latter group a significantly higher male respondents consumed at least one alcoholic drink daily. Finally, 14% and 5% of all male and female respondents were engaged in heavy episodic drinking respectively (i.e. men who had 5 or more and women who had 4 or more alcoholic drinks on any day in the past 30 days prior to the survey).

In a typical week, the mean number of days, fruits and vegetables were consumed by all respondents was 3 and 4 respectively, with no age group or sex specific difference. The mean number of servings of fruits and/or vegetables on average per day was 2. A significant proportion of the respondents (91%) consumed less than five servings of fruits and/or vegetables. Moreover, 92% of the sampled households used palm oil to prepare their meals.

The mean BMI of all respondents was 23.1; with males and females having an average BMI of 22.4 and 23.7 respectively. A significant proportion of the respondents had normal BMI (18.5-24.9) with a high male preponderance (72% vs. 61%). 22% of all respondents were overweight with a significant proportion being females (29% vs. 16%). In addition, 5%, 11% and 8% of males, females and both sexes respectively were classified as obese (BMI≥ 30). Although measurement of blood glucose was beyond the scope of the current study, it was noted that a significant proportion of all respondents (96%) have never had their blood glucose measured.

The mean blood pressure of all respondents including those who were on medication for hypertension was 131/80 mmHg. The proportion of respondents with systolic blood pressure (SBP) of 140 or more and/or diastolic pressure (DBP) of 90 or more including those currently on medication for hypertension was 37%, 33% and 35% for males, females and both sexes respectively. In addition, 16% of males, 15% of females and 15% of both sexes had blood pressure of 160/100 mmHg or more. A significant proportion of the respondents with blood pressure of 140/90 or more were not on medication (94% of males, 92% of females and 93% of all respondents). This could be due in part to the fact that a significant proportion of the respondents (64%) have never had their blood pressure measured. Furthermore, 37% of the known hypentensives were on antihypertensive drugs; with 14% on herbal or traditional remedy.

In summary, the proportion of respondents with 0 and 3-5 risk factors was 1.4% and 27% respectively; with no sex specific significant difference. The proportion of respondents aged 25-44 years with three or more risk factors was 23% with a significant male preponderance. In addition, 37% of the respondents aged 45-64 years had three or more risk factors with no sex specific significant difference.

Introduction

In 2002, WHO predicted that, by 2020, non-communicable diseases (NCDs) will account for 80% of the global burden of disease, causing seven out of every ten deaths in developing nations [1]. Now, at the dawn of the third millennium, NCDs appear to be sweeping the entire globe, with an increasing trend in developing countries [2]; accounting for 56% of all deaths in low- and middle-income countries [3]. The major NCDs include hypertension, cardiovascular diseases (CVDs), chronic pulmonary diseases, diabetes mellitus, obesity and cancers. These diseases are strongly associated with common lifestyle risk factors such as smoking, alcohol consumption, a diet rich in fats, sugars, and salts; and physical inactivity. They usually appear when a person reaches middle age, after years of living with unhealthy behaviours. These behaviours are often linked to modernization and urbanization and result in interrelated conditions like raised blood pressure and obesity. In sub-Saharan Africa the average age of death from CVDs is at least 10 years younger than in developed countries [4].

In 1999, the prevalence of hypertension was documented by Lisk *et al* (1999) in rural and urban Sierra Leone to be 14.7% and 23.4% respectively [5]. They further documented the prevalence of some of the risk factors of NCDs such as tobacco use, alcohol consumption and body mass index (BMI). Specifically they reported a prevalence of tobacco smoke (cigarette) and smokeless tobacco to be 21.7 and 17.7% respectively in both sexes; with a significantly higher male preponderance of 40.8% for tobacco smoke and 27.1 for smokeless tobacco; and a mean BMI of 20.6 for males and 22.6 for females. They also reported a prevalence of 42.8% and 35.5% for current alcohol consumption amongst their male and female subjects respectively. In a separate study by Ceesar *et al.,* (1997), prevalence rates of 0% and 2.4% for diabetes mellitus were documented in rural and urban Sierra Leone respectively; with a mean BMI of 22.8 for males and 25.9 for females [6]. In an earlier study conducted by Lisk (1994) in urban Sierra Leone on adults undergoing routine pre-employment clinical screening, hypertension was noted in 40 % of the subjects [7].

As NCDs contribute significantly to adult morbidity and mortality they will impose a heavy economic burden on individuals, families, communities and the health systems. Unfortunately, in our environment the burden of NCDs and their risk factors remain largely

unknown. Moreover, their potential to compound the already existing high mortality and low life expectancy figures within our resource-constrained health system in the not too distant future remains elusive. However, there are anecdotal evidences that the prevalence of these diseases particularly hypertension, CVDs, stroke, renal failure and diabetes mellitus are on the increase. Thus, with the current large burden of communicable diseases in Sierra Leone if the risk factors of the major NCDs are not prevented today, we will be faced with a double disease burden tomorrow. Therefore there is still a window of opportunity to control these risk factors at the population level if we are to avoid the double disease burden; as preventing risk factors today reduces the burden of NCDs tomorrow.

Most of the risk factors of NCDs can be avoided by adopting policies that discourage smoking and promote healthy eating and physical activity. However, such policies cannot be formulated if we do not determine the prevalence of these risks factors. Thus, the Ministry of Health and Sanitation recently established a Directorate of Non-Communicable disease which is tasked with the responsibility of determining the burden of NCDs and their risk factors; and setting up of a surveillance system to constantly monitor and report epidemiological patterns and trends in these diseases and their risk factors. In addition the NCD directorate shall coordinate and promote awareness of the population on NCDs and their risk factors; and facilitates the formulation and review of policies that will address the prevention and control of these diseases and their risk factors at all levels. It is against this background that the Ministry of Health and Sanitation through the NCD directorate proposed to conduct a nationwide survey to determine the prevalence of the risk factors of NCDs in Sierra Leone.

Goals and Objectives

The overall goal for undertaking the step survey is to generate data that will be utilized to:

a) formulate evidence-based policies and programs that will promote healthy lifestyle;
b) inform policy changes within the Ministry of Health and Sanitation so as to guide the ministry in allocating resources for the prevention and surveillance of the risk factors of NCDs;
c) establish and maintain a comprehensive surveillance system on NCDs and their risk factors; and

d) establish baseline levels of the risk factors of NCDs in the population and monitor future trends

The general objective of this study is to determine the prevalence of the common risk factors of NCDs in Sierra Leone.

The specific objectives include the determination of the sex and age specific prevalence of the risk factors of NCDs such as:

I. tobacco use
II. alcohol consumption
III. raised blood pressure
IV. unhealthy diet
V. physical inactivity
VI. Raised blood pressure
VII. Diabetes mellitus (history only

Scope

The scope of the survey included steps 1 and 2. Specifically, all core modules of step 1 which describe the basic demographic features and measures tobacco smoking, alcohol consumption, fruit and vegetable consumption and physical activity; and all expanded modules of step 1 which describe demographic breakdowns (e.g., ethnicity and employment status); collect information on ex-smokers and smokeless tobacco; capture information on drinking with meals and drinking in the past 7 days; collect information about oil and fat consumption and meals outside a home; capture sedentary behaviour; and describe blood pressure and diabetes history were done. Similarly, all core modules of step 2 which measure the height, weight, waist circumference and blood pressure of subjects; and all expanded modules of step 2 which measure hip circumference and heart rate were covered.

In future steps 1 and 2 will be conducted every 3-5 years and if resources permit step 3 which involves biochemical measurement of blood glucose and cholesterol will also be carried out.

Study Methods

Sampling Frame

The survey of NCDs risk factors was conducted nationwide. Thus, the sampling frame included all individuals resident in Sierra Leone. Currently Sierra Leone has a population of about six million. Administratively Sierra Leone is divided into 4 regions, 14 districts, 164 chiefdoms, 1289 chiefdom sections (CSs) and 9,672 enumeration areas (EAs); with the EAs containing an average of 85 households. The CSs, EAs and households were used as the primary, secondary and tertiary sampling units respectively.

Study Design

A cross sectional population based survey was conducted to determine the prevalence of the risk factors of NCDs. The population surveillance methods for NCDs as described in the manual of the WHO Stepwise approach to chronic diseases were used as a guide.

Inclusion Criteria

Individuals between the ages of **25-64** years of both sexes who are resident in the study area and willing to participate were recruited into this study.

Exclusion Criteria

Individuals between the ages of **0-24** and above **64** years, institutionalized individuals (e.g. those in motels, hotels, hospitals, student hostels, prisons etc.) and also non-permanent Sierra Leonean residents were excluded from this study.

Sampling Plan

The multi-stage cluster sampling strategy was used in this study. The CSs as demarcated by Statistics Sierra Leone (SSL) were used as the first set of clusters i.e. primary sampling unit (PSU). Hundred CSs were selected using the probability proportionate to size (PPS) sampling method. The CSs contain several EAs which served as the secondary sampling units. Five hundred and fifty EAs were selected from within the selected CSs by the PPS sampling method. At the tertiary stage, at least ten households were selected from each selected EA by using a simple random technique. Finally, one eligible respondent was selected from the

list all eligible respondents within a selected household using the Kish method as describe in the WHO stepwise approach to chronic diseases surveillance manual

Sample Size Determination.

Although the prevalence rate of hypertension has been previously documented in a sub-national survey in northern Sierra Leone by Lisk *et al*. (1999) to be 14.7 % and 23.4 % in rural and urban Sierra Leone respectively, these figures may not be representative of the current national situation. Thus we assumed that within 95% confidence level, the prevalence of the risk factors of NCDs is 50 %, with a design effect of 1.5. Taking into cognizance the 10 year age interval (i.e. 25-34, 35-44, 45-55 and 55-64) thereby giving the 8 age-sex estimates, and in anticipation of a 10% non-response rate, the estimated sample size was calculated to be 5,483 using the standard formula as recommended in the steps surveillance manual.

Data Collection

Data collection and questionnaire design

The WHO Stepwise approach to surveillance was adapted for this study focusing on the core and expanded modules of steps 1 and 2. The questionnaire was administered to one eligible individual within each selected household using the e-Step. Data was collected by direct face to face interviews through household visit using the standardized survey instrument, personal digital assistant (PDA). Prior to the collection of the data, the data collector explained to the interviewee the aim of the survey, his/her individual rights and confidentiality and the benefit of the survey to his/her community and the nation; and requesedt that he/she signs an informed consent form. In the event that the participant was not available for interview on the first day of visit, the data collector paid two additional visits after consultation with other members of the household before coding it for “non-interview”.

Preparation of Questionnaire and Quality Assurance

A three day consultative workshop was organized to finalize and adapt the questionnaire. The components of the questionnaire were extracted from the core and expanded modules of both steps 1 and 2 of the WHO Stepwise approach to surveillance manual. The questionnaire was modified appropriately without changing the original meaning of the

questions. It was ensured that all questions were simple, fair, clear and understandable to both the interviewer and respondent. Once the questionnaire was ready it was submitted to WHO/AFRO for programming into the PDAs. In order to ensure quality and reproducibility of the survey result, clearly defined standard steps survey procedures were observed. In addition, random checks by field supervisors, Survey Coordinator and re-interviewing the important questions from at least 5% of the respondents by different interviewers were done.

Selection of Interviewers

Selection

A total of 30 interviewers (21 years and above of both sexes) and 10 supervisors were recruited for the study; with an average of 3 interviewers per supervisor. They were college graduates and/or health care workers with great experience in data collection. Data collection was done in the month of November and it lasted for a maximum period of 5 weeks.

Training of Interviewers

In order to standardize the fieldwork, three (3) days training was conducted to prepare the interviewers and supervisors for their task. During the training they were taught interviewing skills and techniques and familiarized themselves with the e-step and the question-by-question instruction guide. Specifically they were trained to:

a. conduct interviews in the field and be able to administer the questionnaire appropriately;
b. use the PDAs effectively;
c. learn the skill of approaching the public, gaining consent, contact procedures, handling refusals;
d. learn interviewing techniques like asking questions in a non-judgemental manner, seek clarification, probe when necessary, provide feedback, record information, edit and check the PDA for its completeness;

e. identify and use the interviewer instructions and learn the use of show cards where appropriate;

f. take physical measurements in accordance with the laid down protocols; and

g. identify and refer respondents with raised blood pressure or other risks factors requiring medical attention to the nearest peripheral health unit (PHU) or hospital.

Data Entry and Analysis

The data was edited and coded as per the step surveillance manual and entered into the WHO recommended EpiData software version 3.1. The data was analyzed and graphed using the EpiInfo software version 3.4.3 and graph pad prism version 5.1 respectively.

Results

Demographics

A total number of 5.483 respondents of both sexes aged 25-64 years were recruited into the study. Four thousand nine hundred and ninety seven of these respondents completed the questionnaire for both steps 1 and 2 giving a non response rate of 9%. Of those who responded, 46% were males and 54% females (**Table 1**). The ethnic distribution of the respondents was as follows: 35% were mendes, 28% temnes and 3% creoles (**Figure 1).**

When the respondents were asked about the number of years they spent in full-time education (excluding preschool), a mean of 4.8 years was recorded for both sexes, 4.5 and 3.8 years for males and females respectively (**Table 2**). 55% of the respondents had no formal schooling of which 62% were females and 47% males. There was no significant difference in terms of postgraduate educational achievement between both sexes (**Figures 2)**.

With regards the marital status of respondents, 72% was currently married, with 1.2% divorced (**Figure 3**). 54% of the respondents were employed of which 5% were government employees, 4% non-government employees and 44% self employed. 46% of the respondents were recorded as unpaid which includes students, homemakers, retirees and unemployed. There was significant gender inequity amongst the employed (at least 2:1 male/female ratio). Of the unpaid respondents, 19% were unemployed with 5% unable to work, 40% business/traders, 35% homemakers, 3% volunteers and 3% retired (**Figure 4**).

Table 1: shows the age group and sex distribution of all respondents

Age Group (years)	**Men**		**Women**		**Both Sexes**	
	n	%	n	%	n	%
25-34	774	37.1	1310	62.9	2084	41.7
35-44	637	47.9	694	52.1	1331	26.6
45-54	514	54.7	425	45.3	939	18.8
55-64	358	55.7	285	44.3	643	12.9
25-64	**2283**	**45.7**	**2714**	**54.3**	**4997**	**100.0**

Figure 1: shows the ethic distribution of all respondents

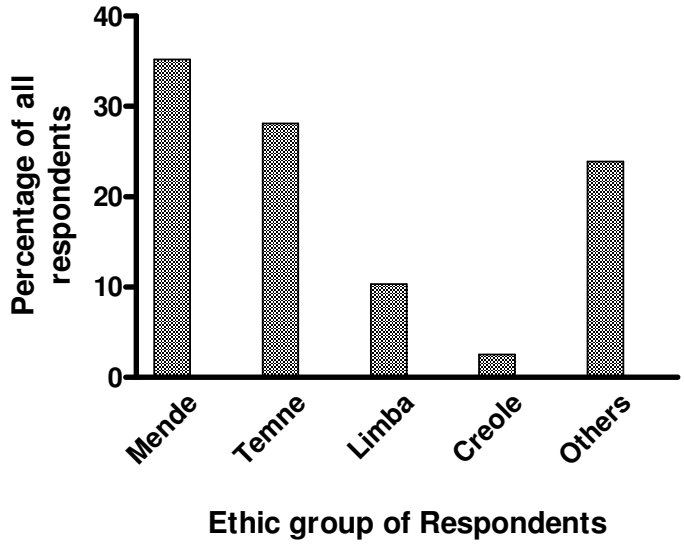


Table 2: shows the mean number of years of education among all respondents						
Age Group (years)	**Men**		**Women**		**Both Sexes**	
	n	Mean	n	Mean	n	Mean
25-34	701	6.5	1137	4.2	1838	5.1
35-44	565	6.1	576	3.8	1141	5.0
45-54	433	5.5	355	3.4	788	4.5
55-64	297	5.3	243	2.2	540	3.9
25-64	1996	4.5	2311	3.8	4307	4.8

Figure 2: shows the highest level of education achieved by all respondents

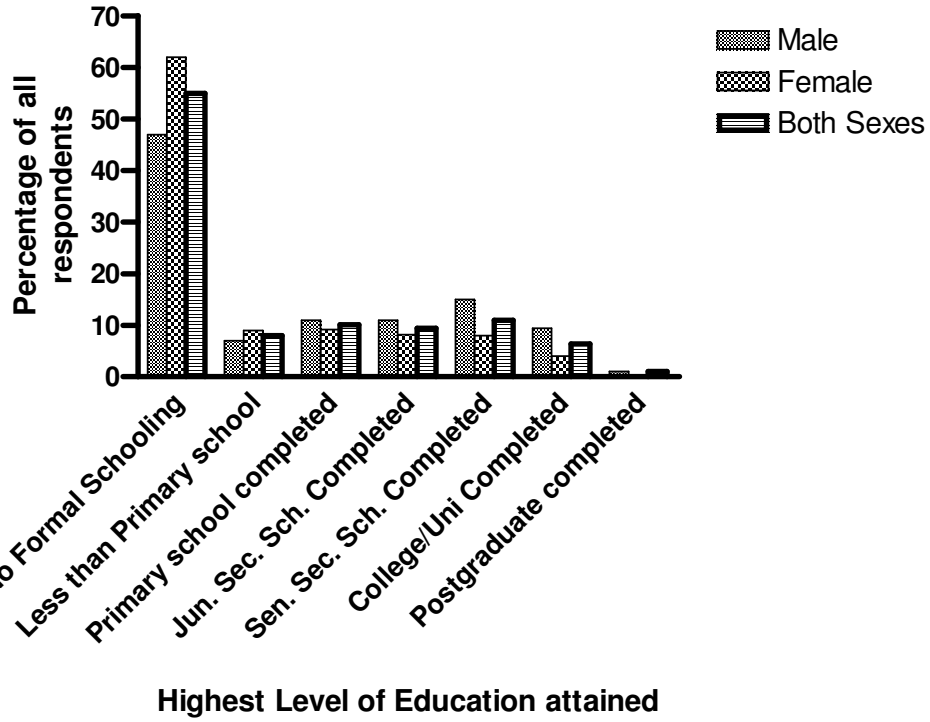


Figure 3: shows the marital status of all respondents

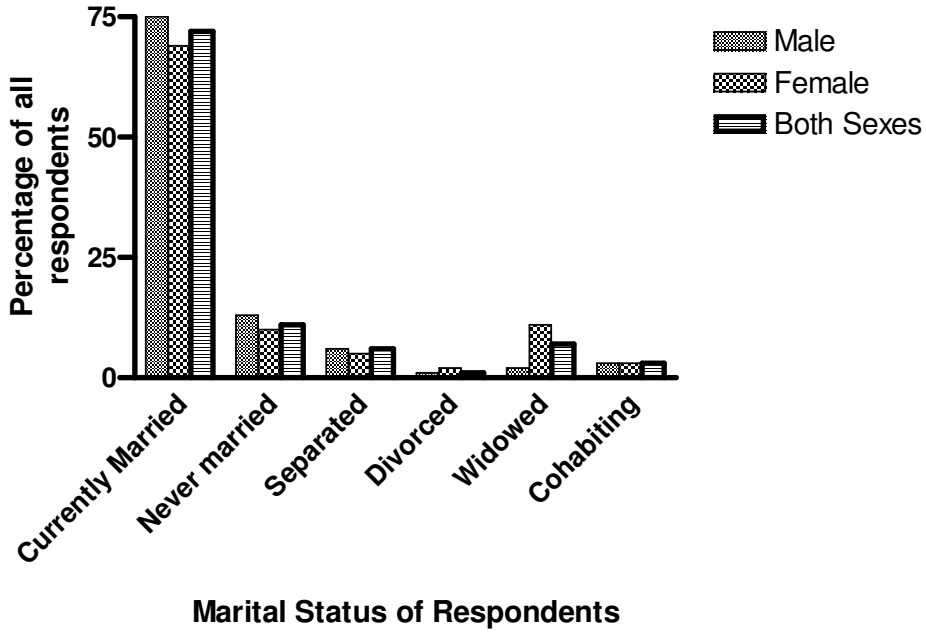
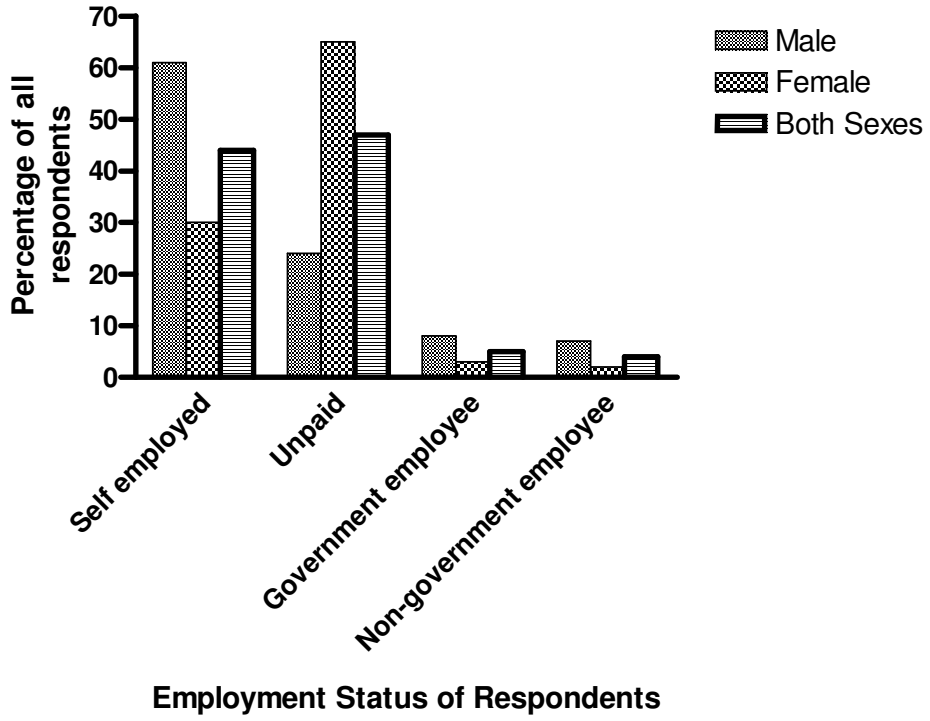


Figure 4: shows the employment status of all respondents



Tobacco Use

Tobacco Smoke

When the respondents were asked whether they currently smoke any tobacco products such as cigarettes, cigars or pipes of tobacco, 26% of the respondents (n=4987) answered in the affirmative, with a significantly high male preponderance (43% for males and 11% for females; *p<0.05*) (**Table 3A**). 23% of all respondents were daily smokers with a significantly high male preponderance (40% vs.8%) {**Table 3B**}. In both cases, there was no age group specific significant difference (*P<0.05*). Furthermore, of the total smoking population, 88% of both sexes were daily smokers (n= 1215), 92% of the male smoking population smoked daily (n=910) and 72% of the female smokers also smoked daily (n=305) (**Table 3C**). 92% and 96% of the male and female daily smokers used manufactured tobacco respectively (**Table 3D**).

Table 3A: Percentage of current smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% Current smoker	95% CI	n	% Current smoker	95% CI	n	% Current smoker	95% CI
25-34	774	**41.0**	34.7-47.3	1307	**10.3***	8.2-12.5	2081	**22.1**	18.8-25.4
35-44	637	**48.3**	41.4-55.2	692	**12.2***	8.3-16.1	1329	**29.3**	25.1-33.6
45-54	511	**42.9**	35.3-50.5	425	**10.0***	5.9-14.1	936	**28.3**	24.3-32.4
55-64	357	**39.2**	28.2-50.2	284	**7.5***	3.4-11.5	641	**26.1**	20.4-31.8
25-64	**2279**	**43.1**	**38.0-48.2**	**2708**	**10.5***	**8.4-12.5**	**4987**	**25.8**	**23.4-28.2**

*P<0.05 vs. Corresponding male age group.

Table 3B: Percentage daily smokers among current smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% daily smoker	95% CI	n	% daily smoker	95% CI	n	% daily smoker	95% CI
25-34	774	**37.8**	31.6-44.0	1307	**8.3***	6.2-10.4	2081	**19.6**	16.6-22.7
35-44	637	**44.4**	37.5-51.2	692	**7.3***	4.5-10.1	1329	**24.9**	21.0-28.8
45-54	511	**40.4**	33.3-47.6	425	**7.5***	4.2-10.9	936	**25.8**	21.7-29.9
55-64	357	**34.3**	24.2-44.4	284	**4.5***	1.6-7.4	641	**21.9**	16.3-27.5
25-64	**2279**	**39.5**	**34.5-44.5**	**2708**	**7.5***	**5.8-9.2**	**4987**	**22.5**	**20.2-24.9**

*P<0.05 vs. Corresponding male age group.

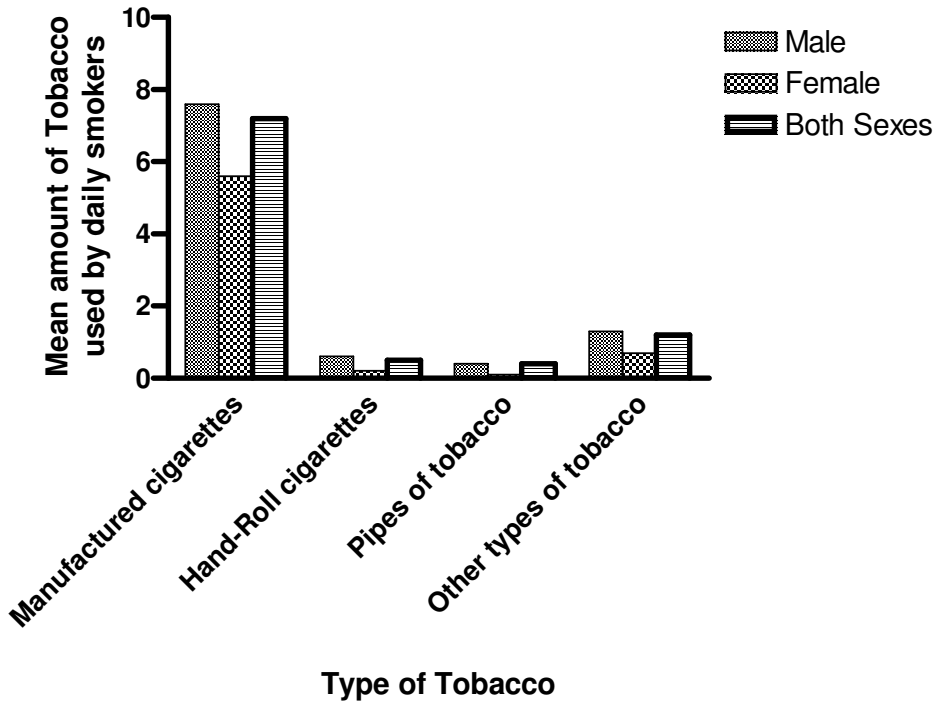
Table 3C: Percentage of current daily smokers among smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% daily smoker	95% CI	n	% daily smoker	95% CI	n	% daily smoker	95% CI
25-34	277	92.3	88.2-96.4	140	80.0	69.8-90.3	417	88.8	84.7-92.8
35-44	293	91.8	87.5-96.1	90	59.7	45.7-73.7	383	84.8	79.9-89.6
45-54	210	94.2	90.9-97.5	53	75.1	56.5-93.8	263	91.2	86.8-95.5
55-64	130	87.5	79.9-95.0	22	59.9	30.3-89.5	152	84.2	75.7-92.7
25-64	**910**	**91.8**	**89.6-94.0**	**305**	**71.6***	**61.9-81.2**	**1215**	**87.5**	**84.3-90.6**

Table 3D: Manufactured cigarette smokers among daily smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI
25-34	251	93.4	88.7-98.1	120	97.3	93.4-100.0	371	94.4	90.8-98.0
35-44	269	96.2	93.3-99.0	61	98.0	94.1-100.0	330	96.4	93.9-98.9
45-54	194	91.3	84.8-97.7	41	93.0	84.0-100.0	235	91.5	85.7-97.3
55-64	108	80.2	62.4-98.0	15	81.2	53.9-100.0	123	80.3	63.8-96.8
25-64	**822**	**91.7**	**87.8-95.7**	**237**	**95.7**	**92.0-99.4**	**1059**	**92.4**	**88.9-96.0**

The mean amount of manufactured cigarettes smoked daily by the daily smokers was 7.6, 5.6 and 7.2 for males, females and both sexes respectively (**Figure 5**). The mean age of starting smoking was 21 and 23 years for males and females respectively, and 21 years for both sexes. The mean duration of smoking was 19 years for males, 13 years for females and 18 years for both sexes.

The ex-daily smokers among all the respondents was 15% for males, 8% for females and 11% for both sexes; with a mean cessation period of smoking of 19.6, 19 and 19.4 years for males, females and both sexes respectively.

Figure 5: shows the mean amount of tobacco used by daily smokers by type



Smokeless Tobacco Use

When the respondents were asked whether they are current users of smokeless tobacco such as snuff or chewing tobacco, , 8% of all respondents (n=4987), 3% of males (n=2279) and 12% of females (n=2707) were found to be users of smokeless tobacco. (**Table 4A**). Of the 8% who were current users of smokeless tobacco, 7% were daily users (n=4987). Of the 3% current male users of smokeless tobacco, 2% were daily users (n=2279) and 11% of the

12% current female users of smokeless tobacco were daily users (n=2707) (**Table 4B**). The mean number of daily usage of smokeless tobacco by type is shown in **figure 6**. The ex-daily users of smokeless tobacco among all the respondents were 2% for males, 4% for females and 3% for both sexes.

In summary, 34% of the respondents were current tobacco users (both smoke and smokeless) and 29% were daily tobacco users (both smoke and smokeless) (**Figure 7**)

Table 4A: Percentage of current users of smokeless tobacco

Age Group (years)	Men			Women			Both Sexes		
	n	% Current users	95% CI	n	% Current users	95% CI	n	% Current users	95% CI
25-34	774	**1.0**	0.1-1.9	1307	5.6	3.0-8.2	2081	3.8	2.2-5.5
35-44	637	**2.5**	1.0-4.0	692	13.1	8.3-17.9	1329	8.1	5.6-10.5
45-54	511	**2.6**	0.5-4.7	425	14.8	9.8-19.9	936	8.0	5.5-10.6
55-64	357	**7.7**	3.6-11.9	283	33.7	25.5-41.9	640	18.5	13.6-23.3
25-64	**2279**	**2.9**	**1.8-4.1**	**2707**	**12.1**	**9.3-14.8**	**4986**	**7.8**	**6.1-9.4**

Table 4B: Percentage daily users of smokeless tobacco among current users

Age Group (years)	Men			Women			Both Sexes		
	n	% daily users	95% CI	n	% daily users	95% CI	n	% daily users	95% CI
25-34	774	0.9	0.0-1.8	1307	5.0	2.6-7.3	2081	3.4	1.9-4.9
35-44	637	1.0	0.2-1.9	692	12.2	7.7-16.7	1329	6.9	4.6-9.2
45-54	511	1.7	0.0-3.4	425	12.6	7.9-17.4	936	6.6	4.1-9.0
55-64	357	6.4	2.8-10.1	283	28.4	19.7-37.1	640	15.5	10.9-20.2
25-64	**2279**	**2.1**	**1.0-3.1**	**2707**	**10.6**	**8.1-13.1**	**4986**	**6.6**	**5.1-8.1**

Figure 6: shows the mean number of usage of smokeless tobacco by type

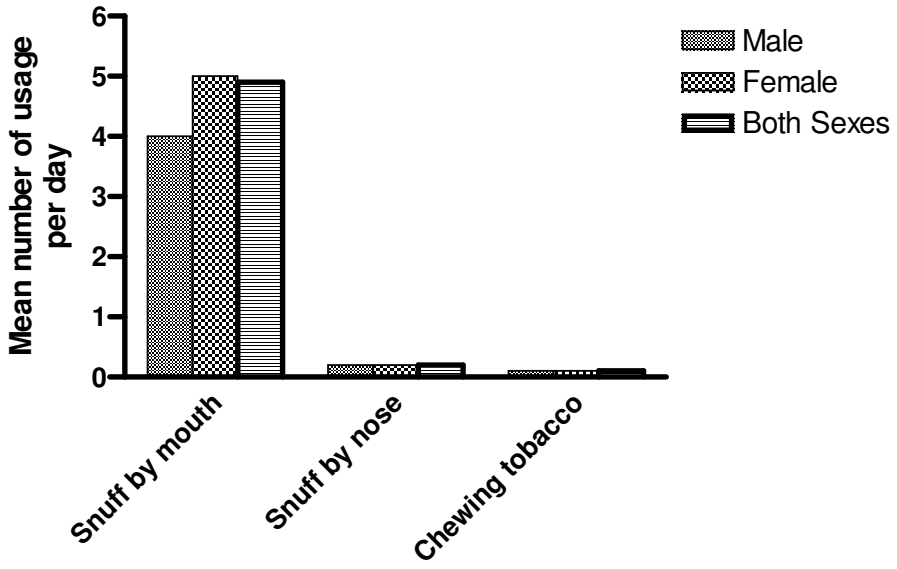
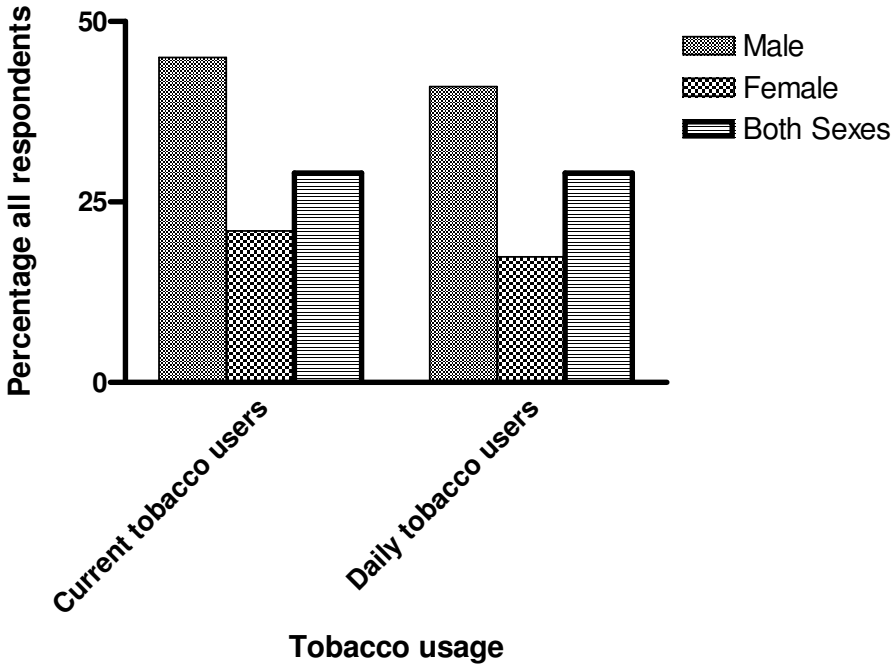


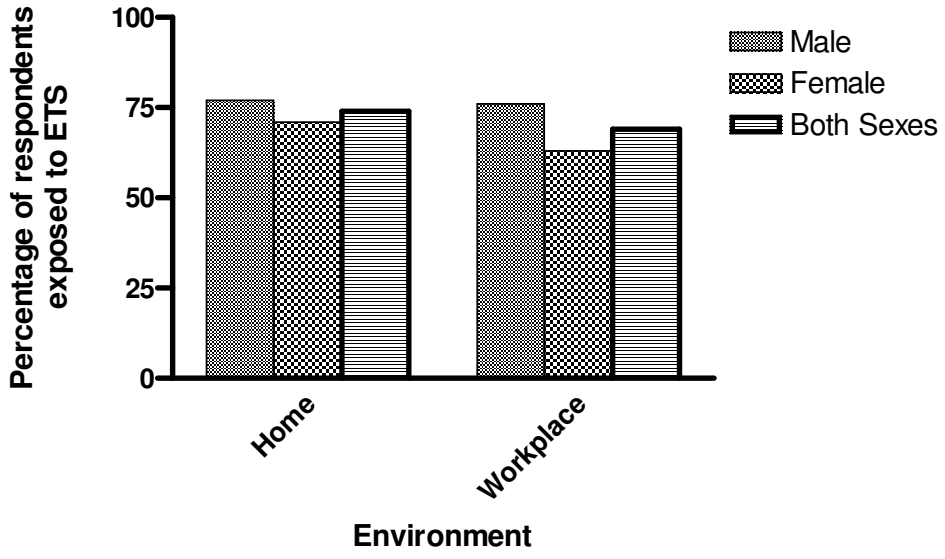
Figure 7: shows the percentage of current and daily tobacco (both smoke and smokeless) users



Environmental Tobacco Smoke

When the respondents were asked whether they were exposed to environmental tobacco smoke (ETS) in the home or at workplace on one or more days in the past 7 days, 74% and 69% of the respondents were exposed to ETS at home and workplace respectively (**Figure 8**).

Figure 8: shows the percentage of respondents exposed to ETS on one or more days in the past 7 days at home or workplace.



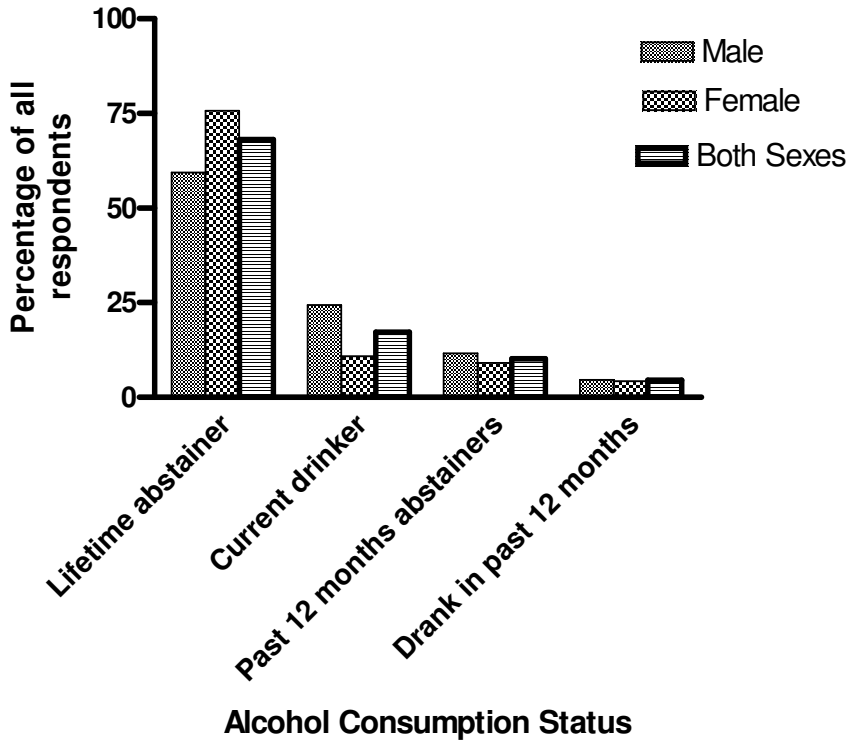
Alcohol Consumption

Alcohol consumption status

When the respondents were asked whether they have consumed any alcoholic drinks such as beer, omole or whisky, in the past 30 days (current drinkers), 17% of both sexes (n=4985), 24% of males (n=2279) and 11% of females (n=2706) answered in the affirmative. There was a sex specific significant difference ($p<0.05$) between the proportion of the current drinkers (**Figure 9**). On the other hand, there was no age group specific significant difference in the proportion of current drinkers of both sexes ($P>0.05$); except the 25-34 and 35-44 years age groups within the female respondents ($P<0.05$). For lifetime abstainers, 76% and 59% of the female and male respondents had never consumed alcoholic drinks respectively. Although a

sex specific significant difference (P<0.05) was noted within this category there was no age group specific significant difference within both sexes (**Figure 9**).

Figure 9: shows the alcohol consumption status of the respondents



P<0.05 vs. males

Current Drinkers

The survey also assessed the average number of drinking occasions and standard drinks consumed per occasion among the current drinkers (those who drank in the past 30 days). The mean number of drinking occasions among the current drinkers was 15, 9 and 14 for males (n=383), females (n=204) and both sexes (n=587) respectively; with an average number of standard drinks per drinking occasion being 6.4, 5 and 6 for males, females and both sexes respectively. In addition, the largest number of alcoholic drinks (counting all types of alcoholic drinks together) consumed during a single drinking occasion by the current drinkers was on average 8, 5 and 7 for males, females and both sexes respectively. Furthermore, the mean number of times on which the current drinkers drank five (for males)/4 (for females) or more alcoholic drinks during a single drinking occasion was 3 for

males and 2 for females. There was no age group or sex specific significant difference noted among the current drinkers for all these parameters (P>0.05).

The current drinkers were also asked on the frequency and quantity of alcoholic drinks they consumed in the past seven days. It was noted that 53%, 36% and 47% of the males, females and both sexes drank alcohol on 4 or more days in the past 7 days respectively. The proportion of males who drank 5 or more alcoholic drinks within this period was 19% and females who drank 4 or more alcoholic drinks was 15%. The proportion of males who drank 20 or more drinks in the past seven days was 17% and females who drank 15 or more drinks was 9%. There was no age group or sex specific significant difference (P>0.05) in all three parameters (**Tables 5A-5C**).

Table 5A: Frequency and quantity of drinks consumed in the past 7 days by current drinkers

	Men						
Age Group (years)	n	% Drank on 4+ days	95% CI	% 5+ drinks on any day	95% CI	% 20+ drinks in 7 days	95% CI
25-34	147	51.8	39.2-64.3	14.5	5.3-23.8	15.2	5.6-24.9
35-44	136	50.6	36.3-64.8	19.7	11.9-27.6	15.3	7.9-22.7
45-54	108	64.1	51.5-76.6	27.5	14.0-40.9	23.6	13.4-33.9
55-64	53	44.8	23.8-65.9	11.0	1.3-20.7	10.0	0.0-20.2
25-64	**444**	**53.3**	**45.8-60.8**	**18.6**	**12.4-24.7**	**16.5**	**10.8-22.1**

Table 5B: Frequency and quantity of drinks consumed in the past 7 days by current drinkers

	Women						
Age Group (years)	n	% Drank on 4+ days	95% CI	% 4+ drinks on any day	95% CI	% 15+ drinks in 7 days	95% CI
25-34	90	50.2	31.0-69.4	13.3	2.5-24.1	3.2	0.0-7.5
35-44	73	36.1	15.9-56.3	24.4	7.4-41.3	16.2	0.0-33.2
45-54	46	16.4	1.7-31.1	4.8	0.0-11.0	1.6	0.0-5.0
55-64	22	36.1	9.8-62.4	5.2	0.0-15.8	7.0	0.0-17.7
25-64	**231**	**35.9**	**25.4-46.5**	**15.3**	**5.4-25.1**	**8.5**	**0.5-16.6**

Table 5C: Frequency and quantity of drinks consumed in the past 7 days by current drinkers			
Age Group (years)	Both Sexes		
	n	% Drank on 4+ days	95% CI
25-34	237	51.3	38.8-63.7
35-44	209	44.2	29.8-58.6
45-54	154	47.8	32.2-63.4
55-64	75	42.3	23.7-60.9
25-64	**675**	**47.0**	**39.1-55.0**

The average volume drinking categories among current (past 30 days) drinkers was also recorded and is presented as the percentage of current drinkers engaged in categories I, II and III drinking. Category III drinking is defined as consumption of 60 g or more of pure alcohol on average per day for men and 40 g or more for women. Category II is drinking 40-59.9 g of pure alcohol on average per day for men and 20-39.9 g for women; and Category I is the consumption of less than 40 g of pure alcohol on average per day for men and less than 20 g for women. A standard drink contains approximately 10 g of pure alcohol. Significantly higher male and female current drinkers were engaged in category I drinking. In all three categories there was no age group specific significant difference in the drinking pattern of both sexes (**Figure 10**). The average volume drinking categories among all respondents who drank alcohol in the past 30 days was also recorded and is shown in **figure 11**.

Furthermore the current drinkers were asked whether they usually, sometimes, rarely or never consumed alcoholic drinks with meals. It was noted that 50% of males, 44% of females and 48% of both sexes never drank with meal. The proportion of the current male drinkers who never drank with meals was significantly higher ($P<0.05$) than those who usually drink with meals (**Figure 12**).

Figure 10: shows Percentage of current drinkers engaged in Category I, II and III drinking

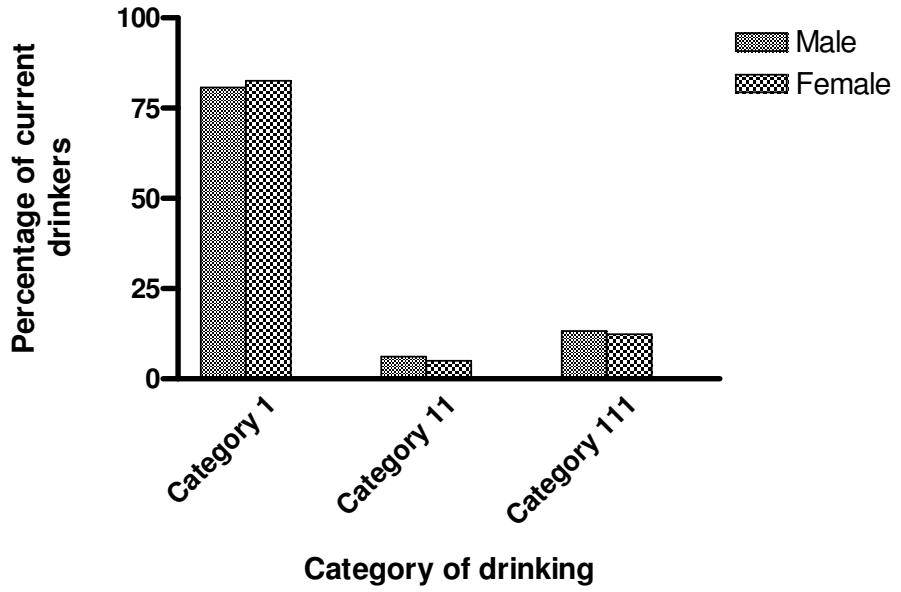


Figure 11: shows the Percentage of all respondents engaged in Categories II and III drinking

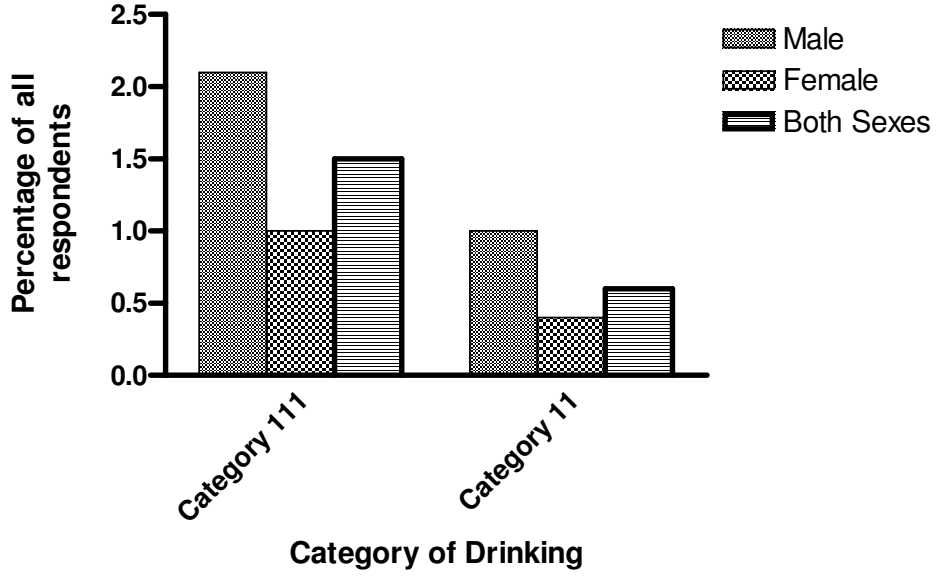
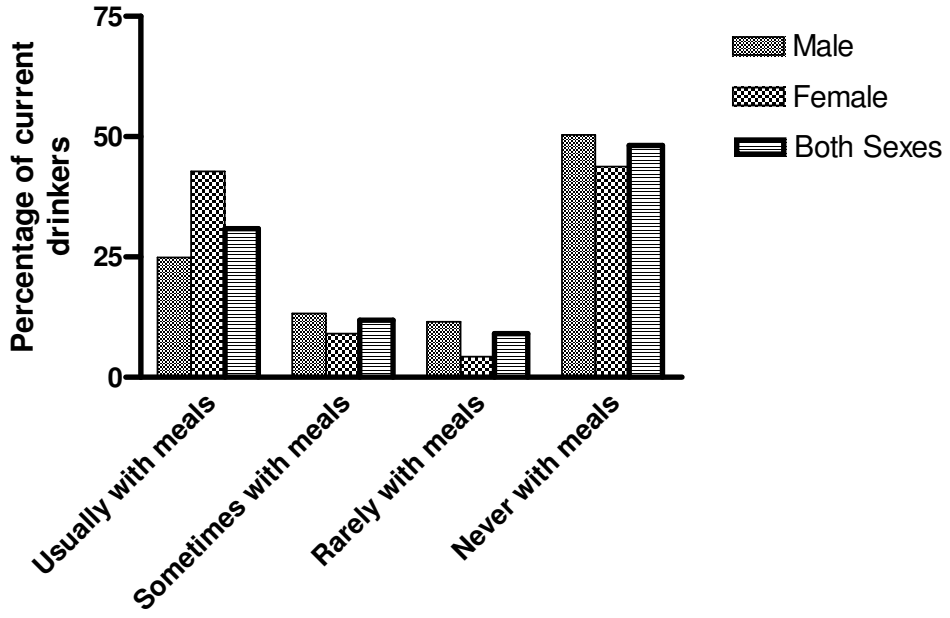


Figure 12: shows Percentage of current (past 30 days) drinkers who usually, sometimes, rarely or never drink with meals



Drinking with meals among current drinkers

Heavy episodic drinkers

The study also determined the percentage of all respondents who were engaged in heavy episodic drinking by asking them how many times they drank 5 (for males)/ 4 (for females) or more alcoholic drinks in the past 30 days during a single occasion. 14% of the males (n=2279) and 5% females (n=2705) answered in the affirmative. Although there was no age group specific significant difference (P>0.05) noted within each sex, a significantly higher male preponderance (P<0.05) was noted in the 25-34, 35-44 and 25-64 years age groups (**Table 6**).

Non-Current Drinkers

The percentage of respondents who drank alcoholic drinks in the past 12 months (non-current drinkers) was 5, 4 and 5% for males, females and both sexes respectively (**Figure 9**). The percentage of these respondents who consumed at least one alcoholic drink in the past 12 months daily was 28% for both sexes, with a significantly higher male preponderance (35% vs. 18%; *P<0.05*). Conversely, there was a significantly higher proportion of females

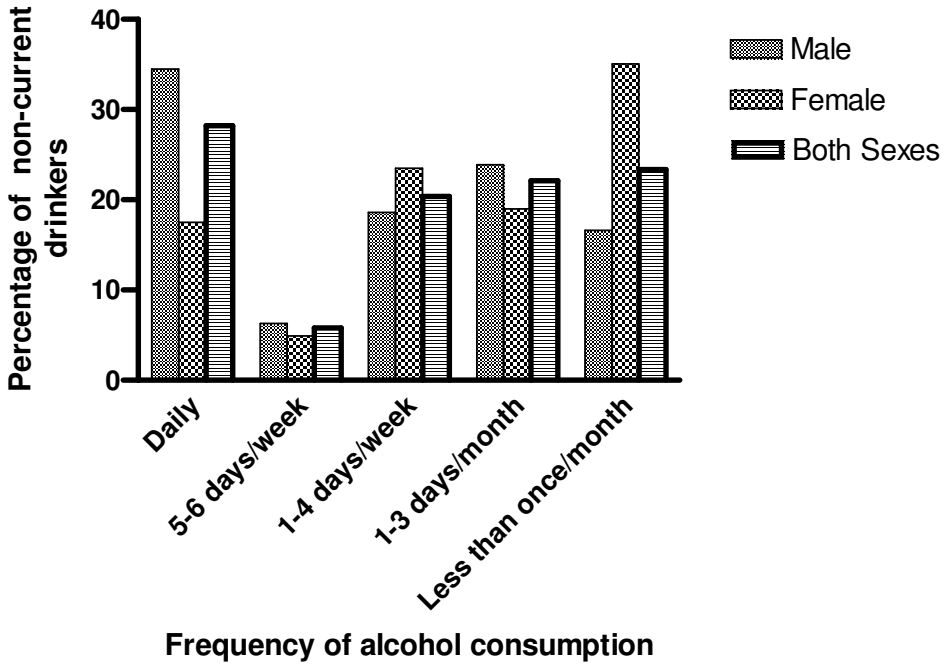
compared to males (35% vs. 17%; P<*0.05*) who drank alcohol less than once a month among these respondents (**Figure 13**).

Table 6: shows the percentage of men who had five or more/women who had four or more drinks on any day in the past 30 days during a single occasion among the total population.

Age Group (years)	Men			Women		
	n	% ≥ 5 drinks	95% CI	n	% ≥ 4 drinks	95% CI
25-34	774	13.7	8.9-18.4	1306	3.5*	1.9-5.1
35-44	637	17.2	11.9-22.5	691	7.1*	3.6-10.7
45-54	511	13.6	9.5-17.8	425	6.7	1.4-12.0
55-64	357	11.8	6.2-17.5	283	5.5	1.8-9.2
25-64	**2279**	**14.3**	**10.8-17.8**	**2705**	**5.2***	**3.2-7.1**

P<0.05 vs. the corresponding male age group.

Figure 13: shows the frequency of alcohol consumption in the past 12 months among Non-current drinkers

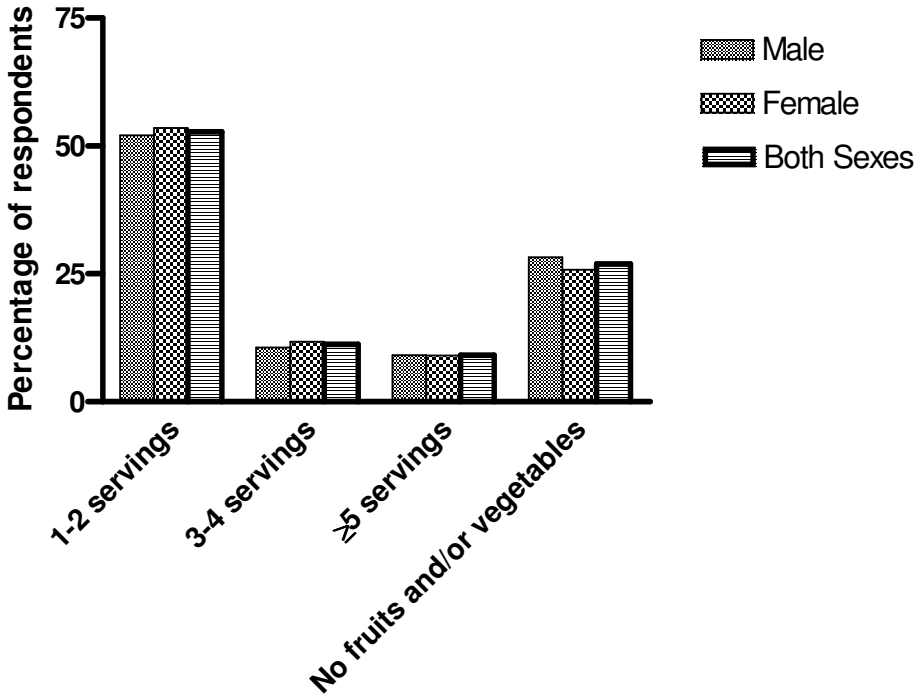


P<0.05vs.males

Fruits and Vegetables consumption

The average number of days fruits and vegetables were consumed in a typical week by all respondents was determined. In a typical week the mean number of days fruits were consumed was 3.3, 3.5 and 3.4 for males, females and both sexes respectively. Similarly, the mean number of days vegetables was consumed by males, females and both sexes was 4.2, 4.3 and 4.2 respectively. The mean number of servings of fruits and/or vegetables on average per day was 2.5 for males, 2.4 for females and 2.4 for both sexes; with 1.5 servings of fruits for each sex and 1.3 and 1.2 servings of vegetables for males and females respectively. A significant proportion ($P<0.05$) of the respondents had 1-2 servings of fruits and/or vegetables compared to those who had 3-4, ≥5 or no servings (**Figure 14**).

Figure 14: shows the percentage of respondents per number of servings of fruits and/or vegetables on average per day



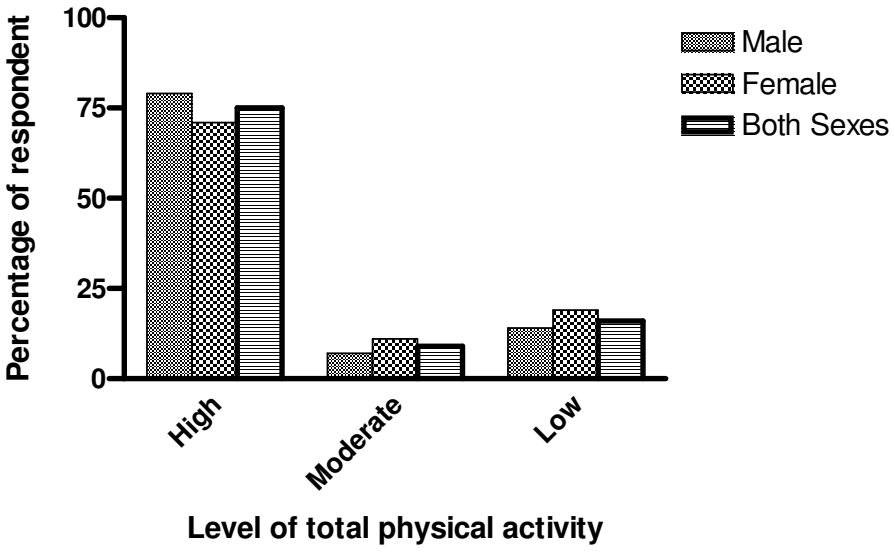
The Percentage of respondents who had less than 5 servings of fruit and/or vegetables on average per day was 91% for each sex. In all of these cases there was no age group or sex specific significant difference ($P>0.05$). In addition 92%, 4% and 1% of households (n=4984)

used palm oil, palm kernel oil and vegetable oil to prepare their meals respectively. On average the number of meals eating outside homes per week was 2.3, 1.7 and 1.9 for males, females and both sexes respectively.

Physical activity

When the respondents were categorized according to the three levels of total physical activity suggested for classifying populations, a significant proportion was found to be engaged in high physical activity; where as 14% and 19% of males and females were found to be engaged in low physical activity respectively. There was no sex specific significant difference (P>0.05) between respondents engaged in all three categories of total physical activity (**Figure 15**). However there was a statistical significant difference (P<0.05) between the proportion of the 55-64 years old respondents and the younger age groups engaged in both high and low physical activities within each sex.

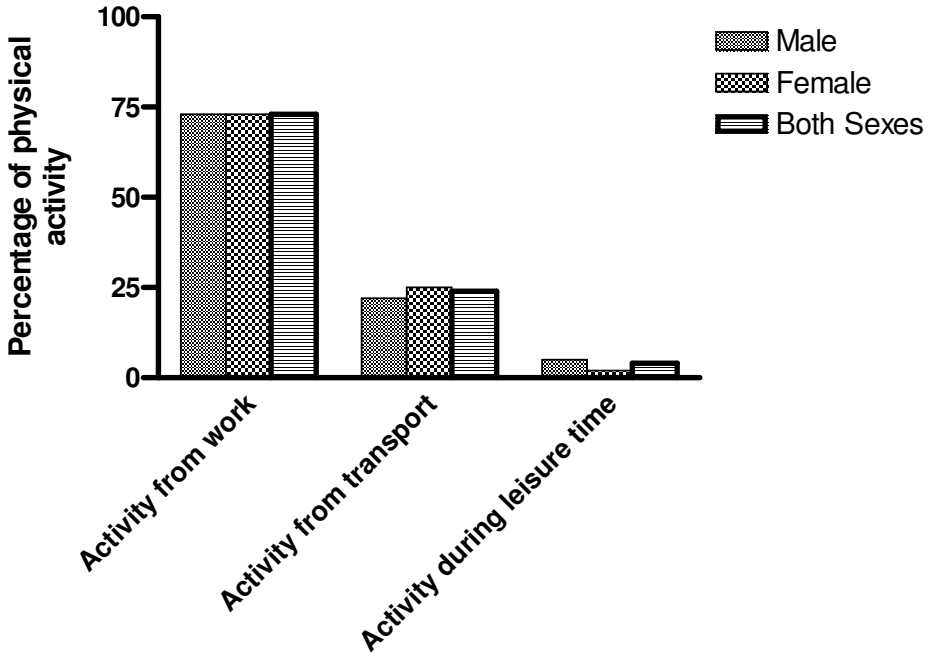
Figure 15: shows the percentage of respondents classified into the three categories of total physical work.



The composition of the total physical activity was computed from activity -from work, for transport and during leisure time as shown in **figure 16.** A significantly high proportion of the respondents were engaged in physical activity from work (73% for both sexes), followed

by transport-related activity. Moreover, a significant (P<0.05) proportion of males were engaged in leisure-related activity than females (5.3% vs. 2.0%). However, there was no age group specific difference (P>0.5) in all three forms physical activity within each sex.

Figure 16: shows the percentage of respondents engaged in the three different forms of total physical activity.



Composition of total physical exercise

The mean and median times spent on total physical activity were 291 and 244 minutes for both sexes respectively; with a significantly longer time spent by males compared to females {329 vs. 255 mean minutes; and 300 vs. 215 median minutes} (Figure 17 A & B). Both mean and median times spent on total physical activity by the 55-64 years age group within each sex was found to be significantly lower than that spent by the younger age groups (P<0.05). Furthermore, the mean and median time spent on work-related physical activity on average per day by both sexes was significantly longer, followed by the time spent on transport-related physical activity (**Figures 17 A & B**). With the exception of the 55-64 years age groups within both sexes, there was no age specific significant difference in both the mean and median time spent on work-, transport- and recreational-related physical activity.

Figure 17A: shows the Mean minutes spent in work-, transport- and recreation-related physical activity on average per day

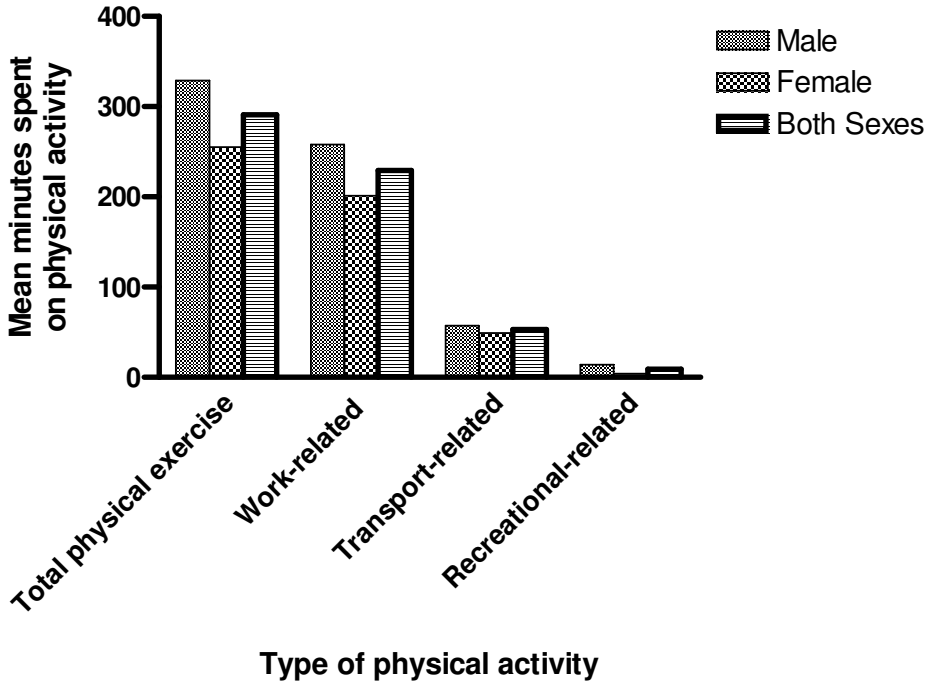
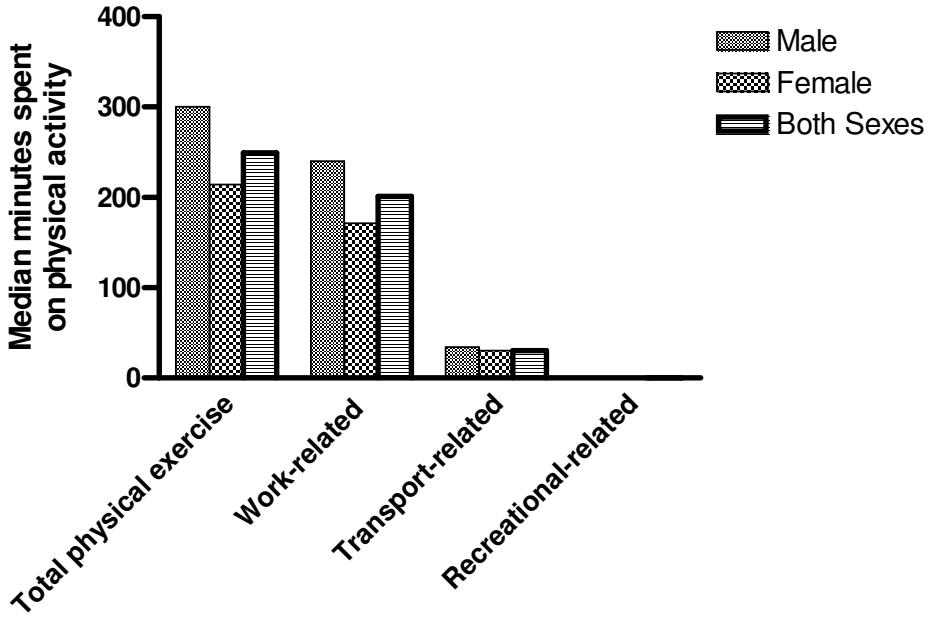
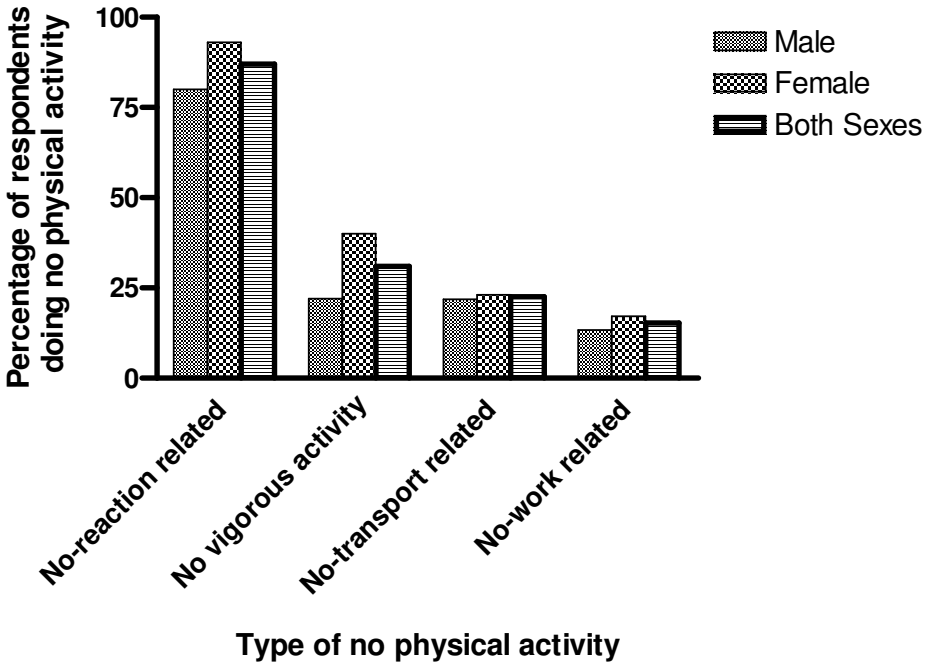


Figure 17B: shows the Median minutes spent in work-, transport- and recreation-related physical activity on average per day



The study further examined the percentage of respondents who were not engaged in work-, transport-or recreational- related or no vigorous physical activity. It was noted that a significant proportion (87%) of the respondents were not engaged in any recreational physical activity; with a significant female preponderance (93% vs. 80%). Similarly, a significant proportion ($P<0.05$) of females were not engaged in any vigorous activity compared to males (40% vs. 22%). However, there was no sex specific significant difference ($P>0.05$) between the proportion of respondents not engaged in work- or transport-related physical activity. Although there was no age group specific significant difference in the proportion of respondents not engaged in transport-related physical activity within both sexes ($P>0.05$), the proportion of the 55-64 years old was significantly ($P<0.05$) higher than the younger age groups within the male respondents (**Figure 18**). On average the respondents spent a mean and median times of 122 and 60 minutes per day on sedentary activities respectively; with no sex or age specific significant difference ($P>0.05$).

Figure 18: Percentage of respondents classified as doing no work-, transport- or recreational-related physical activity or engaged in no vigorous physical activity



History of raised blood pressure and diabetes

The scope of the survey also included expanded modules of step 1 such as history of raised blood pressure and diabetes. It was found that 64% of all respondents have never had their blood pressure measured; with no age specific difference, but males accounted for a significant proportion (71% vs.57%; P<0.05%). There was however no sex or age specific significant difference (P>0.05) of respondents whose blood pressures were measured but normal and those who were diagnosed within and beyond the past 12 months (**Figure 19**). Thirty seven percent of the known hypentensives were currently on antihypertensive drugs prescribed by a either doctor or health worker; with no age or sex specific significant difference. Furthermore, 19% of the known hypertensives were seen by a traditional healer with 14% currently on herbal or traditional remedy for their raised blood pressure. In addition, there was no sex or age specific significant difference between the proportions of respondents with raised blood pressure who were on lifestyle advice for their blood pressure by either a doctor or health care worker (**Figure 20**).

Figure 19: Blood pressure measurement and diagnosis among all respondents

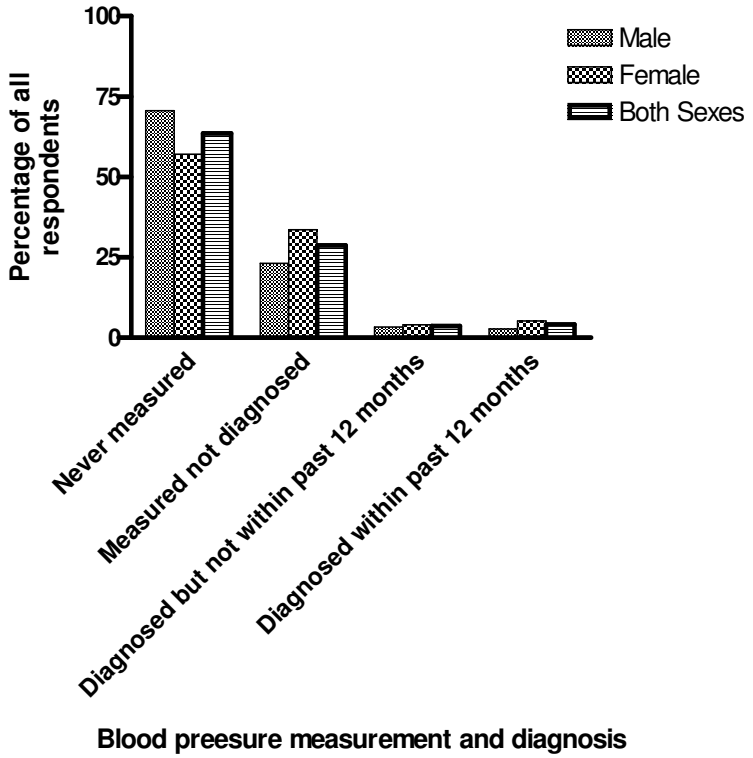


Figure 20: shows percentage of hypertensives on lifestyle advice by a doctor or health worker

With regards blood glucose measurement, a significant proportion of all respondents (96%) have never had their blood glucose measured. There was no age or sex specific significant difference among respondents whose blood glucose was- never measured, measured but non-diabetic, measured and diagnosed within and beyond past 12 months (**Figure 21**). 42% and 63% 0f the known diabetics were currently on insulin and oral hypoglycaemic drugs respectively. 21% of the diabetics were been seen by traditional healer with 7% currently taking herbal or traditional remedy for their blood glucose. The proportion of diabetics who were on diabetic lifestyle advice is shown in **figure 22**.

Figure 21: Blood glucose measurement and diagnosis among all respondents

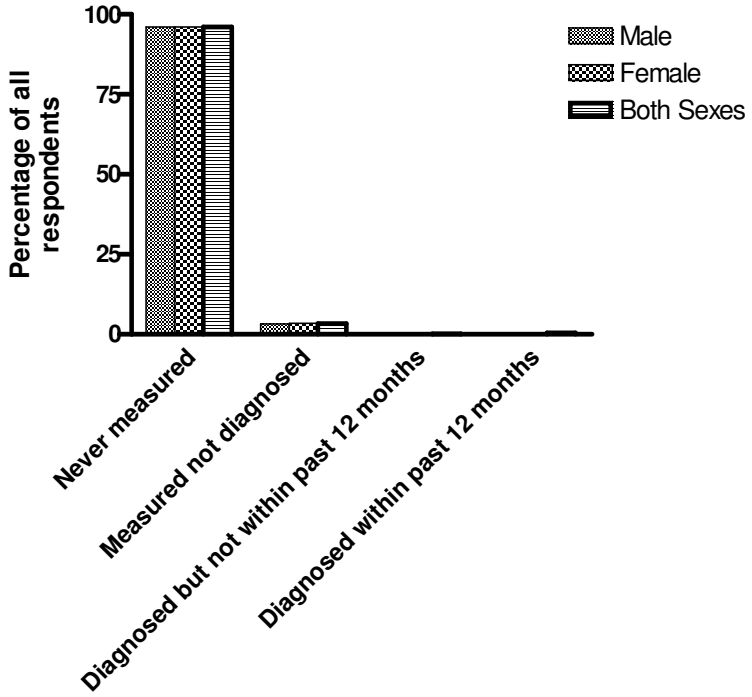


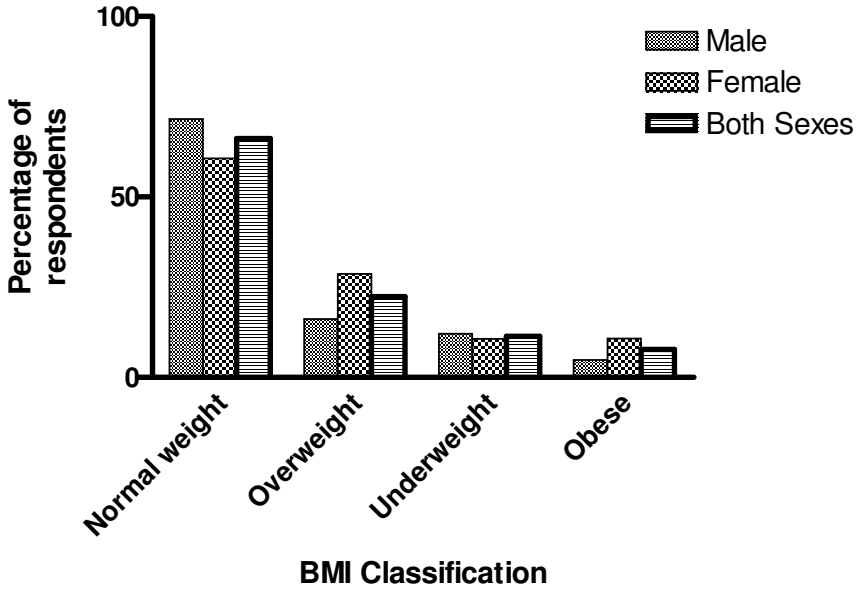
Figure 22: shows percentage of diabetics on lifestyle advice by a doctor or health worker

Physical Measurements

The mean weight and height of all male respondents was 62 kg and 166 cm respectively and that for all female respondents was 59 kg and 158 cm respectively. Although there was sex specific significant difference ($P<0.05$) in the height of the respondents, no age group specific significant difference ($P>0.05$) was noted in both weight and height among both sexes.

The mean BMI of all respondents was 23.1; with males and females having an average BMI of 22.4 and 23.7 respectively. A significant proportion of respondents had normal BMI (18.5-24.9) with a high male preponderance (72% vs. 61%; *P<0.05*). Respondents with BMI of 25 or more were classified as overweight. 22% of all respondents were overweight with a significant proportion being females (29% vs. 16%). In addition, 5%, 11% and 8% of males, females and both sexes respectively were classified as obese (BMI≥ 30). Although there was no age-group specific difference among respondents who were overweight and/or obese, a significant proportion ($P<0.05$) of females were found to be overweight and/or obese compared to males (**Figure 23**).

Figure 23: Percentage of respondents (excluding pregnant women) in each BMI category.



The mean blood pressure of all respondents including those who were on medication for hypertension was 133/80, 129/81 and 131/80 mmHg for males, females and both sexes respectively. The proportion of respondents with systolic blood pressure (SBP) of 140 or more and/or diastolic pressure (DBP) of 90 or more including those currently on medication for hypertension was 37%, 33% and 35% for males, females and both sexes respectively. In addition, 16% of males, 15% of females and 15% of both sexes had blood pressure of 160/100 mmHg or more. A significant proportion of the respondents with blood pressure of 140/90 or more were not on medication (94% of males, 92% of females and 93% of all respondents).

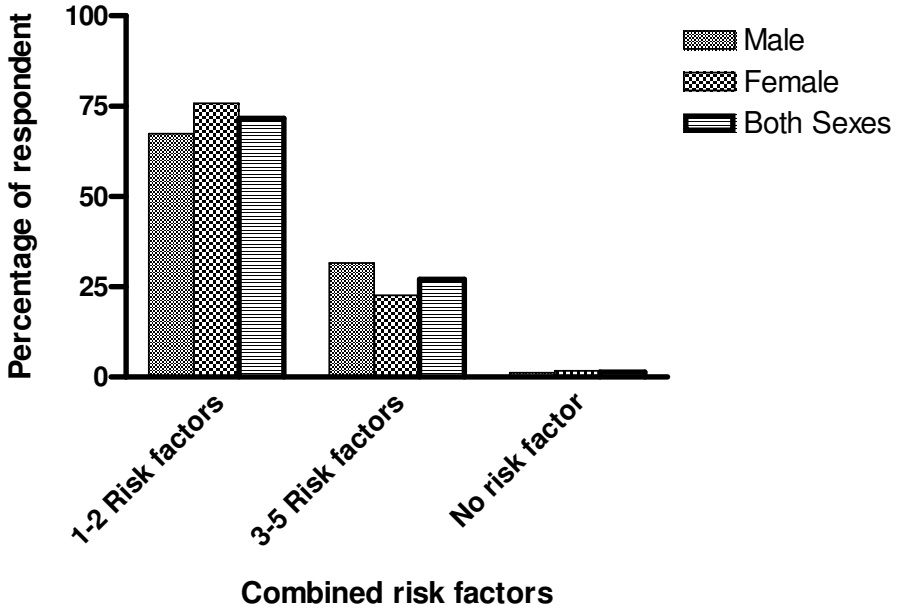
Summary of Combined risk factors

The Percentage of respondents with 0, 1-2, or 3-5 of the risk factors listed below was computed and is shown in **figure 24**:

- current daily smoker
- less than 5 servings of fruits and vegetables per day
- low level of activity (<600 MET -minutes)
- overweight or obese (BMI ≥ 25 kg/m^2)
- raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised BP).

The proportion of all respondents with 3-5 risk factors was 27% with no sex specific significant difference (32% for males vs. 23% for females; P>0.05). The proportion of respondents aged 25-44 years with three or more risk factors was 23% with a significant male preponderance (27% vs. 19%; P<0.05). Furthermore, 37% of the respondents aged 45-64 years had three or more risk factors with no sex specific significant difference (40% for males vs. 34% for females, P>0.05).

Figure 24: Percentage of respondents with 0, 1-2, or 3-5 of the following risk factors



Discussion

Demographics

A total of 5,483 respondents of both sexes were recruited into the current study with a response rate of 91%. The majority of the respondents were mendes followed by temnes and limbas. Fifty–five percent of the respondents had no formal schooling with a significant proportion being females. A significant proportion of the respondents were married. In addition, a small proportion of the respondents were either government employees (5%) or non-government employees (4%); with the rest being either self employed (44%) or unpaid (46%).

The high no formal schooling rate confirms the high level of illiteracy in our population. Thus, health promotion messages on lifestyle changes should be done in the common local languages and also designed according to the educational level of the population. As marriage couples are less likely to indulge in risky behaviours such as alcohol abuse and/or substance misuse, peer education on healthy living and lifestyle changes as well as community and home management of chronic diseases should be promoted among marriage couples. With the low employment rate NCDs policies addressing lifestyle changes or healthy living should not be limited to work places but rather promote population based interventions. In addition, favourable policy which supports the unpaid in terms of access to health care should be promoted.

Tobacco use

The study also revealed that 34% of the respondents do currently use tobacco products with 26% engaged in smoking tobacco products such as cigarettes, cigars or pipes of tobacco; and 8% smokeless tobacco. Significant higher male respondents were both current tobacco smokers (43% vs. 11%) and daily smokers (40% vs. 8%) as compared to females; with no age group specific significant difference. The average age of commencing tobacco smoking was 21 years; with 92% and 96% of the male and female daily smokers smoking at least six manufactured tobacco respectively. 74% and 69% of the respondents were exposed to ETS at home and workplace respectively.

The sex specific significant difference in both current tobacco smoke and daily smoking documented in this study is similar to reports from other countries such as Ethiopia, Benin, Cote d'Ivoir, and Swaziland. It is also in agreement with a previous sub-national report by Lisk and colleagues in rural and urban Sierra Leone [5]. Although the current study did not look into the outcomes of smokeless tobacco and tobacco smoke, smoking has been associated with a high risk of multiple cancers particularly lung cancer [8], malnutrition and premature death [9-11]. Tobacco smoke also increases the risk of heart disease, stroke and chronic obstructive pulmonary disease (COPD). Moreover, lip, tongue and mouth cancers are known to be highly prevalent among people who chew tobacco. Also, although pregnant women were excluded from this survey, smoking in pregnancy is associated with intrauterine growth retardation, spontaneous miscarriages and low birth weight babies [8]. Thus, NCDs policy should address smoking in pregnancy. Since a significant proportion of smokers smoked at least six manufactured tobacco daily, government should levy high import taxes on tobacco products to serve as a deterrent to manufactured tobacco smoke.

The risk of acute coronary disease and chronic respiratory disorders is increased by 25-30% in non-smokers exposed to ETS [12]. Moreover, the risk of contracting lower respiratory tract infections, middle ear infections and sudden infant death syndrome increases in small children whose parents smoke at home [13]. Since a significant proportion of the respondents (at least 69%) were exposed to ETS either at home or workplace, NCDs policy discouraging smoking at home, workplace or public places should be adopted. Apart from the health hazards of tobacco smoke, it can also pose serious economic burden on individuals and families. Several studies have documented that as much as 10% of the total household's expenditure in some low-income countries is on tobacco [9-11] Although this was not verified in this study it may not be far from what is obtained in Sierra Leone as on average about six manufactured tobacco is smoked daily by the smoking population.

Alcohol consumption

The proportion of respondents who currently drink alcohol such as bear, whisky, omole or local beverages (i.e. those who drank alcohol in the past 30 days prior to the survey), is 17% with a significant high male preponderance. On the other hand significantly high female

respondents are lifetime abstainers. In addition, a significant proportion of the 17% current drinkers who consumed alcohol on 4 or more days in the past 7 days prior to the survey were males. 19% of the male and 15% of the female current drinkers had 5 or more- and 4 or more- alcoholic drinks during this period respectively. The proportion of males who drank 20 or more drinks in the past seven days was statistically similar to females who drank 15 or more drinks. Moreover, a significant proportion of the current drinkers were engaged in category I drinking and most of them never or sometimes drank with meals. Furthermore, 5% of the respondent drank alcohol in the past 12 months prior to the survey. Among this latter group a significantly higher male respondents consumed at least one alcoholic drink daily. Finally, 14% and 5% of all male and female respondents were engaged in heavy episodic drinking respectively (i.e. men who had 5 or more and women who had 4 or more alcoholic drinks on any day in the past 30 days prior to the survey).

The high male alcohol consumption rate seen in this study is similar to reports from other countries such as Malawi, Ethiopia, Cote d'Ivoire and also from a sub national report by Lisk and colleagues in urban and rural Sierra Leone. However, the prevalence of current alcohol consumption in the current study is significantly lower than that reported by other countries such as cape Verde, Ethiopia, Cote d'Ivore, Benin and Malawi but significantly higher than the report from Mali and Swaziland. The prevalence of current alcohol consumption among male and female subjects was found to be significantly lower than that reported by Lisk and colleagues in 1999. This may be due to the fact that the current study is national as opposed to the study of Lisk *et al* [5] which was sub national. Although the consequences of alcohol consumption and/or the harmful use of alcohol was beyond the scope of the current study, it is important to note that harmful drinking is a major avoidable risk factor for neuropsychiatric disorders and other NCDs such as CVDs, cirrhosis of the liver and various cancers.

Fruits and Vegetables consumption

The mean number of days, fruits and vegetables were consumed by all respondents was 3 and 4 respectively, with no age group or sex specific difference. The mean number of servings of fruits and/or vegetables on average per day was 2. This picture is similar to other

step survey reports from several countries such as Cape Verde, Mali and Cote d'Ivoire. A significant proportion of the respondents (91%) consume less than five servings of fruits and/or vegetables. This is lower compared to the recent step survey report from Ethiopia but higher than reports from Cape Verde, Mali and Cote d'Ivoire. Moreover, 92% of the sampled households used palm oil to prepare their meals.

Like tobacco use, the consequences of the consumption of low fruits and vegetables were beyond the scope of this study. However, it is important to note that well over 2.7 million lives could be potentially saved worldwide if fruit and vegetable consumption is increased [14]. Furthermore, low intake of fruits and vegetables is associated with 85% CVDs and 15% cancers. Specifically, 19% GI cancer, 31% IHD and 11% stroke worldwide are attributable to low intake of fruits and vegetables [15]. Thus, the consumption of 400g of fruits and vegetables, the recommended population target, prevents diet-related chronic diseases and reduces the risk of CVDs, colorectal cancer and obesity [16] as well as stomach cancer [17].

Physical activity

In the current study, a significant proportion (75%) of the respondents was engaged in high physical activity such as lifting or carrying heavy loads, digging and/or construction works for at least 10 minutes continuously. Moderate physical activity such as brisk walking or carrying light loads for least 10 minutes continuously was undertaken by 9% of the respondents; with 16% low physical activity. A significant difference was further noted between of the 55-64 years age group and the younger age groups (25-34, 35-44 & 45-54) in terms of both high and low physical activities. Specifically, a significant proportion of the younger age group was engaged in high physical activity and the converse was true. Additionally, a significantly high proportion of the respondents were engaged in physical activity from work (73% for both sexes), followed by transport-related activity. Moreover, a significant ($P<0.05$) proportion of males was engaged in leisure-related activity than females (5.3% vs. 2.0%). Furthermore, a significant proportion (87%) of the respondents was not engaged in any recreational physical activity; with a significant female preponderance (93% vs. 80%). Similarly, a significant proportion ($P<0.05$) of females were not engaged in any vigorous activity compared to males (40% vs. 22%). The mean and median times spent on

total physical activity by the respondents were 291 and 244 minutes respectively; with males spending more time on physical activity than females (329 vs. 255 mean minutes; and 300 vs. 215 median minutes). On average the respondents spent a mean and median times of 122 and 60 minutes per day on sedentary activities respectively; with no sex or age group specific significant difference.

The proportion of respondents engaged in low physical activity or no vigorous activity in this study is significantly lower than reports from Cot d'Ivoire, Mali, Ethiopia and Swaziland but significantly higher than that from Benin and comparable to Malawi. Globally, physical inactivity causes about 1.9 million avoidable deaths per annum [18] and increases the risk of all-cause mortality by 20-30% [19]. It also serves as a major risk factor in promoting obesity [19]. Physical inactivity has been documented to account globally for 22% of ischemic heart disease, 11%of ischemic stroke, 14% of diabetes, 16% and 10% respectively of colon and breast cancers. Although these effects were not verified in the current study, it is not unlikely that the high physical inactivity seen in this study coupled with other risk factors may predispose to these conditions. Thus, NCD policy which promotes increase physical activity will not only reduce the incidence of these disorders but it will also protect against the development of cognitive impairment and dementia [20-22], osteoporosis and its related features [19].

Physical Measurements and History of raised blood pressure and diabetes

The mean BMI of all respondents was 23.1; with males and females having an average BMI of 22.4 and 23.7 respectively. A significant proportion of respondents had normal BMI (18.5-24.9) with a high male preponderance (72% vs. 61%). Respondents with BMI of 25 or more were classified as overweight. 22% of all respondents were overweight with a significant proportion being females (29% vs. 16%). The adverse metabolic effects of overweight and obesity on blood pressure, cholesterol, triglycerides and insulin resistance has long been documented as increased BMI is associated with increase risks of coronary heart disease, ischemic stroke , type 2 diabetes and cancer of the breast, prostate and colon [23]. In

addition, 5%, 11% and 8% of males, females and both sexes respectively were classified as obese (BMI≥ 30). Thus, 8% of the population are at moderate to severe risks of co-morbidities as their BMI is greater than 30 [24]. Although measurement of blood glucose was beyond the scope of the current study, it was noted that a significant proportion of all respondents (96%) have never had their blood glucose measured.

The mean blood pressure of all respondents including those who were on medication for hypertension was 133/80, 129/81 and 131/80 mmHg for males, females and both sexes respectively. The percentage of respondents with SBP of 140 mmHg or more and/or DBP of 90 mmHg or more including those currently on medication for hypertension was 37%, 33% and 35% for males, females and both sexes respectively. Thus, on average 35% of the population has stage 1/grade 1 hypertension. 93% of these hypertensives were not on any medication or lifestyle advice for their raised blood pressure. This could be due in part to the fact that a significant proportion of the respondents (64%) have never had their blood pressure measured; as at least 75% of essential hypertension is usually diagnosed on routine clinical examination. Furthermore, 37% of the known hypentensives were on antihypertensive drugs; with 14% on herbal or traditional remedy. Moreover, 15% of the respondents have at least stage 2/grade 2 hypertension as their SBP was 160 mmHg or more and/or DBP was 100 mmHg or more. Raised blood pressure has been documented to be directed related to the risk of stroke and coronary heart disease [25]; as the risk of cardiovascular diseases doubles for each increment of 20/10 mmHg pressure starting at 115/75 mmHg [26].

Recommendations

1. Health promotion messages on lifestyle changes should be done in the common local languages and also designed according to the educational level of the population.

2. Peer education on healthy living and lifestyle changes as well as community and home management of chronic diseases should be promoted particularly among marriage couples

3. With the low employment rate, NCDs policies addressing lifestyle changes or healthy living should not be limited to work places but rather promote population based

interventions. In addition, favourable policy which supports the unpaid in terms of access to health care should be promoted.

4. Government should levy high import taxes on both tobacco products and alcoholic drinks to serve as a deterrent to manufactured tobacco smoke and harmful use of alcohol. NCDs policy should also address smoking and drinking in pregnancy.

5. Since a significant proportion of the respondents were exposed to ETS either at home or workplace, NCDs policy discouraging smoking at home, workplace or public places should be adopted.

6. Government should highly regulate the local production and distribution of alcoholic beverages.

7. NCD policy promoting increase consumption of fruits and vegetables should be promoted.

8. Routine and regular physical examinations including measurements of blood sugar, weights, and blood pressure should be promoted.

9. NCDs policy and strategic plan addressing the common risks of NCDs should be developed and implemented.

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