



WHO STEPS

Chronic Disease Risk Factor Surveillance

GRENADA

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Introduction

In Grenada, the demand for services by persons with chronic diseases continues to increase. This places a burden on the health care system, almost to breaking point. Mortality and Morbidity associated with chronic diseases is substantial. In 2003, there were 2,387 (231.2 per 10,000 pop.) reported incident cases of Chronic Non-Communicable Diseases (CNCD's), while in 2004 there were 2,535 reported cases (242.1 per 10,000 pop.), and in 2005, there were 3,139 cases (299.8 per 10,000 pop.). In Grenada, these data show a steady increase in the total cases of CNCDs, particularly cerebrovascular disease, hypertensive disease, diabetes, diseases of pulmonary circulation, other forms of heart disease, and cancer. (*Medical Records Department, MOH*).

CNCDs are the main causes of death among adults in the region. In 2010, the leading causes of death in Grenada were malignant neoplasm, endocrine nutritional and metabolic disease, diseases of the pulmonary circulation and other forms of heart diseases, diseases of the respiratory system, hypertensive diseases among others which together comprises 50.3% of all deaths.

In 2005, diabetes was the most commonly reported condition, followed by hypertensive disease, accidents, respiratory diseases and cancer. Attempts to measure the complications related to diabetes during 2005 found 343 complications due to diabetes, of which 67% were eye problems, followed by 22% with circulatory problems and 3% having amputations below the knee. The disabilities associated with these conditions place an enormous economic burden on the health care system, and the society at large in terms of productivity and quality of life.

Data is collected routinely on Diabetes Mellitus (DM) and High Blood Pressure (HBP); however there are always questions about the reliability of the data collected. A risk factor survey to establish baseline levels of CNCDs in Grenada has never been implemented although it has long been recognized that this information was critically needed. In 1998, the Ministry of Finance conducted a labour force cross-sectional household survey in which supplemental questions were included by the Ministry of Health to gather information on the general health of the population. The health component of the survey collected data concerning use of and attitudes toward the Grenada health care system, overall personal health of subjects, exercise habits, lifestyle choices (e.g. smoking and alcohol consumption), accident/injury history, and history of common chronic diseases. The sample size was 1500 households, but once a household was identified, more than one adult could be interviewed which led to a sample size larger than 3000 persons with varying amounts of information. [Ref: Hunte, D. Report on the Grenada 1998 Labor Force Survey, Central Statistical Office, Grenada. June, 2000.]

Due to technical difficulties with the data management software, few analyses were done with the data. In 2002, two students in the MD/MPH program at St. George's University received permission to analyze a small portion of the data from the labor force survey to estimate prevalence and risk factors for hypertension and diabetes. The self-reported prevalence of hypertension was found to be 15.4% among all respondents, while the self-reported prevalence of diabetes (i.e., having been told by a health professional) was 6.3% overall. While both estimates are almost certainly understated, it was noted that the reported prevalence of both conditions increased with age. In fact, diabetes increased markedly with age, nearly doubling in

prevalence among those aged 50 years and above. Obesity, measured by BMI, was the leading preventable risk factor for these conditions. [Ref: K. O'Toole and E. Jernigan, MPH thesis, completed in 2002.]

The World Heart Foundation undertook a project in Grenada to map specific risk factors that lead to heart disease. The project, known as The Grenada Heart Project, studied the major cardiovascular disease risk factors in adults and children. It is hoped that the information garnered from this project will be used to formulate interventions that will address the health needs of the country. The researchers have conducted surveys in Grenada, Carriacou and Petite Martinique.

Data availability

The absence of clear objectives that support gathering the most essential information on CNCDS has hampered previous attempts to design appropriate intervention and to justify funding to support these efforts. To date, there are no current population-based data on risk factors for chronic diseases nor reliable prevalence estimates of the most common chronic diseases. Regular attempts have been made to collect data on persons who seek medical care in the public sector hospitals, clinics and health centers. However, there is no mechanism for collecting data from persons who are attended to by private doctors. Data are collected for many purposes and by many health care providers for periodic reporting but there is no co-ordinated mechanism for organizing the data and ensuring that the information is representative of Grenada's population.

Infrastructure and capacity

There is limited infrastructure in terms of human capacity, equipment, and other needs in the public sector on which STEPS could be built. Health services are provided at the hospital level (the General Hospital, Princess Alice and Princess Royal) and at the community level. The community health service is sub-divided into six districts with one health centre and several medical stations in each district. Each district should be serviced by district medical officers, a public health nurse and/or family nurse practitioner, district nurses and nursing assistants, pharmacist and social worker. However, there are frequent shortages, mainly of nursing staff and certain types of equipment. Health facilities may have manual equipment for measuring blood pressure and some locations have floor scales, but there are no portable weight scales or automatic blood pressure machines available for consistent assessment in the field. Personnel trained in data entry and analysis is limited to the Ministry of Health, and more emphasis is placed on communicable disease surveillance activities.

Staff training and empowerment is vital to develop a culture of prevention. Also, the recruitment of additional data entry staff is critical to develop capacity and improve integrated surveillance activities. The Central Statistical Office can be requested to provide support to assist with data collection, management and analysis.

Rationale

Non-communicable diseases, which are the leading causes of death and disability in Grenada, are expected to increase in frequency by the year 2020 as the population ages and become more affluent. Current data on major risk factors for CNCDS are not available and do not address needs on a population basis. The absence of clear objectives that support gathering the most essential information has hampered previous attempts to design programs.

In reference to the high burden of disease there is an urgent need to know the risk factors driving the epidemic in order to inform planning and implement policies and programs.

Goals and Objectives of the Survey

The goal is to implement population-based surveillance of risk factors for CNCDs in the adult Grenadian population in order to influence changes in public policy and support the implementation of interventions aimed at chronic disease prevention and control in Grenada

The objectives are to:

- Describe the current levels of risk factors for chronic diseases in the population
- Plan targeted health promotion and preventive campaigns
- Predict likely future demands for health services

Scope of the Survey

Overview of scope

The STEPS Instrument covers three (3) different levels or (STEPS) of risk factor assessment: STEP 1, STEP 2 and STEP 3.

STEP 1: Gathering demographic and behavioral information by questionnaire in a household setting. The purpose of STEP 1 is to obtain basic demographic information including: - age, sex, years in school, tobacco use, alcohol consumption, types of physical activity, sedentary behavior (time spent sitting at the desk) and vegetable consumption.

STEP 2: Collecting physical measurements with simple tests in a household setting i.e.

- Height and weight
- Waist circumference
- Hip circumference
- Heart rate
- Blood pressure

STEP 3: Taking blood samples for biochemical measurement, fasting blood glucose, total cholesterol, HDL- Cholesterol and triglycerides.

The initial STEPS survey consisted of STEP 1 Core and expanded questions and STEP 2 Core and expanded physical measurements. No optional questions were included in the initial assessment, but may be added to subsequent surveys as the need arises and the availability of funding.

Grenada did not have resources for collection of biochemical measures in STEP 3. While there has been discussion of STEP 3 data collection on a smaller scale through a separate initiative that has not been materialized.

STUDY METHODOLOGY

Geographical coverage

The sample frame comprised adults 25 to 64 years throughout Grenada, Carriacou and Petite Martinique. Administratively, the state of Grenada is divided into seven parishes with the islands of Carriacou and Petite Martinique being one parish. Each parish has a town (with the exception of St. David's) and several villages.

Sample size

The target sample size is 1736 households within Grenada, using the following parameters:-

- Baseline Prevalence: 20% (Based on Prevalence of Hypertension of 15.4% from analysis of data collected with the Health Survey 1998)
- Margin of error: 0.05
- Level of confidence: 95%
- Response Rate: 85% based on previous studies
- Design Effect: 1.5 (cluster sampling)
- Age/sex strata: four 20-year age groups due to limited financial resources.

A three-stage stratified sampling methodology was constructed using the Population and Housing Census 2001 as the sampling frame. The master frame was divided into 42 regions with an average size of eight (800) hundred households per region using a contiguous set of Enumeration Districts (EDs), where the approximate size of each ED is between 46 – 189 households (refer to Table 36 in the appendix).

In the first stage, a paired design, i.e. samples of two EDs were randomly selected per region using a 3-digit table of random numbers. Since the frame was stratified by parish it would mean that in the large parishes, a larger number of EDs were selected. Since the ED size was fairly consistent, there was no need to use PPS sampling and hence simple random sampling was used.

The number of households enumerated per ED was calculated

$$((1736/42)/2) = 21$$

There were therefore twenty-one households per selected ED.

At the second stage, the sampling interval was computed by dividing the total number of households in the selected ED by the determined sample size of twenty-one (21) households per ED. Once the ED had been listed and the listing returned to the CSO a random table was used to select a random number (k) between 1 and the sample interval value, I, inclusive then to this number was added the sampling interval for the full list of households within the ED. Thus, the list of selected households was k, k+I, k+2I, ... k+(n-1)I where n is the size assigned to each ED (21).

The third stage of the sampling required a listing of the members of the selected household then using the KISH Method the eligible person to be interviewed was selected.

Inclusion criteria

Criteria for selection were as follows: persons should be between the ages of 25 – 64 years. They should be mentally capable, not bed ridden or visibly pregnant.

Staff Recruitment and Training

A Co-ordinating Committee was installed to oversee the survey implementation. The Committee was chaired by the Surveillance Officer who served as survey co-ordinator and included the Chief Nursing Officer, the Health Information Officer, Family Nurse Practitioner, Health Promotion Officer, Surveillance Officer, Statistician, Computer Operator, Medical Officer of Health (Epidemiology) and five (5) Field Supervisors.

There were forty (40) interviewers (third year nursing students) working in groups of twos, (twenty (20) teams). All interviewers were trained at the same venue and time to ensure standardization of data collected. Field enumerators and supervisors were selected from the Central Statistical Office, Community Health Services, and T.A. Marryshow community College (TAMCC) Division of Nursing. The Five (5) supervisors were responsible for conducting interviews, overseeing field work, and for assigning the work load to the field enumerators.

Timeframe

The survey was conducted from December 2010 to March 2011 with a break of about 3 weeks during the Christmas vacation.

Data Collection

The data was collected by trained interviewers in a face-to-face setting using hand held computers. Interviewers were trained in October 2010 and data collection commenced in December 2010. The data was entered at the time of collection using handheld PDA HP iPAQ Classic with running windows Mobile 6.0 Classic.

The interviewers were managed in the field by trained supervisors.

At the household, the Kish method was used to randomly select the individual who participated in the survey from all eligible persons.

Data Analysis

The data was downloaded from the PDA and cleaned by the Biostatistician attached to the Caribbean Epidemiological Centre (CAREC) who started the analysis using EPI INFO version 3.2 software. A training session in data analysis was conducted by the Chronic Disease Program Co-ordinator and the Biostatistician from CAREC in November 2011 targeting staff from the Epidemiology Unit (Epi Unit) and Central Statistical Office (CSO). The training included (1) Reviewing the dataset and weighting information (2) weighting data to make it representative (3) introduction to EpiInfo (4) using Epi Info to do basic exploration of data

Members from the Epi Unit and the CSO completed the analysis using output files with pre-formulated syntax. Information from the survey was compiled and presented in the form of a fact sheet, data book and a final report.

The data will be used to:

- Estimate the prevalence of risk factors and identify groups at risk for NCDs in the population.
- Provide base line data on prevalence of the risk factors for chronic non-communicable diseases by 20 year gender/age group strata.
- Establish a NCD surveillance system.
- Provide future reference for similar surveys to be done within 5 years.
- Utilize the information for developing a national strategy for NCD prevention and control.
- Measure trends and prevalence of NCD risk factor over time.
- Assess the impact of the NCD prevention and control programs.

Data Dissemination Plan - Steps Survey

A written report including the results of the survey will be done by the team at the Epidemiology Unit, Ministry of Health and a senior statistician at the Central Statistical Office, Ministry of finance.

Subsequently, there will be proofreading and rehearsals to ensure that the data disseminated is accurate. The data will then be disseminated to the relevant persons.

Audience for site report are as follows:

Relevant government bodies and sponsoring agencies i.e.

- Minister for Health
- Minister for Education
- Permanent Secretary (Minister of Health)
- Prime Minister and other Parliamentarians
- La Qua Brothers Funeral Agency
- Ministry of Agriculture
- Ministry of Sports and Youth Empowerment
- Ministry of Finance

Agencies and organizations likely to use the information for policy and planning:-

- Key decision makers
- Chief Health Planner
 - Permanent Secretary
 - Chief Medical Officer
 - St. George's University IRB Board
 - Pan American Health Organization Website
 - Grenada Diabetes Association
 - Grenada Heart Project
 - Senior Medical Officer for health responsible for chronic Disease
 - National Chronic Non-Communicable Disease Commission

- Press and media
- Government Information Service

- Government Broadcasting Network
- Maitland Television (MTV)
- Ministry of Tourism
- Community Channel 6
- WEE FM Radio
- Libraries

Websites dealing with Chronic Disease and related health issues:

- Ministry of Health
- World Health Organization
- Pan American Health Organization
- CAREC
- CDC Atlanta

Purpose of disseminating the data

Data will be disseminated to:

- Create awareness to the public and other organizations of the prevalence of risk factors and to identify groups at risk for chronic non-communicable diseases in the Grenadian population.
- Be utilized for developing a National Strategy for Chronic Non- Communicable Disease prevention and control.
- Provide base line data on prevalence of the risk factors for Chronic Non-Communicable Diseases by twenty (20) year gender/age group strata.
- Stimulate research.
- Establish a Chronic Non-Communicable Disease surveillance system
- Provide future reference for similar surveys to be done within a 3-5 years period.
- Create comparison of data on CNCD in Grenada with other countries.
- Predict likely future demands for health services.
- Guide the decision makers in the area of policy planning.

Resources available for dissemination

Trained persons from Ministry of Health Grenada, will be disseminating the data to the public as well as to targeted organizations. Financial assistance will be provided by Ministry of Health. Dissemination will be done via website, news and radio and TV interviews, printed materials, workshop and seminars.

Those trained personnel are:

- Epidemiologist
- Statistician
- Health Information Officer
- Computer Operator
- Surveillance Officer
- PRO (Ministry of Health)

Study Limitations

Chronic disease surveillance continues to be a challenge to managers in the Ministry of Health. The steps survey which is the surveillance of chronic disease risk factors is one of the early initiatives in establishing and strengthening chronic disease surveillance. Some of the challenges faced in conducting the study included:

- Inadequate budgetary allocations to cover transportation, meals and stipend
- Unavailability of some interviewees resulting in more than one visit to several households
- Surpassing survey timeframe resulting in unavailability of interviewers due to prior commitments
- Inadequate synchronization of activities by supervisors and interviewers
- Misinterpretations of instructions
- Inadequate supervision
- Lack of transportation for field work

Results

Demographic Information

The study achieved a response rate of 65% with 1129 respondents, 460 men (40.7%) and 669 women (59.3%). Table 1 gives a breakdown of respondents by age group and sex. Among males, the percentage of respondents ranged from 39% in the 55 to 64 age group to 43% in the 25 to 34 years age group. For the females, it ranged from 57% in the age group 25 -34 to 61.2% in the 55-64 age group. The proportion of responses from both the men and women respondents is similar, however, there was a notable difference between the female (61.2%) and the male (38.8%) in the 55-64 age group.

Table1: Participants by Age group and sex

Age group and sex of respondents						
Age Group (Years)	Men		Women		Both Sexes	
	n	%	n	%	n	%
25-34	139	42.6	187	57.4	326	28.9
35-44	103	40.4	152	59.6	255	22.6
45-54	131	40.4	193	59.6	324	28.7
55-64	87	38.8	137	61.2	224	19.8
Total	460	40.7	669	59.3	1129	100

Ethnicity

The majority of respondents was of African descent (83.6%) followed by Indians (5.1%) and Caucasians 1.7% (figure 1). Persons of other ethnic origin totaled 9.7%.

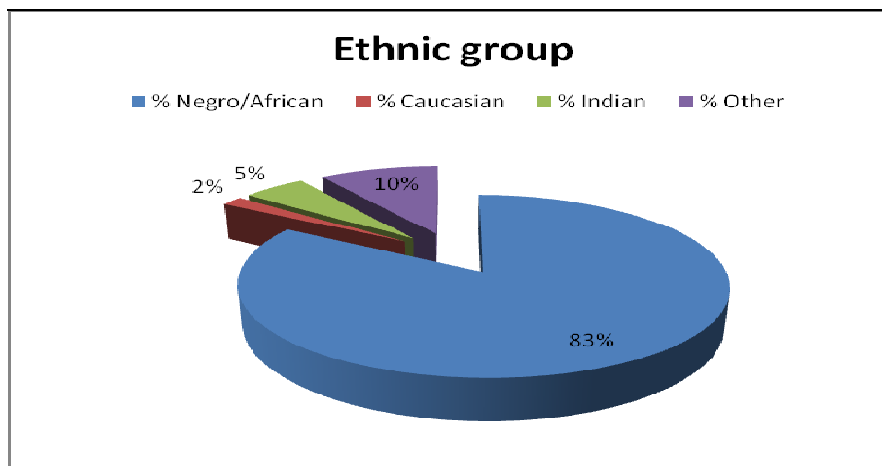


Figure 1: Participants by Ethnicity

Education

Table 2 indicates that the number of years of education ranged from 9 to 12 years in males and 9 to 11 years in females with the average number of years of education being 10.6 and 10.0 years for men and women respectively. Younger persons (both men and women) in the age group 25 to 34 had more years of schooling than those in the older age groups.

Table 2: Average Years of Education

Mean number of years of education							
Age Group (years)	Men			Women			Both Sexes
	n	Mean		n	Mean		<i>n</i> <i>Mean</i>
25-34	131	11.9		175	11.2		306 11.5
35-44	90	10.4		129	9.9		219 10.1
45-54	106	9.9		171	9.6		277 9.7
55-64	69	9.4		110	9.0		179 9.1
Total	396	10.6		585	10.0		981 10.1

Table 3 shows that 86.7% of the participants completed primary school, 12.1% did not complete and 1.2% did not have any formal schooling. Persons in the younger age groups achieved a higher level of education than those in the older age groups. More persons 45 years and over had no formal education and less completed high school or university when compared with those under 45 years.

Table 3: Level of Education by Age group and Gender

Age Group (years)	Highest level of education								Total
	Sex	% No formal schooling	% Less than primary school	% Primary school complete	% Secondary school complete	% High school complete	% College/ University complete	% Post graduate degree complete	
25-34	M	0.7	5.8	20.4	13.9	37.2	19.0	2.9	137
	F	0.5	6.5	23.2	8.6	41.1	17.8	2.2	185
35-44	M	0.0	15.5	33.0	8.7	25.2	15.5	1.9	103
	F	0.7	7.2	42.1	11.2	33.6	4.6	0.7	152
45-54	M	3.1	14.5	49.6	9.9	10.7	5.3	6.9	131
	F	1.0	12.0	55.7	8.9	12.5	6.3	3.6	192
55-64	M	3.5	19.8	58.1	4.7	8.1	2.3	3.5	86
	F	0.7	21.9	54.0	6.6	10.2	2.9	3.6	137
Total	M+F	1.2	12.1	41.4	9.3	23.4	9.5	3.1	1123

Marital status

Almost fifty-nine percent (59%) of the 428 male respondents never married, 24.8% were currently married, 8.6% cohabiting, 3% are separated, 2.8% divorced and 1.9% widowed (see Figure 2). Among the 635 female participants, about half (50.2%) never married, 32.6% are currently married, 6.8% are cohabiting, 3.9% are divorced, 3.9% widowed and 2.5% separated.

The percentage of persons who never married decreased as one moved from the younger to the older age groups while those currently married increased (figure 2). More young people cohabit than older ones.

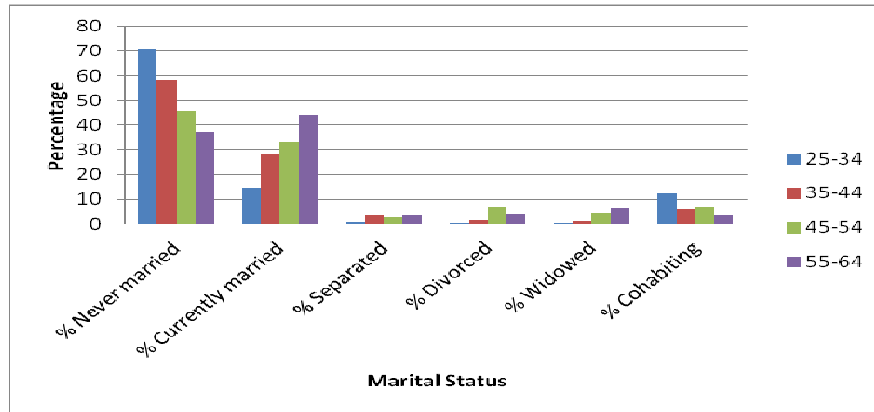


Figure 2: Marital Status by Age Group

Employment

Table 4 shows the employment status of all respondents comprising the different categories of employed persons and unpaid persons. It is seen that employed persons accounted for 44.8% of respondents with the unpaid consisting 55.2% among all respondents. Unpaid persons included students, homemakers and retired persons. Six hundred and nine respondents are either unpaid or unemployed with 224 men and 385 women.

Table 4: Employment Status

Employment status					
Age Group (years)	Both Sexes				
	n	% Government employee	% Non- government employee	% Self- employed	% Unpaid
25-34	323	20.4	33.1	0.9	45.5
35-44	251	13.1	34.3	1.6	51.0
45-54	318	15.1	26.7	1.3	56.9
55-64	212	10.8	16.5	0.5	72.2
Total	1104	15.4	28.4	1.1	55.2

Table 5 shows employment status by gender and type of employment. A larger percentage of men are employed. More females do unpaid work. The percentage of men employed was 50%, those unpaid was 50%. Among the employed men 68% are not employed by government.

Table 5: Employment status by Gender

Employment status by Gender				
Employment status	Men		Women	
	Number	%	Number	%
% Government employee	66	15	104	16
% Non-government employee	154	34	159	24
% Self-employed	5	1	7	1
% Unpaid	224	50	385	59
Total	449	100	655	100

Figure 3 shows 15% men are government employees.

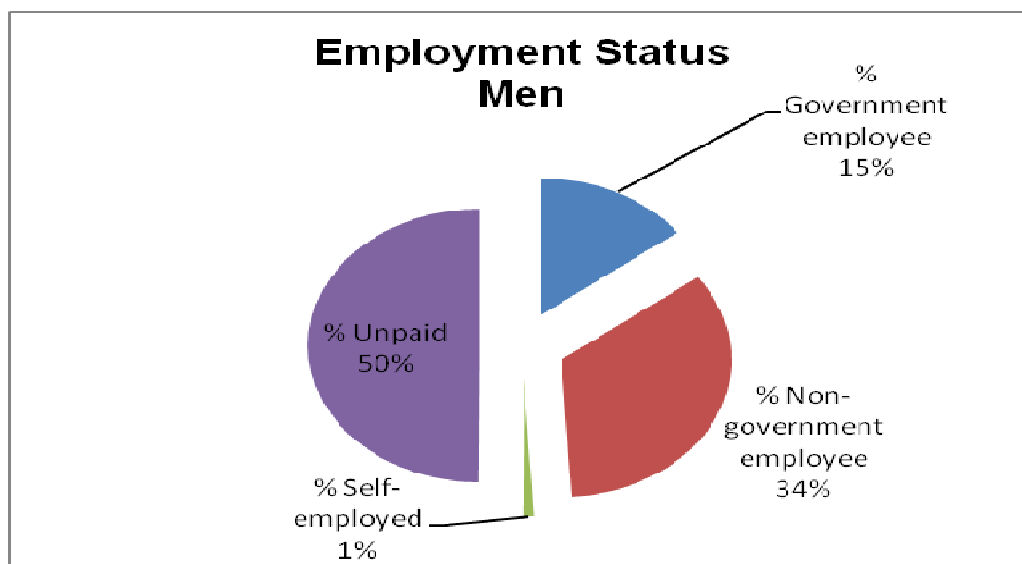


Figure 3: Men employment status

Among females 41% are employed. Unpaid female respondents constituted 59%.

Employment Status Women

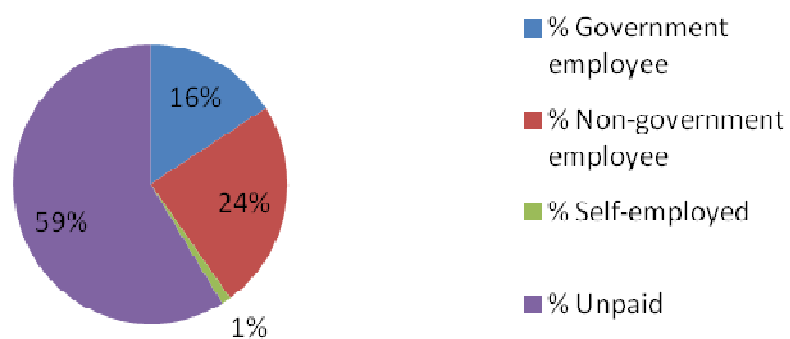


Figure 4: Women employment status

Behavioural Measurements

Tobacco Use

Current Smokers: Tables 6 shows that 18.7% of all respondents were current smokers of which 30.7% were men and 6.5% women. Smoking was more prevalent among persons 35 years and over. Also, the percentage of “current smokers” in the age-group 45 – 54 years {26.3% (95% CI: 21.1 – 31.6)} was significantly greater than that in the 25 – 34 years age group (12.4%: 95% CI 9.0 – 15.9%) and those in the 55 to 64 years age group (14.7: 95% CI 9.9 – 19.5%).

Table 6: Current tobacco users

Current tobacco users											
Age Group (years)	Men				Women				Both Sexes		
	n	% Current users	95% CI		n	% Current users	95% CI		n	% Current users	95% CI
25-34	137	20.4	13.8-27.1		186	4.3	1.3-7.3		323	12.4	9.0-15.9
35-44	102	35.3	25.8-44.8		152	7.2	2.6-11.9		254	21.7	15.5-27.9
45-54	131	40.5	31.6-49.3		193	11.4	6.7-16.1		324	26.3	21.1-31.6
55-64	87	27.6	17.7-37.4		136	2.9	0.1-5.8		223	14.7	9.9-19.5
25-64	457	30.7	26.5-34.8		667	6.5	4.5-8.5		1124	18.7	16.2-21.3

Daily Smokers: Table 7 shows that 11.2% respondents smoked daily of which 19.4% were men and 2.8% women. Again, the proportion of daily smokers, 17.4% (95% CI: 12.5 – 22.4), in the age group 45 to 54 was significantly more than those in the age groups 25 to 34 and 55 to 64 years.

Table 7: Daily Tobacco Users

Daily tobacco users											
Age Group (years)	Men				Women				Both Sexes		
	n	% Daily users	95% CI		n	% Daily users	95% CI		<i>n</i>	% <i>Daily users</i>	95% <i>CI</i>
25-34	137	12.4	7.0-17.8		186	2.2	0.2-4.1		323	7.3	4.2-10.4
35-44	102	21.6	14.5-28.7		152	2.0	0.0-4.0		254	12.1	7.6-16.5
45-54	131	29.0	20.6-37.4		193	5.2	2.3-8.1		324	17.4	12.5-22.4
55-64	87	14.9	7.4-22.5		136	2.9	0.1-5.8		223	8.7	4.9-12.4
25-64	457	19.4	15.6-23.1		667	2.8	1.7-4.0		1124	11.2	9.1-13.3

Initiation of smoking

The average age at which daily smokers started to smoke was 18 years, 17.7 for men and 20.5 for women. The difference in the age of initiation is not significant.

Table 8: Initiation of smoking

Mean age started smoking											
Age Group (years)	Men				Women				Both Sexes		
	n	Mean age	95% CI		n	Mean age	95% CI		n	Mean age	95% CI
25-34	15	16.5	14.0-19.1		4	18.0	15.2-20.8		19	16.8	14.5-19.0
35-44	21	17.1	15.2-19.0		3	25.3	13.2-37.5		24	17.8	15.7-19.9
45-54	34	19.3	16.6-21.9		9	18.9	10.2-27.6		43	19.2	16.6-21.8
55-64	11	17.9	14.8-21.0		4	21.0	12.9-29.1		15	18.5	15.5-21.5
25-64	81	17.7	16.3-19.2		20	20.5	16.5-24.6		101	18.1	16.8-19.4

Manufactured cigarettes were the most common form of tobacco used, 11.1% of respondents smoked daily. Pipe smoking is rare at 0.1% and exists only in the persons over 45 years. Hand-rolled cigarettes accounted for 0.7%.

The percentage of men, among daily smokers, who stopped smoking, 15.2% (95% CI: 11.0% - 19.4%), was significantly greater than that of women (4%; 95% CI: 2.5% - 5.5%). It should be noted that a greater proportion of men smoked.

For persons who stopped smoking, the average number of years since quitting was 21.8 years (95% CI: 17.9 – 25.7) for men and 22.6 years (95% CI: 17.0 – 28.2) for women.

Current use of smokeless tobacco was generally low among both genders, men at 2.2% (CI: 0.8% – 3.5%) and women 0.3% (CI: 0.1% – 0.7%).

Exposure to environmental tobacco smoke (ETS)

Exposure to environmental tobacco smoke occurred in the home and even more in the workplace. Exposure in the workplace, 21.4% (95% CI 17.0-25.7%), was significantly greater than that in the home, 12.5% (95% CI 10.1-14.9%). Also, a larger percentage of men was affected compared to women both in the home 15.3% (95% CI: 11.1%-19.5%) to 9.6% (95% CI: 7%-12.2%) and in the workplace 29.4 (95% CI: 23.1-35.7%) to 13.1% (95% CI: 8.9-17.3%) (see tables 9 and 10). Exposure of men in the workplace is significantly greater than that of women.

Table 9: Exposure to ETS at home

Exposed to ETS in home on 1 or more of the past 7 days											
Age Group (years)	Men				Women				Both Sexes		
	n	% Exposed	95% CI		n	% Exposed	95% CI		<i>n</i>	% <i>Exposed</i>	95% <i>CI</i>
25-34	127	16.5	9.1-23.9		170	10.0	5.5-14.5		297	13.3	8.8-17.8
35-44	92	17.4	7.5-27.3		135	8.9	3.8-14.0		227	13.3	7.2-19.4
45-54	112	15.2	8.6-21.7		165	10.9	4.9-16.9		277	13.1	8.6-17.6
55-64	74	6.8	1.1-12.4		116	8.6	3.5-13.7		190	7.7	4.1-11.3
25-64	405	15.3	11.1-19.5		586	9.6	7.0-12.2		991	12.5	10.1-14.9

Table 10: Exposure to ETS at work

Exposed to ETS in the workplace on 1 or more of the past 7 days											
Age Group (years)	Men				Women				Both Sexes		
	n	% Exposed	95% CI		n	% Exposed	95% CI		<i>n</i>	<i>% Exposed</i>	<i>95% CI</i>
25-34	125	28.0	18.3-37.7		168	14.3	7.9-20.7		293	21.2	14.4-28.0
35-44	91	33.0	22.5-43.4		134	11.9	6.4-17.4		225	22.9	16.5-29.2
45-54	110	29.1	20.7-37.5		161	14.9	8.8-21.0		271	22.2	16.4-28.1
55-64	74	24.3	14.7-33.9		115	10.4	2.4-18.5		189	17.1	10.4-23.7
25-64	400	29.4	23.1-35.7		578	13.1	8.9-17.3		978	21.4	17.0-25.7

Alcohol Consumption

The proportion of respondents who consumed alcohol during the past month (current drinkers) was 44.3%. In addition 10.6% reported drinking alcohol in the past year. Thirty-four point five percent (34.5%) reported never having drunk any alcohol. The rate of consumption was highest in the youngest age group surveyed in both men and women although the difference was not statistically significant. The frequency, however, of daily drinking was higher among the older drinkers.

Table 11: Alcohol consumers by age

Alcohol consumption status									
Age Group (years)	Both Sexes								
	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-34	323	52.1	43.8-60.4	10.2	6.2-14.3	7.8	4.8-10.8	29.8	21.5-38.2
35-44	254	42.7	35.3-50.1	13.8	8.9-18.7	8.4	5.2-11.7	35.1	27.0-43.1
45-54	323	42.3	36.5-48.2	9.5	5.8-13.2	13.7	10.2-17.3	34.4	28.6-40.3
55-64	222	33.4	27.1-39.7	6.0	2.5-9.4	17.4	11.0-23.8	43.2	35.6-50.8
25-64	1122	44.3	39.4-49.1	10.6	8.2-13.1	10.6	8.1-13.2	34.5	28.9-40.0

Figure 5 shows that 63% men consumed alcohol in the past 30 days and an additional 10.6% in the past year. Also 24.8% women consumed alcohol in the past month with a further 14.5% consuming within the past year. The percentage of males and females who never drank was 22.6% and 46.6% respectively.

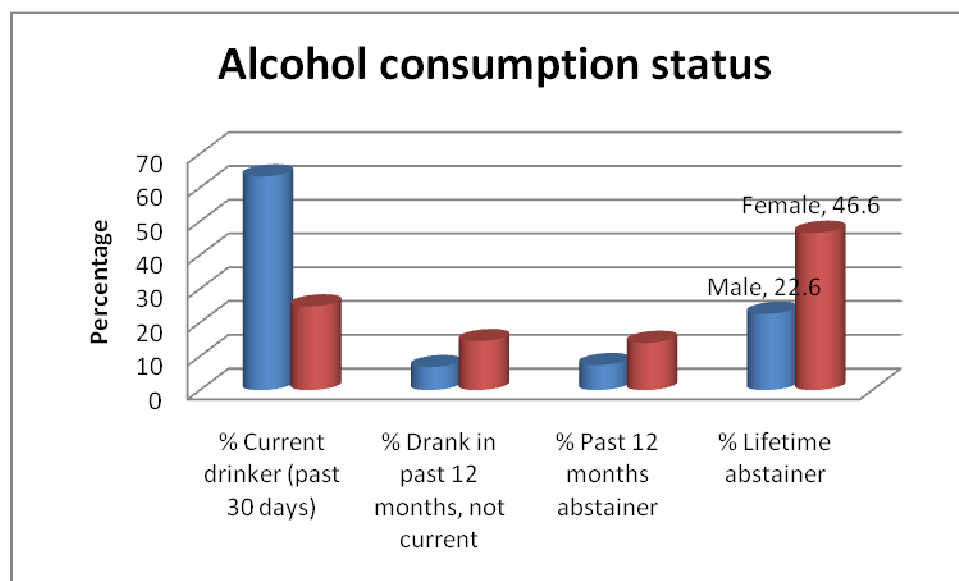


Figure 5: Alcohol consumption status by gender

Figure 6 indicates the frequency of drinking by men and women. Nine percent (9%) respondents comprising 12.8% men and 2.7% women drank daily. Also 8.3% men and 2.7% women drank 5 to 6 days a week. More than half the women (54.8%) and less than 20% men drank less than once per month.

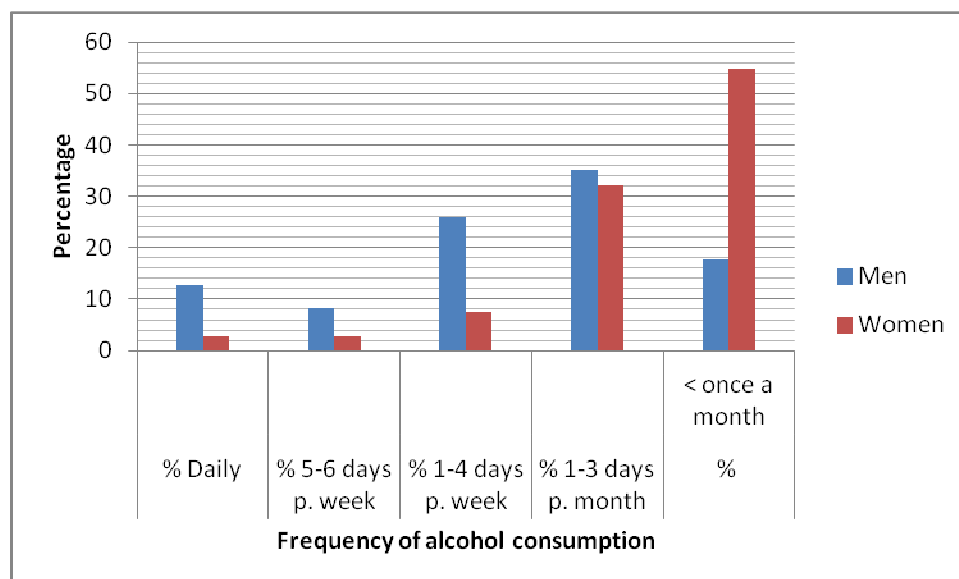


Figure 6: Frequency of alcohol consumption status by gender in past 12 months

Number of Standard of drinks per day

Figure 7 shows the average number of standard drinks consumed per day by age groups of men and women. Men consumed more alcohol than women in every age group. Also, one should note that the youngest age group surveyed drank more alcohol than the older age groups in both men and women. Men consumed a mean of 5.1 standard drinks and women a mean of 3.

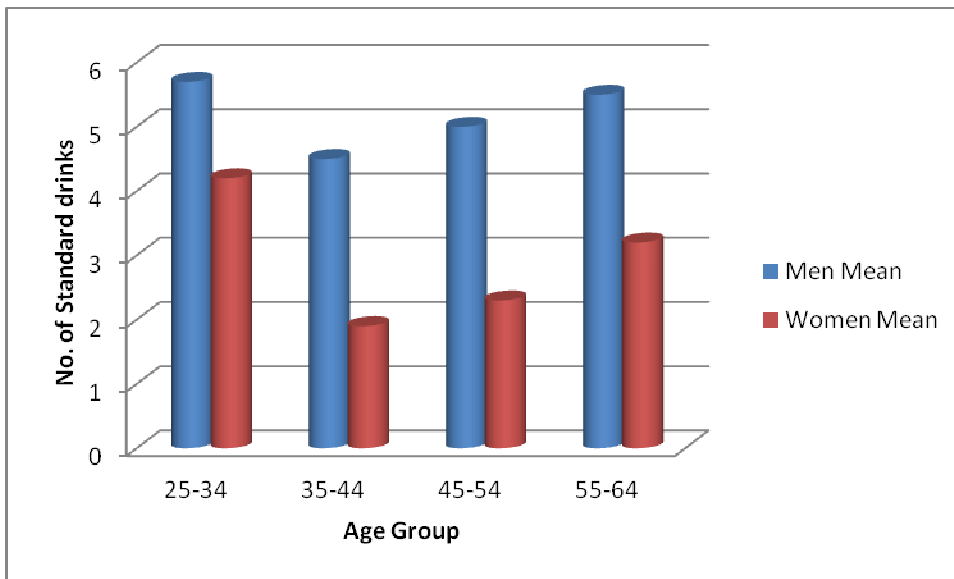


Figure 7: Number of standard drinks by age group

Table 12 gives the frequency and quantity of drinks consumed in the last 7 days by current drinkers grouped into three categories. Fifteen point eight percent (15.8%) drank on more than 4 days during the past week (20.4% men and 4.4% women), 28.5% men and 10.2% women had more than the recommended number of drinks which is more than 5 drinks for men and more than 4 drinks for women on any day and 8.6% men and 2.7% women had more than 20 drinks in the past 7 days.

Table 12: Frequency and quantity of drinks consumed in past 7 days

Frequency and quantity of drinks consumed in the past 7 days by current drinkers							
Men							
Age (years)	n	% Drank on 4+ days	95% CI	% 5+ drinks on any day	95% CI	% 20+ drinks in 7 days	95% CI
25-64	251	20.4	14.5-26.3	28.5	22.2- 34.8	8.6	5.0-12.3
Women							
Age (years)	n	% Drank on 4+ days	95% CI	% 4+ drinks on any day	95% CI	% 15+ drinks in 7 days	95% CI
25-64	149	4.4	1.3-7.5	10.2	5.3-15.1	2.7	0.0-5.3

Five/four or more drinks on a single occasion

Not only do more men consume alcohol more frequently than women but also the percentage of men who drink at a level which can be harmful to their health is more than 3 times that of women. Thirty-eight percent (38.2%) of men had 5 or more drinks on more than 2 occasions while 11.6 % women had 4 or more drinks more than once during the past month.

Table 13: Drinking at levels which can be harmful to health

Five/four or more drinks on a single occasion at least once during the past 30 days among study sample							
Age Group (years)	Men				Women		
	n	% ≥ 5 drinks	95% CI		n	% ≥ 4 drinks	95% CI
25-34	137	49.6	38.2-61.1		186	16.7	9.7-23.6
35-44	102	31.4	21.6-41.1		152	12.5	8.1-16.9
45-54	130	34.6	25.6-43.7		193	7.8	3.6-11.9
55-64	87	34.5	20.3-48.6		135	4.4	1.2-7.6
25-64	456	38.2	31.2-45.3		666	11.6	8.2-15.1

Figure 8 shows the average number of times on which men consumed five or more drinks and women four or more drinks during a single occasion in the past 30 days among current drinkers broken down by age groups.

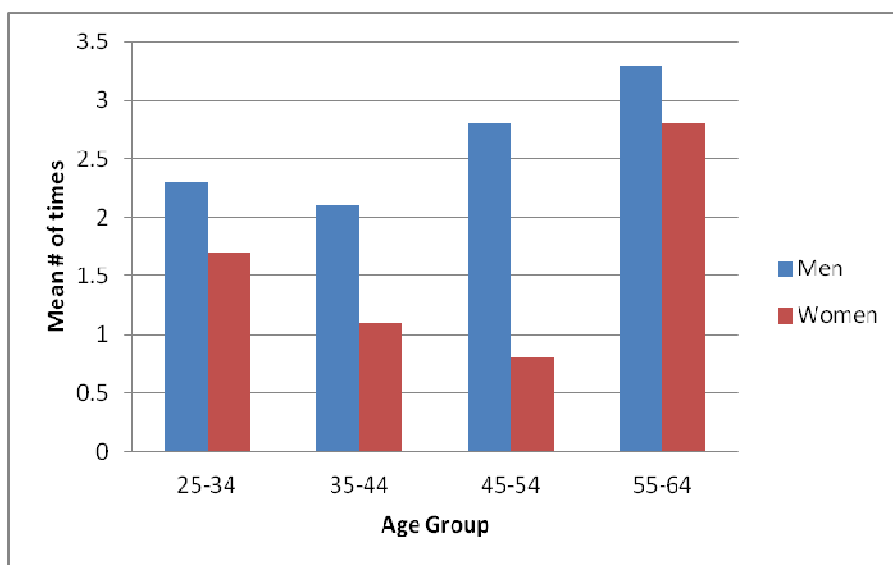


Figure 8: Mean number of times with five/four or more drinks

Among current drinkers almost nineteen percent (21.2% men and 13% women) usually drink with meals while 53.4% (62% of women and 50% of men) never drink with meals (Table 14).

Table 14: Drinking with meals

Drinking with meals among current drinker									
Age Group (years)	Both Sexes								
	n	% Usually with meals	95% CI	% Sometimes with meals	95% CI	% Rarely with meals	95% CI	% Never with meals	95% CI
25-34	159	20.6	13.2-28.1	15.9	9.2-22.6	8.5	3.7-13.2	55.0	45.5-64.5
35-44	97	17.3	8.6-26.1	16.5	8.0-24.9	11.7	5.0-18.5	54.5	42.9-66.1
45-54	125	20.9	12.5-29.2	17.9	11.0-24.7	10.8	5.0-16.5	50.5	41.7-59.3
55-64	65	13.8	3.9-23.7	22.7	11.5-34.0	13.1	3.6-22.6	50.3	37.1-63.6
25-64	446	18.9	13.5-24.3	17.2	12.2-22.2	10.5	7.1-13.8	53.4	46.3-60.6

In table 15, of concern is the mean maximum amount of drinks consumed on one occasion in the past month by both men (6.5) and women (3.9). The number of alcoholic drinks consumed by men decreased as persons got older with the youngest men 25 to 34 consuming a mean of 8 drinks on one occasion. There is no definite trend among the women, however, the youngest and oldest age groups drank above the harmful critical level.

Table 15: Mean maximum number of drinks consumed

Mean maximum number of drinks consumed on one occasion in the past 30 days											
Age Group (years)	Men				Women				Both Sexes		
	n	Mean maximum number	95% CI		n	Mean maximum number	95% CI		<i>n</i>	<i>Mean maximum number</i>	<i>95% CI</i>
25-34	87	7.7	5.7-9.6		58	5.0	2.6-7.4		145	6.8	5.3-8.3
35-44	55	6.2	4.5-7.9		33	2.5	1.9-3.2		88	5.2	4.0-6.4
45-54	67	5.8	4.4-7.1		44	3.3	1.8-4.8		111	5.0	3.9-6.2
55-64	41	4.7	3.8-5.6		12	5.3	0.8-9.9		53	4.8	3.8-5.8
25-64	250	6.5	5.4-7.5		147	3.9	2.8-5.0		397	5.7	5.0-6.5

Diet

Fruit and Vegetable Consumption

Total respondents consume an average of 2.2 servings of fruit and 1.5 serving of vegetable on average per day (table 16). During a typical week fruits was consumed on 4.5 days (CI: 4.3 – 4.7) and vegetables on 4.3 (CI: 4.1 – 4.5) days per week (figure 9) with no significant difference among age groups or between gender.

Table: 16 Average number of servings of fruits and vegetables per day

Fruits				Vegetables			
Age group (years)	n	Mean no. of servings	95% CI	Age group (years)	n	Mean no. of servings	95% CI
25-34	315	1.9	1.6-2.2	25-34	317	1.2	1.0-1.4
35-44	247	2.5	2.0-2.9	35-44	242	1.7	1.3-2.0
45-54	315	2.4	1.9-2.8	45-54	309	1.7	1.5-1.9
55-64	210	2.2	1.8-2.6	55-64	213	1.7	1.4-2.0
25-64	1087	2.2	1.9-2.5	25-64	1081	1.5	1.3-1.7

Figure 9 shows that the average number of days that men consume fruits and vegetables is slightly greater than that of women.

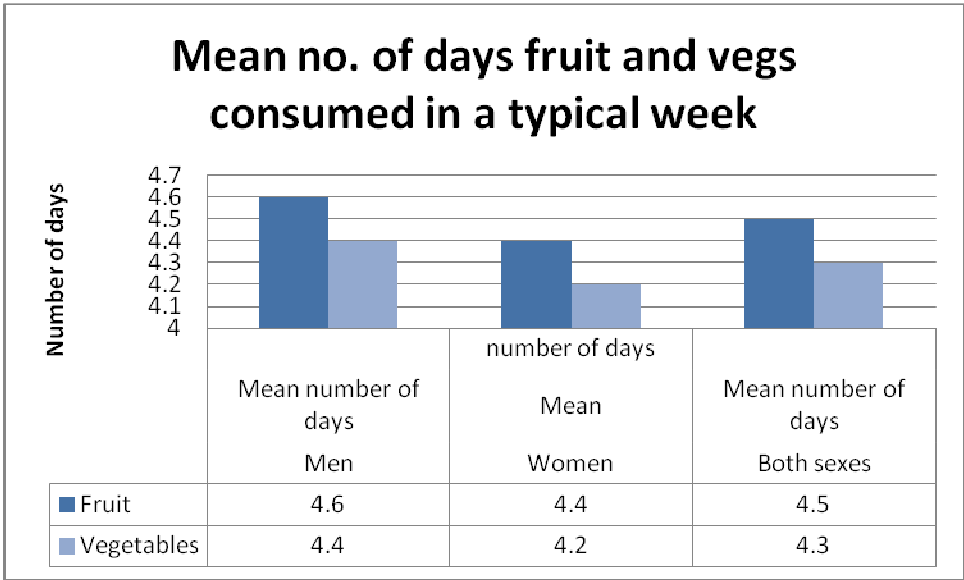


Figure: 9 Mean no. of days fruits and vegetables consumed

The mean number of servings of fruit and/or vegetables on average per day was 3.7 (CI: 3.2 – 4.1) for all respondents; 3.9 for men (CI: 3.4 -4.5) for women it is 3.4 (CI: 3.0 – 3.8) and for all respondents it is 3.7 (CI: 3.2-4.1). Figure 10 shows the mean number of servings for males and females by age-group.

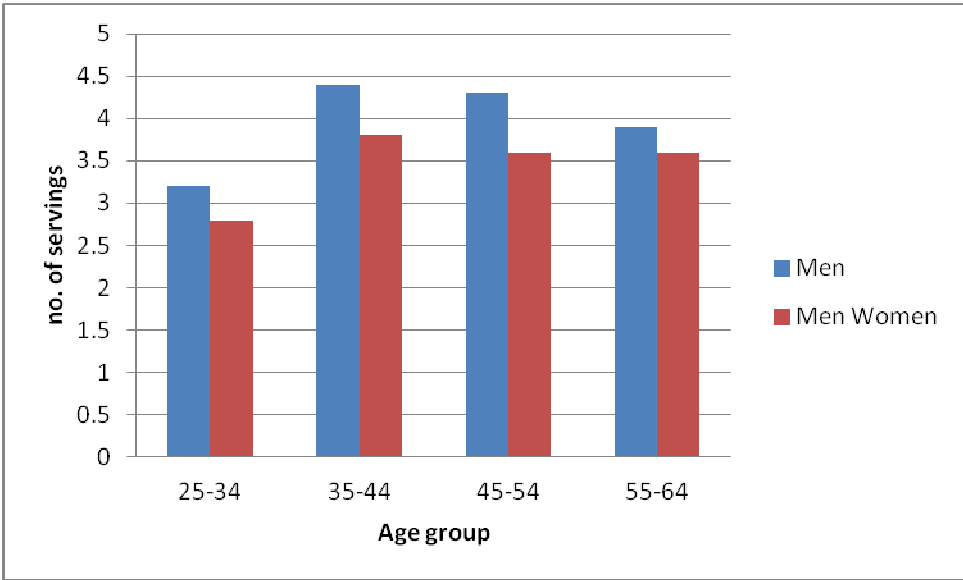


Figure 10: Mean no. of servings of fruits and/or vegetables on ave per day

Sixteen percent (16%) of respondents (14.4% men and 17.6% women) had no servings of fruit and/or vegetables on average per day, 38.2% (38.3% men and 38.2% women) had 1-2 servings, 21.1% (19.3% men and 22.9% women) had 3-4 servings and 24.7% (28.1% men and 21.4% women) had five or more.

Figure 11 indicates the percentage of those eating less than five servings of fruit and/or vegetables on average per day.

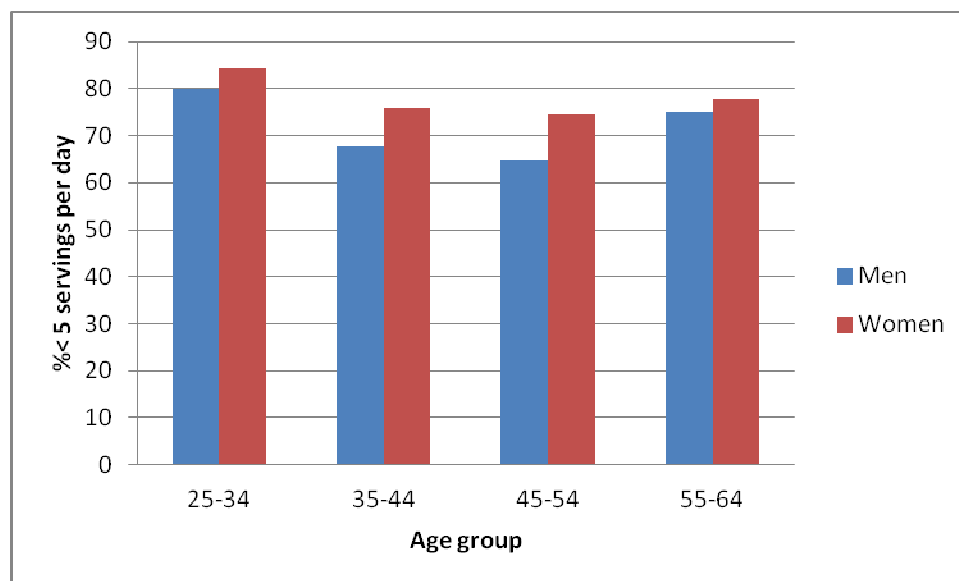


Figure 11: % Eating less than 5 Servings of Fruit/Vegetables per day

Seventy-eight percent of households use vegetable oil or fat in meal preparation. Six percent use no specific type and 8% another type that was different from those mentioned in the survey. A smaller percentage uses margarine or butter or none at all.

Physical Activity

Total physical activity of respondents was based on the length of time spent doing the activity and the level or intensity with which it was done. The activities used to measure total physical activity were: (a) activity at work (b) travel to and from places and (c) recreational activities. Also intensities were ascribed to these activities as high, moderate or low.

Figure 12 indicates that 49% of respondents reported that they had a high level of physical activity, 18% had a moderate level and 33% had a low level of physical activity.

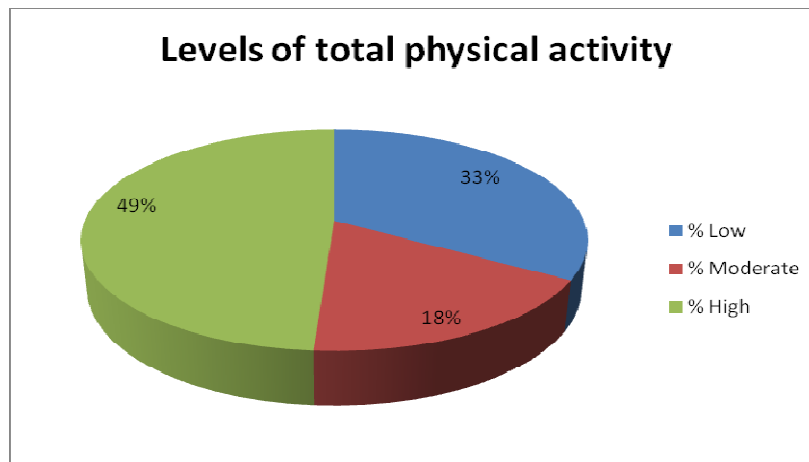


Figure 12: Levels of physical activity

The differences in the levels of physical activity of respondents among age groups are not significant.

Figure 13 compares the levels of total physical activity reported by men and women. It was found that a larger proportion of men (61.3%) reported that they had a high level of physical activity compared to women (35.8%). Low levels of physical activity were more prevalent among women (40%) to men (27%). More women than men reported moderate level of total physical activity, 24% women to 12% men.

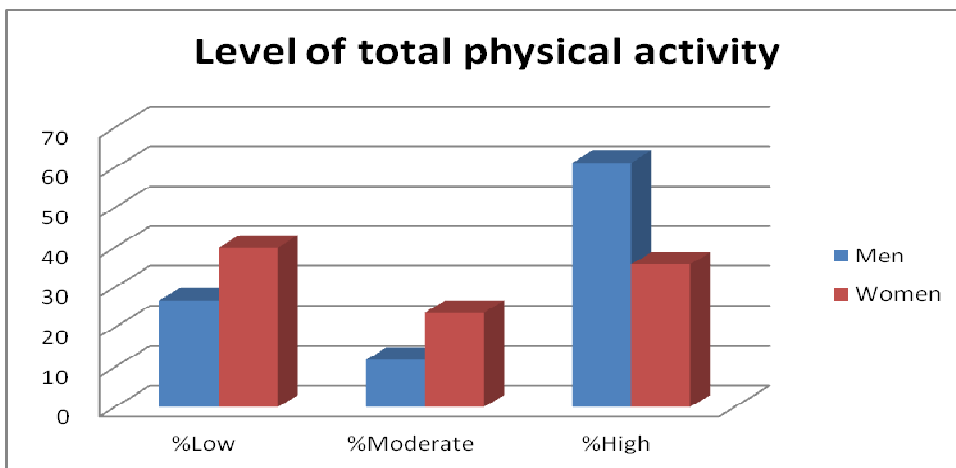


Figure 13: physical activity

Level of total physical activity by gender

The mean time of total physical activity on average per day by men was 295.9 minutes (CI: 255.4-336.4) compared to 130.5 (CI: 107-154.1) by women. There were no significant differences among the different age groups. The figure below gives the contribution of the different types of activity to total physical activity for men and women.

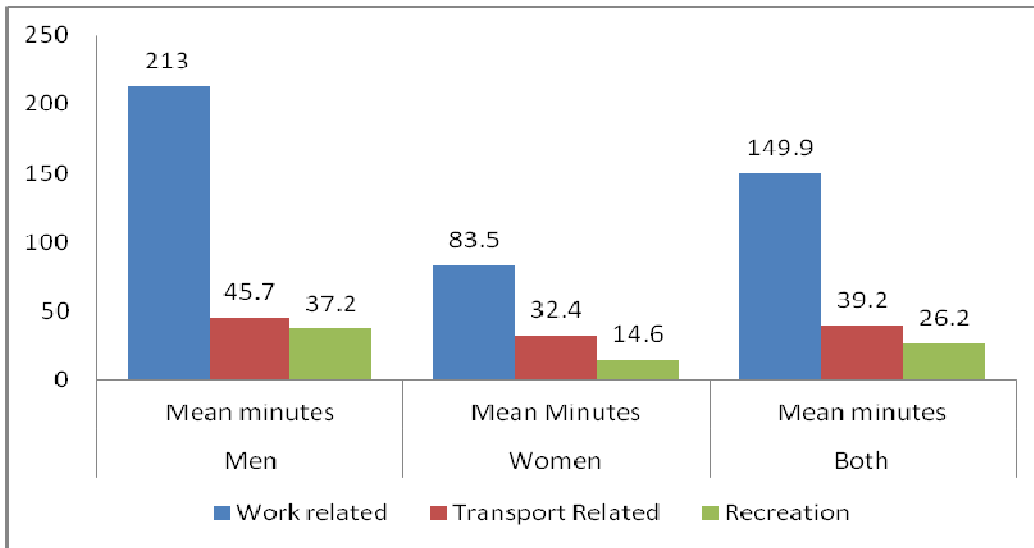


Figure 14: Mean minutes of total physical activity on average per day

Figure 15 compares males and female during work-related, transport-related and recreation-related physical activity. During work-related physical activity the mean minutes for males (213 minutes) more than double that for females (86) on average per day. For transport-related physical activity men spent 46 minutes compared to 32 minutes for women on average per day. For recreation-related physical activity men spent 37.2 minutes compared to 14.6 minutes for women on average per day. The mean time spent by men in recreational physical activity is more than twice that spent by women.

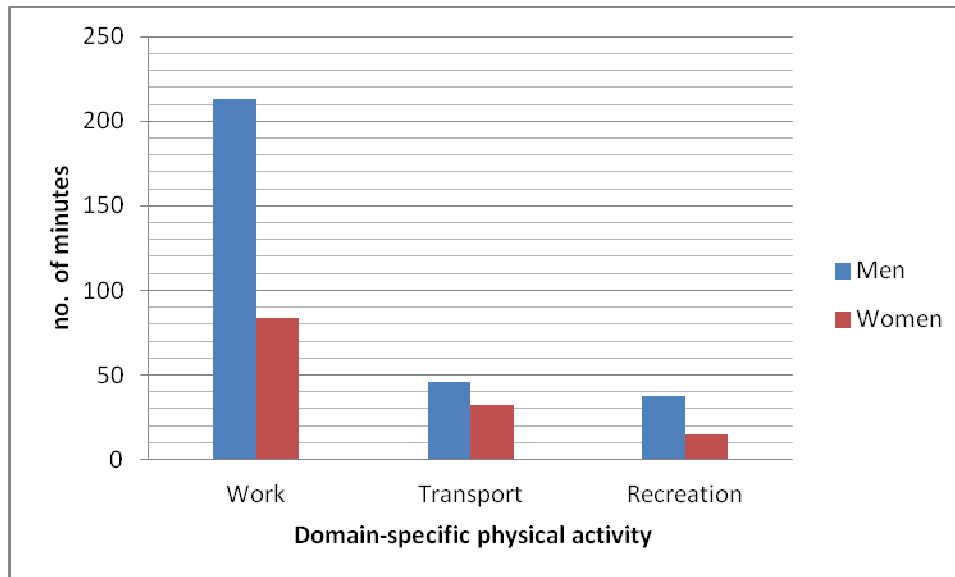


Figure 15: Mean Domain-specific physical activity per day

Percentage of work, transport and recreational activity contributing to total physical activity

Mean activity from work constitute the largest proportion of total physical activity in both men (59% CI: 53.8 – 64.4) and women (47% CI: 41.6 -52.4) while mean activity from leisure accounts for the lowest percentage of total physical activity in both men (16% CI: 13% -19%) and women (14% CI: 10.9% -17.2%). The composition

of total physical activity from work is higher for men compared to women while that for transport is higher for women. There is no significant difference in the composition of activity from leisure (Figure 16).

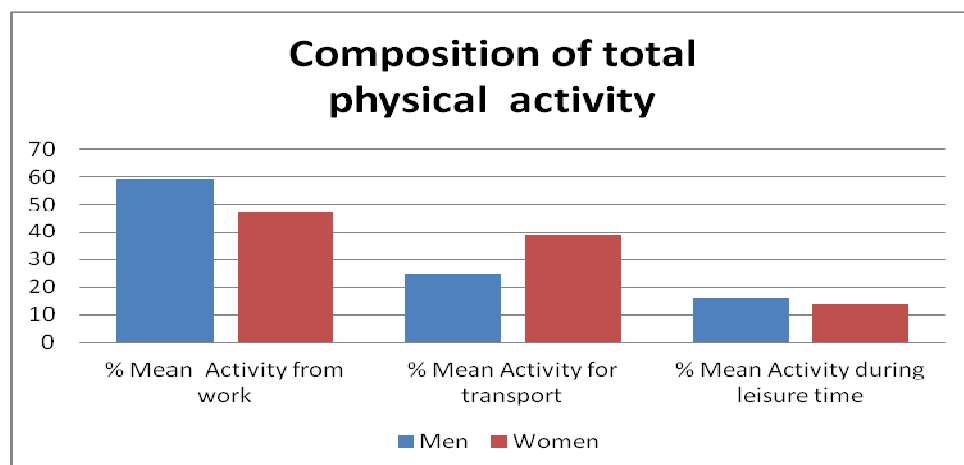


Figure 16: Composition of total physical activity

In table 17, there is no difference in mean total physical activity from work activities or transport among the different age groups for men. However, there seems to be a decreasing trend in mean activity during leisure (though not significant) as men got older.

Table 17: Composition of total physical activity (men)

Age Group (years)	Men						
	n	% Mean Activity from work	95% CI	% Mean Activity for transport	95% CI	% Mean Activity during leisure	95% CI
25-34	104	57.0	47.2-66.8	22.8	14.8-30.8	20.2	13.6-26.9
35-44	86	60.5	52.9-68.0	22.2	16.7-27.7	17.4	12.0-23.0
45-54	103	59.8	51.9-67.8	27.8	21.1-34.5	12.4	8.3-16.5
55-64	64	58.9	48.6-69.2	33.0	24.2-42.0	8.1	0.7-15.5
25-64	357	59.1	53.8-64.4	24.9	20.8-29.0	16.0	13.0-19.0

In women 47% mean activity is from work, 39% from transport and 14% from recreation. In general no specific trend is seen while looking at the age groups for both sexes. However for recreation the percentage of mean activity decreases slightly as women got older.

Table 18: Composition of total physical activity (women)

Composition of total physical activity							
Age Group (years)	Women						
	n	% Mean Activity from work	95% CI	% Mean Activity for transport	95% CI	% Mean Activity during leisure	95% CI
25-34	138	38.4	31.7-45.0	44.7	37.0-52.5	16.9	12.2-21.6
35-44	111	53.4	45.2-61.5	31.7	24.8-38.6	15.0	9.8-20.1
45-54	137	49.5	42.7-56.2	39.8	32.6-47.1	10.7	6.6-14.9
55-64	96	48.5	38.5-58.5	40.9	31.5-50.2	10.6	6.0-15.2
25-64	481	47.0	41.6-52.4	38.9	33.7-44.1	14.1	10.9-17.2

The percentage of work, transport and recreational activity contributing to total activity is shown in Figure 17. Work related physical activity contributed 59% towards total physical activity in men, 25% contributed by transport related activities and 16% by recreational related activities.

For the women 47% of total physical activity came from work related activities 39% from transport and 14% from recreational activities.

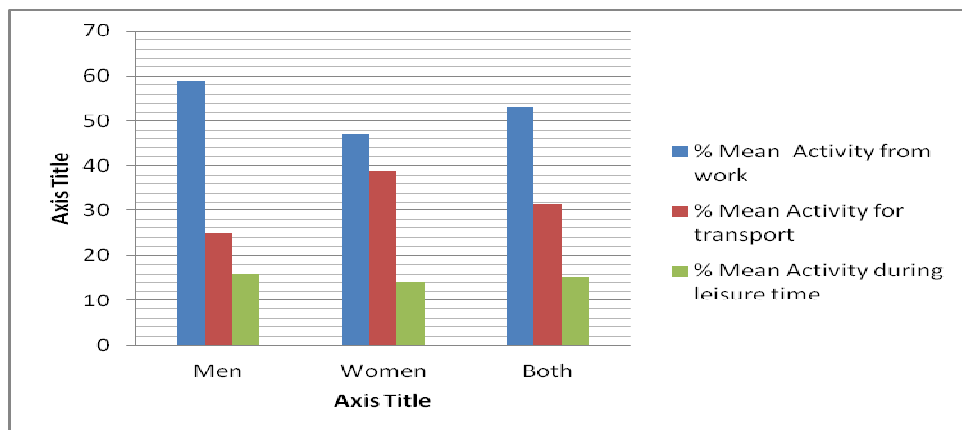


Figure 17: Composition of total physical activity

No vigorous physical activity

Figure 18 shows the percentage of respondents classified as doing no work-, transport- or recreational-related physical activity. There is no significant difference in “no transport-related physical activity” between men,

35% and women 37%. However there is a significant difference in “no work-related physical activity” between men 32% and women 48% and “no recreation-related physical activity” between men 55% and women 73%.

Figure 18: No vigorous physical activity

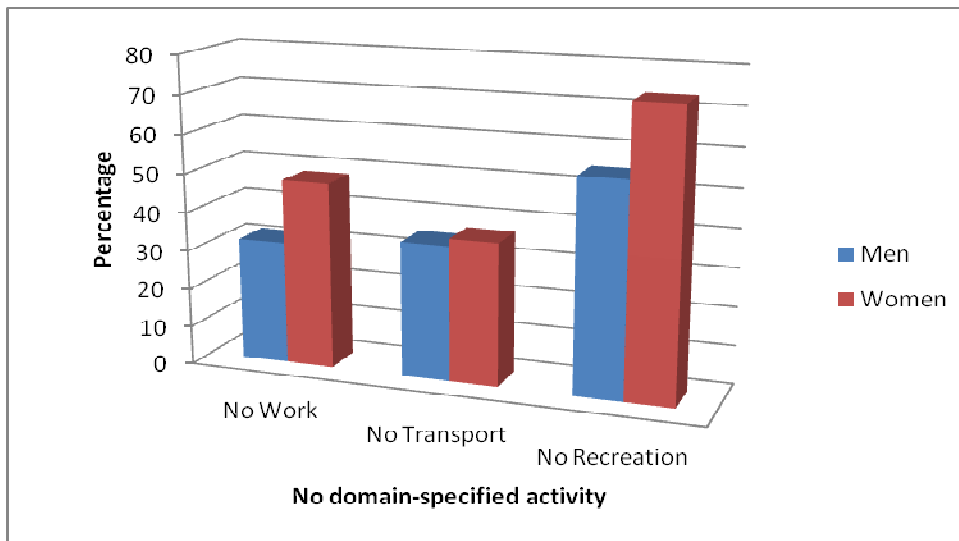


Figure 18: No vigorous physical activity

Forty-six percent of the men and 81% of women do no vigorous physical activity.

Sedentary behavior

The youngest age group 25 – 34 years spends more time in sedentary activities on average per day than the older age groups. Respondents spent 192 minutes in sedentary activities on average per day. The youngest age group spends the most time in sedentary activities (231 minutes on average per day). The difference between men and women is not significant.

Blood Pressure and Diabetes History

History of raised blood pressure

Table 19 shows that 11.2% respondents never had their blood pressure checked. Of the 88.8% whose blood pressure was checked at some time 26.5% was diagnosed with high blood pressure, 19.6% in the last 12 months. The percentage of respondents diagnosed in the last year increases with age group and this increase is statistically significant for the first three groups.

Table 19: Blood pressure measurement and diagnosis

Age Group (years)	Total Respondents								
	n	% Never measured	95% CI	% measured, not diagnosed	95% CI	% diagnosed, but not within past 12 months	95% CI	% diagnosed within past 12 months	95% CI
25-34	324	12.7	7.9-17.4	75.0	68.5-81.5	3.2	1.1-5.2	9.1	6.1-12.2
35-44	254	13.0	8.1-17.8	62.3	56.0-68.6	7.7	4.4-11.0	17.0	12.5-21.6
45-54	323	7.8	4.1-11.5	55.6	49.3-61.8	8.1	5.0-11.2	28.5	22.9-34.1
55-64	223	8.9	3.5-14.4	43.7	37.0-50.4	11.6	7.1-16.2	35.7	28.8-42.7
25-64	1124	11.2	8.3-14.2	62.2	58.2-66.2	6.9	5.3-8.5	19.6	16.9-22.4

Eighty-four percent men and 93% women had their blood pressure checked at some time with 19.6% men and 33.4% women diagnosed with elevated blood pressure in the past. Thirteen percent men and 26.1% women were diagnosed in the past 12 months.

Results of persons on medication for elevated blood pressure

Table 20 shows that the percentage of women currently taking medication for high blood pressure, 58.2%, is comparable to that of men, 49.2%.

Table 20: Persons currently on medication

Currently taking blood pressure drugs prescribed by doctor or health worker among those diagnosed											
Age Group (years)	Men				Women				Both Sexes		
	n	% taking meds	95% CI		n	% taking meds	95% CI		n	% taking meds	95% CI
25-34	14	42.9	13.6-72.1		27	25.9	10.3-41.6		41	33.0	14.9-51.1
35-44	18	38.9	5.9-71.9		49	49.0	36.0-62.0		67	45.3	30.9-59.6
45-54	41	56.1	41.5-70.7		81	61.7	49.2-74.2		122	59.2	49.1-69.3
55-64	26	57.7	36.4-79.0		86	80.2	71.7-88.8		112	73.5	64.0-83.0
25-64	99	49.2	34.5-63.8		243	58.2	50.8-65.7		342	54.8	46.6-62.9

Table 21 shows the percentage of persons who reported receiving lifestyle advice from a doctor or health worker to treat high blood pressure. The most common advice reported was to reduce salt, increase exercise and lose weight

Table 21: Persons with high blood pressure given lifestyle advice

Percentage of Persons with high blood pressure given lifestyle advice by doctor or health worker											
Age Group	Men				Women				Both Sexes		
(years)	n	%	95% CI		n	%	95% CI		n	%	95% CI
Advised to reduce salt	99	64.7	52.3-77.1		243	69.0	61.9-76.1		342	67.4	60.8-74.0
Advised to lose weight	99	36.8	24.4-49.2		243	53.8	47.8-59.8		342	47.4	41.8-52.9
Advised to stop smoking	99	23.2	13.8-32.7		243	4.3	1.7-6.9		342	11.5	6.8-16.1
Advised to exercise	99	56.6	45.5-67.7		243	62.9	56.3-69.5		342	60.5	55.4-65.7

Six percent men and 5% women have sought advice or received treatment from traditional healers to manage their blood pressure. Nineteen percent men and 8.8% women are currently taking herbal or traditional remedy to treat their high blood pressure. This practice is most commonly reported by the older men.

History of diabetes

Table 22 shows that 32.9% of respondents reported that they never had a blood test for sugar. Of the 67.1% tested 9.9% was diagnosed with high blood sugar, 7.4% in the last 12 months. The percentage of respondents who reported being diagnosed with high blood sugar increased with age i.e. as persons got older. For persons diagnosed within the past 12 months this increase is statistically significant between the first and second group and also third and fourth.

Table 22: Status of blood sugar measurement and diagnosis

Age Group (years)	Total Respondents								
	n	% Never measured	95% CI	% measured, not diagnosed	95% CI	% diagnosed, but not within past 12 months	95% CI	% diagnosed within past 12 months	95% CI
25-34	324	38.4	32.1-44.6	58.5	52.2-64.8	1.2	0.0-2.3	2.0	0.6-3.3
35-44	254	34.8	27.4-42.2	57.0	49.6-64.4	1.6	0.3-2.9	6.6	3.8-9.4
45-54	323	27.5	21.4-33.5	60.5	54.1-66.8	3.0	1.3-4.6	9.1	6.3-11.9
55-64	223	24.4	18.5-30.3	50.5	42.6-58.4	6.5	3.4-9.6	18.6	13.2-24.0
25-64	1124	32.9	29.2-36.6	57.3	53.3-61.2	2.5	1.6-3.4	7.4	5.7-9.1

Fifty-seven percent men and 77% women reported having been screened for elevated blood sugar at some time in the past with 5.3% men and 14.5% women diagnosed with elevated blood pressure. Four percent (95% CI: 2.4 - 6.1) men and 10.6% (95% CI: 8.2 - 13.1) women were diagnosed in the past 12 months with elevated blood sugar.

History of Diabetes treatment

Fifteen percent men and 9.1% women reported being treated with insulin. Women were reportedly treated with insulin from a younger age (35 to 44) than men (45 to 54).

More persons reported being treated with oral medication than insulin. Seventy percent men and 66% women reported being on oral drugs.

Table 23: Diabetics treated with oral medication.

Currently taking oral drugs prescribed for diabetes among those previously diagnosed											
Age Group (years)	Men				Women				Both Sexes		
	n	% taking meds	95% CI		n	% taking meds	95% CI		n	% taking meds	95% CI
25-34	2	100.0	100.0-100.0		9	33.3	1.6-65.0		11	49.0	18.4-79.6
35-44	3	100.0	100.0-100.0		21	61.9	39.9-83.9		24	69.0	50.0-87.9
45-54	12	50.0	19.7-80.3		29	51.7	31.1-72.3		41	51.0	33.0-69.1
55-64	12	66.7	38.1-95.2		48	83.3	72.1-94.5		60	79.0	68.2-89.8
25-64	29	69.7	51.7-87.7		107	64.8	55.3-74.2		136	66.1	58.3-73.9

Table 24 shows the percentage of persons who reported being diagnosed with diabetes and received advice from a doctor or health worker as part of the management of their diabetes. The most common advices received were to exercise, lose weight and diet.

Table 24: Lifestyle advice given to diabetics

Percentage of Persons with diabetes given lifestyle advice by doctor or health worker											
Age Group (years)	Men				Women				Both Sexes		
	n	%	95% CI		n	%	95% CI		n	%	95% CI
Advised on diet	29	35.0	17.2-52.7		107	49.3	37.6-61.1		136	45.4	35.3-55.5
Advised to lose weight	29	39.5	16.8-62.2		107	49.2	38.4-59.9		136	46.6	36.7-56.5
Advised to stop smoke	29	12.2	0.0-24.6		107	3.8	0.2-7.4		136	6.0	2.2-9.9
Advised to exercise	29	54.4	32.1-76.6		107	61.9	51.7-72.1		136	59.9	50.4-69.3

Five percent of persons with diabetes visited a traditional healer and 12.5% were currently taking herbal or traditional treatment to control their diabetes. According to table 25, 18.5% are men and 8.8% women who were previously diagnosed with diabetes were taking herbal or traditional treatment for it.

Table 25: Herbal or traditional treatment of persons with diabetes

Currently taking herbal or traditional treatment for diabetes among those previously diagnosed											
Age Group (years)	Men				Women				Both Sexes		
	n	%	95% CI		n	%	95% CI		n	%	95% CI
25-34	14	14.3	0.0-31.8		27	0.0	0.0-0.0		41	6.0	0.0-13.8
35-44	18	11.1	0.0-24.0		49	6.1	0.0-13.2		67	8.0	1.3-14.6
45-54	41	19.5	6.6-32.4		81	14.8	6.3-23.3		122	16.9	9.1-24.6
55-64	26	30.8	12.3-49.3		86	10.5	2.8-18.1		112	16.6	7.6-25.5
25-64	99	18.5	10.0-26.9		243	8.8	4.2-13.4		342	12.5	7.9-17.0

According to table 26 there is a significant difference between men, 67.6% (95% CI: 46.3%-88.9%) and women, 29.7% (95%CI: 19.6-29.8%) who never have had an eye examination as part of their diabetic control. Fourteen percent of men have had their eyes examined more than 2 years ago and 18.6% within the past 2 years.

Table 26: Persons with diabetes who received eye examination

Time of last eye exam, as part of diabetes control, among those diagnosed with diabetes							
	n	% within the past 2 years	95% IC	% more than 2 years ago	95% IC	% never	95% IC
Men	28	18.6	2.1-35.1	13.8	0.1-27.4	67.6	46.3-88.9
Women	100	39.4	28.6-50.1	30.9	21.9-40.0	29.7	19.6-39.8

Foot examination and cholesterol levels

Sixty-one percent of diabetic respondents (men: 67.6% and women: 58.9%) reported that they never had a foot exam as part of their diabetes management.

Elevated levels of cholesterol were reportedly more prevalent among women, 18.9% (95% CI: 15.7- 22.1) compared to men, 7.9% (95% CI: 5.3% - 10.5%). The prevalence of all respondents was 13.4%.

Cholesterol lifestyle advice

Table 27 shows the percentage of persons who reported being diagnosed with high cholesterol and received advice from a doctor or health worker as part of the management of their condition. The most common advice given to both men and women was to exercise.

Table 27: Persons with high cholesterol who received advice by gender

Percentage of Persons with high cholesterol given lifestyle advice by doctor or health worker											
Age Group	Men				Women				Both Sexes		
(years)	n	%	95% CI		n	%	95% CI		n	%	95% CI
Advised on diet	40	41.4	21.7-61.0		144	46.6	36.9-56.2		184	45.0	35.7-54.3
Advised to lose weight	40	33.7	19.2-48.3		144	48.4	38.3-58.5		184	44.0	35.7-52.3
Advised to exercise	40	56.9	42.8-70.9		144	60.2	49.6-70.9		184	59.2	50.9-67.6

Four percent men and 4.7% women reported visiting a traditional healer for their cholesterol and 6% of men and 6% women reported currently taking herbal or traditional treatment for high cholesterol.

Family history of Respondents

Figure 19 shows the family history of chronic disease conditions of the respondents. Diabetes and hypertension were the most common diseases among family members. The prevalence of a positive family history for the diseases specified was similar for both men and women.

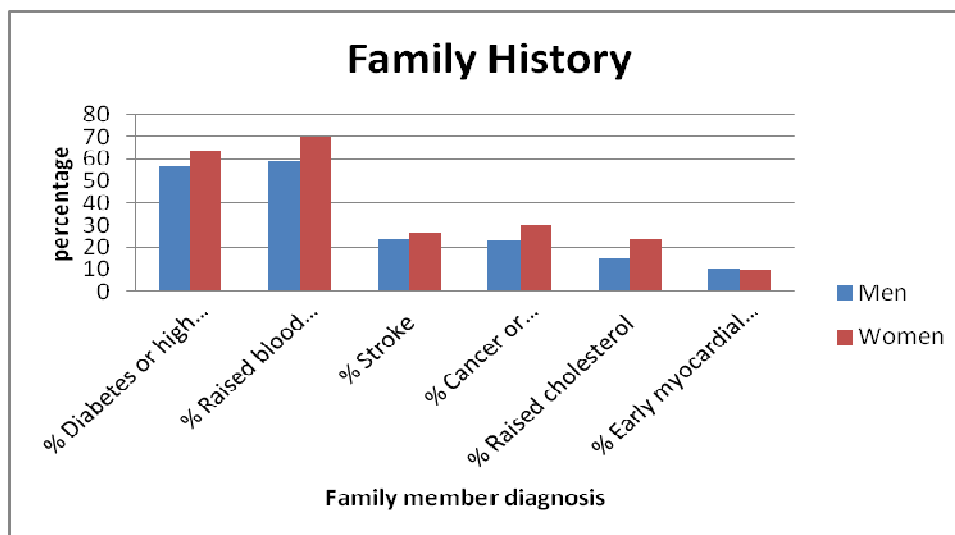


Figure: 19 Family History of chronic diseases

Physical Measurements

Body Mass Index (BMI)

The mean BMI of women (28.9) is statistically significantly higher than that of men (25.2) although both are in the overweight range. There is no significant difference among the age groups in either gender.

Table 28: Body Mass Index (BMI)

Mean BMI (pounds/inches ²)											
Age Group (years)	Men				Women				Both Sexes		
	n	Mean	95% CI		n	Mean	95% CI		<i>n</i>	<i>Mean</i>	<i>95% CI</i>
25-34	128	25.2	24.5-25.9		179	27.7	26.7-28.7		307	26.4	25.8-27.0
35-44	96	25.3	24.6-26.1		147	29.0	28.0-30.0		243	27.1	26.3-27.9
45-54	127	24.9	24.2-25.7		190	29.9	28.7-31.2		317	27.4	26.7-28.1
55-64	85	25.4	24.4-26.4		130	29.8	28.7-30.9		215	27.7	26.9-28.5
25-64	436	25.2	24.7-25.7		646	28.9	28.3-29.5		1082	27.1	26.6-27.5

Figure 20 shows the range of BMI among male and female respondents. More males have normal BMI (48.4% to 28.3%) while more females are obese (36.6% to 13.9%).

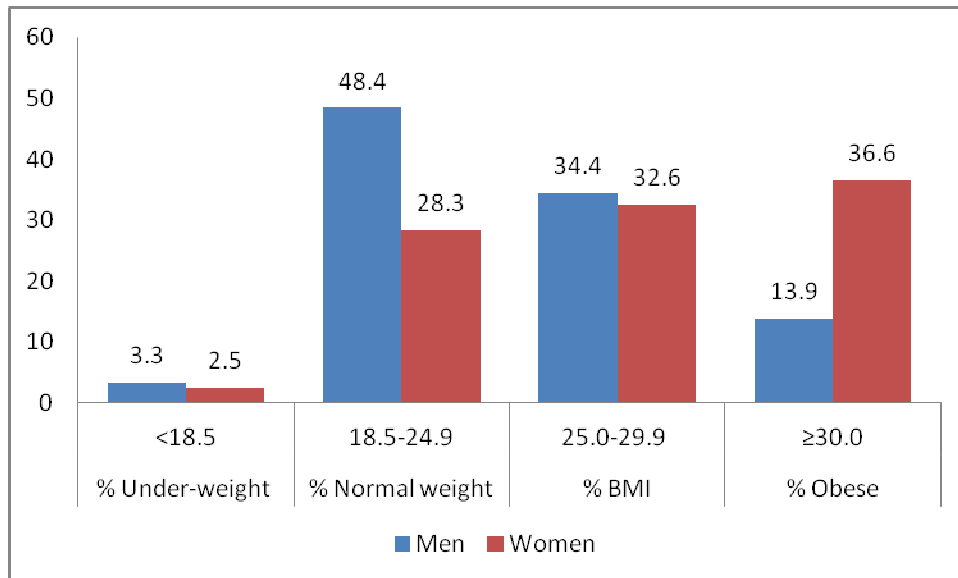


Figure 20: BMI Classifications

Table 29 shows the percentage of respondents classified as overweight (BMI \geq 25). Sixty-nine percent (69%) of women and 48.3% men are over-weight or obese.

Table 29: Body Mass Index \geq 25

Age Group (years)	BMI \geq 25								
	Men			Women			Both Sexes		
	n	% BMI \geq 25	95% CI	n	% BMI \geq 25	95% CI	n	% BMI \geq 25	95% CI
25-34	128	44.5	36.2-52.9	179	58.7	50.4-66.9	307	51.6	45.8-57.4
35-44	96	50.0	39.5-60.5	147	74.8	68.7-81.0	243	62.2	55.0-69.3
45-54	127	48.0	40.4-55.7	190	74.2	67.1-81.3	317	60.8	55.3-66.4
55-64	85	52.9	42.4-63.5	130	72.3	64.9-79.8	215	63.0	56.3-69.7
25-64	436	48.3	43.0-53.6	646	69.2	64.9-73.5	1082	58.7	55.1-62.4

Waist circumference

The mean waist circumference among men and women respondents (excluding pregnant women) were 35.3 (CI: 34.8 – 35.9) and 37.3 (CI: 36.8 – 37.8) respectively as shown in table 30.

Table 30: Waist circumference of men and women

Waist circumference (inches)							
Age Group (years)	Men				Women		
	n	Mean	95% CI		n	Mean	95% CI
25-34	101	35.2	34.2-36.2		126	36.0	35.1-36.9
35-44	80	35.5	34.4-36.5		121	37.4	36.5-38.4
45-54	108	34.8	34.3-35.3		181	37.9	37.1-38.6
55-64	71	36.0	35.0-37.0		122	38.3	37.3-39.3
25-64	360	35.3	34.8-35.9		550	37.3	36.8-37.8

Blood pressure (BP)

The mean systolic and diastolic blood pressure in men was 133.8mm Hg and 81.8 mmHg respectively. The mean systolic and diastolic blood pressure in women was 128 mm Hg and 79.9 mm Hg respectively. Among men the systolic blood pressure shows a slightly increasing trend with the older age groups higher than the youngest. There is no difference in the diastolic BP. Among the women however, there is a definite increasing trend with age for both systolic and diastolic blood pressures in the study sample.

Respondents with raised blood pressure

Table 31 shows that for persons not on any antihypertensive medication (a) blood pressure increases with age and (b) more than a third of the men 35.5% (95% CI 30.7 – 40.2) and more than a fifth of the women, 21.6% (95% CI 17.8 – 25.4%) has raised blood pressure with systolic and/or diastolic blood pressure being equal to or greater than 140 and/or 90 mmHg respectively.

Table31: Participants by Age group and SBP \geq 140 and/or DBP \geq 90

SBP ≥140 and/or DBP ≥ 90 mmHg, excluding those on medication for raised blood pressure											
Age Group (years)	Men				Women				Both Sexes		
	n	%	95% CI		n	%	95% CI		<i>n</i>	%	<i>95% CI</i>
25-34	125	20.8	13.6-28.0		175	11.4	6.7-16.1		300	16.1	11.9-20.3
35-44	93	36.6	27.1-46.1		126	15.9	9.4-22.3		219	27.0	21.3-32.8
45-54	104	45.2	36.3-54.1		148	35.1	27.9-42.3		252	40.4	34.2-46.6
55-64	73	54.8	45.0-64.5		73	50.7	39.2-62.1		146	53.1	46.3-59.9
25-64	395	35.5	30.7-40.2		522	21.6	17.8-25.4		917	28.9	25.7-32.0

Table 32 shows 41% men and 35% women who are on medication for high blood pressure have elevated blood pressure. Again the percentage of persons with uncontrolled blood pressure increases as age increases for both men and women.

Table 32: Participants by Age group and SBP ≥ 140 and/or DBP ≥ 90 (on medication)

SBP ≥140 and/or DBP ≥ 90 mmHg or currently on medication for raised blood pressure											
Age Group (years)	Men				Women				Both Sexes		
	n	%	95% CI		n	%	95% CI		<i>n</i>	%	95% <i>CI</i>
25-34	130	23.8	16.4-31.3		182	14.8	9.2-20.5		312	19.3	14.7-23.9
35-44	97	39.2	29.6-48.8		148	28.4	20.7-36.1		245	33.9	27.9-39.9
45-54	126	54.8	46.3-63.2		190	49.5	42.2-56.7		316	52.2	46.2-58.1
55-64	85	61.2	51.8-70.5		133	72.9	65.3-80.5		218	67.3	61.9-72.8
25-64	438	40.8	35.7-45.9		653	35.3	31.3-39.4		1091	38.1	34.8-41.3

For persons not on any medication 9% men and 7% women have very high blood pressure with SBP ≥ 160 and/or DBP ≥ 100 mmHg. Such persons are at a very high risk of being diagnosed with high blood pressure.

Table 33: Participants by Age group SBP ≥ 160 and/or DBP ≥ 100 mmHg (Not on medication)

SBP ≥160 and/or DBP ≥ 100 mmHg, excluding those on medication for raised blood pressure											
Age Group	Men				Women				Both Sexes		
(years)	n	%	95% CI		n	%	95% CI		<i>n</i>	%	95% <i>CI</i>
25-34	125	4.0	0.6-7.4		175	1.7	0.0-3.5		300	2.8	1.1-4.6
35-44	93	8.6	3.1-14.1		126	5.6	1.5-9.6		219	7.2	3.1-11.3
45-54	104	13.5	7.3-19.6		148	10.8	5.1-16.5		252	12.2	7.7-16.7
55-64	73	16.4	6.3-26.6		73	24.7	14.7-34.6		146	19.8	12.6-27.0
25-64	395	9.1	6.2-11.9		522	7.1	4.7-9.6		917	8.1	5.9-10.4

Table 34 shows that for persons on medication 17% men and 23% women have systolic blood pressure ≥ 160 and diastolic blood pressure ≥ 100 . Among all respondents 20% has systolic blood pressure ≥ 160 and diastolic blood pressure ≥ 100 . This is again indicating inadequate management of high BP. With the exception of the youngest age group, the percentage of women is higher than men.

Table 34: Participants by Age and SBP ≥ 160 and/or DBP ≥ 100 mmHg (on medication)

SBP ≥160 and/or DBP ≥ 100 mmHg or currently on medication for raised blood pressure											
Age Group	Men				Women				Both Sexes		
(years)	n	%	95% CI		n	%	95% CI		<i>n</i>	%	<i>95% CI</i>
25-34	130	7.7	2.9-12.5		182	5.5	2.9-8.1		312	6.6	3.9-9.2
35-44	97	12.4	5.9-18.8		148	19.6	12.7-26.5		245	15.9	10.8-21.0
45-54	126	28.6	20.3-36.8		190	30.5	23.9-37.1		316	29.5	23.8-35.3
55-64	85	28.2	16.6-39.8		133	58.6	50.1-67.2		218	44.2	37.2-51.2
25-64	438	16.6	12.5-20.7		653	23.4	19.9-26.9		1091	20.0	17.0-23.0

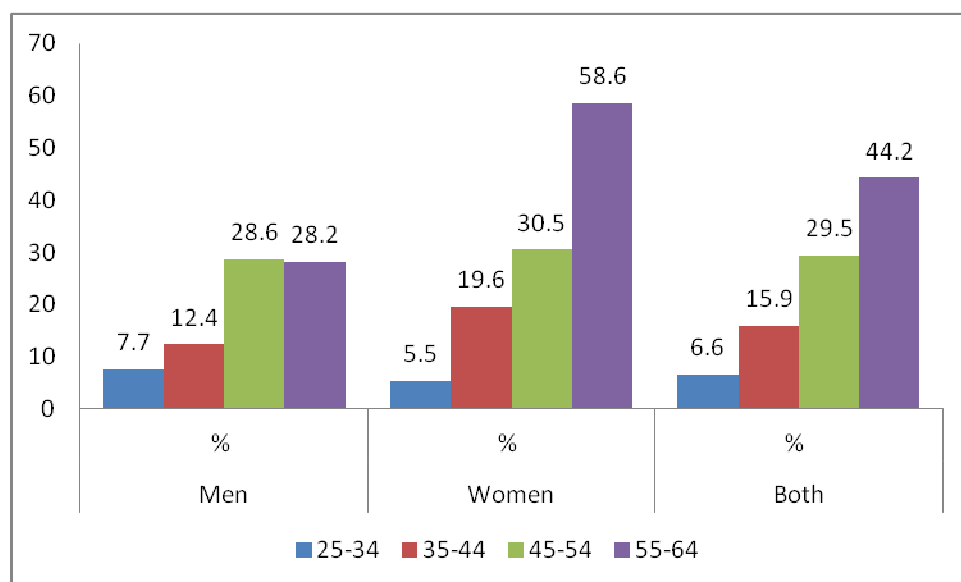


Figure 21: Respondents on medication with SBP ≥ 160 mm Hg and DBP ≥ 100 mm Hg by gender and age

Mean heart rate

The mean heart rate for both men and women was within normal limits and the variation among the different age groups was minimal.

Summary of Combined Risk Factors

The risk factors studied in this survey were as follows:

- current daily smoker
- harmful levels of alcohol consumption
- less than 5 servings of fruits & vegetables per day
- low level of activity
- overweight or obese ($\text{BMI} \geq 25 \text{ kg/m}^2$)
- raised blood pressure ($\text{SBP} \geq 140$ and/or $\text{DBP} \geq 90$ mmHg or currently on medication for raised BP).

Respondents were analyzed in terms of the number of risk factors for each individual. The survey indicated that 61.3% of respondents have 1 or 2 risk factors, 35% has 3 to 5 risk factors and 3.7% has no risk factors.

Table 35: Summary of combined risk factors by age

Summary of Combined Risk Factors							
Age Group (years)	Both Sexes						
	n	% with 0 risk factors	95% CI	% with 1- 2 risk factors	95% CI	% with 3- 5 risk factors	95% CI
25-44	490	3.6	1.8-5.4	67.6	62.1-73.2	28.8	23.0-34.5
45-64	459	3.8	2.0-5.6	49.6	44.3-54.9	46.6	40.8-52.3
25-64	949	3.7	2.3-5.1	61.3	57.1-65.5	35.0	30.4-39.7

Comparing men and women 65.5% men and 57% women has 1 or 2 risks, 30.5% men and 39.8% women has 3 to 5 risk factors and 4% men and 3.3% women had no risk factors. Among respondents with 3 – 5 risks the 45 – 64 age group has a significantly higher combined risk than the 25 – 44 years age group.

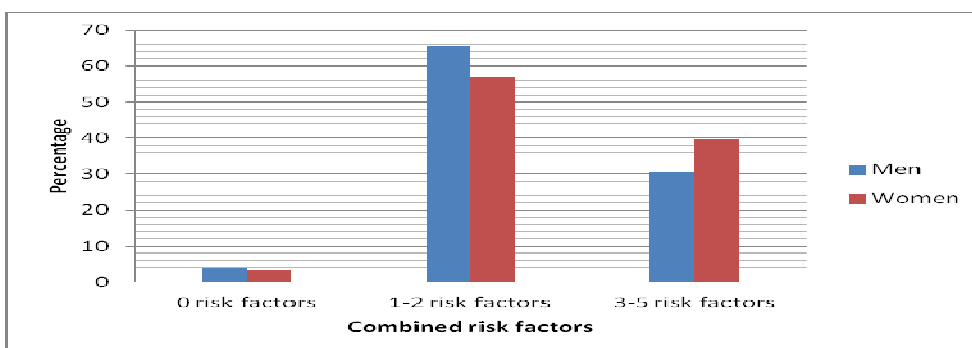


Figure 22: Summary of combined risk factors by gender

Discussion

Non-communicable diseases are the main causes of morbidity and mortality in Grenada. Interventions addressing chronic disease issues must be informed by accurate and reliable data. The STEPS survey will provide invaluable information needed to inform policy and planning. The survey addressed certain known chronic diseases risk factors such as tobacco use, alcohol consumption, diet, physical activity and body mass index.

One of the main preventable causes of death resulting from chronic non-communicable diseases (CNCD) worldwide is tobacco use. The surgeon general report, 2010 “substantiates the evidence that there is no safe level of exposure to cigarette smoke”. It also says that “when individuals inhale cigarette smoke, either directly or secondhand, they are inhaling more than 7,000 chemicals: hundreds of these are hazardous, and at least 69 are known to cause cancer”. Among the conclusions of the report was that “inhaling the complex chemical mixture of combustion compounds in tobacco smoke causes adverse health outcomes, particularly cancer and cardiovascular and pulmonary diseases” (U.S. Department of Health and Human Services, 2010). “Tobacco use is estimated to cause, among other problems, about 71% lung cancer, 42% of chronic respiratory problems, 10% cardiovascular problems and cancers of several other organs” (World Health Organization, 2011). It is not only dangerous for smokers but also for nonsmokers including children and even the fetuses that are exposed to environmental tobacco smoke (ETS).

Tobacco smoking is an important behavioral risk factor in Grenada. Although anecdotal data suggest a decrease in tobacco use, the survey indicated that 3 out of 10 men are current smokers. Also, there is substantial exposure to environmental tobacco smoke both at home (12.5%) and work (21.4%). Tobacco use by women is low with 2.8% smoking daily and 3.7% non-daily over the past 12 months.

A Global Youth Tobacco Survey (GYTS) conducted among 13 – 15 year olds in forms 1 – 4 in 2000, revealed that almost 28% of the students reported having experimented with cigarette smoking. This comprised 34% males and 20.9% females. In general there was an increasing trend in experimentation as form level increased (Grenada GYTS, 2000). The survey indicated that the current use of any tobacco product was 16.4%. Almost 9% reported using cigarettes currently while 11% reported using other tobacco products. One cannot become complacent regarding smoking tobacco. Programs and policies against the use of tobacco and its products must be implemented to counteract advertising, social and other factors that would encourage tobacco use and to further decrease the prevalence of smoking among men, women and children. Initiation of smoking is 17.7 years in males and 20.5 years in women. Tobacco smoking and second hand tobacco is associated with cancers of several organs, heart disease, chronic obstructive pulmonary disease, asthma and other health problems. Grenada has conducted the “Global youth tobacco survey” several times, is a signatory to the Framework convention on tobacco control and is obligated to implement the terms of this convention. In 2007, smoking was banned in Government buildings by way of a Cabinet conclusion. Currently, the National Anti Tobacco Committee set up by cabinet is reviewing draft model legislation to send to Cabinet for approval. Cabinet has decided to ban smoking in government buildings and in public places.

Alcohol consumption

The results of the study indicated that alcohol consumption was relatively high. Fifty-five percent (55%) of respondents have consumed alcohol in the last 12 months. This is made up of 63.3% men and 24.8% women who drank in the last month plus 6.8% men and 14.5% women who drank in the past 12 months. Of great concern is the frequency of drinking and the amount of drinks consumed on one occasion. Thirty-eight percent (38.%) of men had 5 or more drinks and 11.6 % women had 4 or more drinks at least once during the past month. Also of concern, is the mean maximum amount of drinks consumed on one occasion in the past month by both men (6.5 drinks) and women (3.9 drinks). The number of alcoholic drinks consumed by men decreased as age increased with the youngest men 25 to 34 consuming a mean of 8 drinks in one session. The number of alcoholic drinks consumed by men is more than that consumed by women.

The recommendation from the NHS is that “men should not regularly drink more than 3 to 4 units of alcohol a day and women should not regularly drink more than 2 to 3 units of alcohol a day” (5). “The Royal College of Physicians (RCP) advises no more than 21 units per week for men and 14 units per week for women” (6). The harmful use of alcohol accounts for about 3.8% of all deaths in the world. More than half of these deaths occur from NCDs including cancers, cardiovascular disease and liver cirrhosis (2). “Harmful drinking is a major determinant for neuropsychiatric disorders, such as alcohol use disorders and epilepsy and other non-communicable diseases such as cardiovascular diseases, cirrhosis of the liver and various cancers” (7).

Fruits and vegetables consumption

Fruits and vegetables are very important components of a healthy diet. Researchers found that “ individuals who ate more than 5 servings of fruits and vegetables per day had roughly a 20 percent lower risk of coronary heart disease and stroke, compared with individuals who ate less than 3 servings per day” (8). WHO in Promoting fruit and vegetable consumption around the world stated that “Insufficient intake of fruit and vegetables is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of ischaemic heart disease deaths and about 9% of stroke deaths” (9).

The steps survey showed that the mean number of servings of fruits and vegetables eaten by respondents is 2.2 and 1.5 respectively per day. On average fruits and vegetables are eaten on 4.5 days per week. Respondents eat less than 4 servings on average per day.

Three quarters of respondents, either ate no fruits and/or vegetables or less than 5 servings of fruits and vegetables per day. Although there is slightly more women than men the difference is not significant. With such a large proportion of respondents eating less than adequate or no fruits and/or vegetables, it is therefore incumbent on policy makers and planners to implement measures that would facilitate the consumption of more fruits and vegetables.

A minimum of 5 servings of fruits and vegetables per day is therefore needed to provide the body with the fibre, vitamins and minerals needed to control weight, protect against inflammation and chronic non-communicable diseases such as diabetes, heart disease, and cancer.

Total Physical Activity

“Physical inactivity is a major independent modifiable risk factor for chronic diseases such as cardiovascular disease, ischaemic stroke, type 2 diabetes, colon cancer, and breast cancer.”

“Physical inactivity is the fourth leading risk factor for global death, after high blood pressure, smoking and high blood glucose, and levels of physical inactivity are rising in many countries. This increase has major implications for health and the prevalence of NCDs, such as:

1. Around 3.2 million deaths per year, including 2.6 million in low- and middle-income countries, are due to physical inactivity.
2. Over 670,000 premature deaths (people aged under 60 years).
3. Physical inactivity is estimated as being a cause of breast and colon cancer, 27% of diabetes and 30% of ischaemic heart disease”. (10)

In this survey, total physical activity is determined by the intensity and duration of work, transport or recreation related activities undertaken. About half of the persons surveyed exhibited a high level of physical activity and a third a low level. More men (61%) were engaged in high intensity level activity than women (36%) while more women (40%) were engaged in low intensity level physical activity than men (27%). The mean minutes or time during which men engaged in the three forms of activity were higher than that for women.

Work-related physical activity contributed the largest proportion toward total physical activity for both men and women. Transport contributed a larger percentage towards total physical activity in women than men. Contributions from recreational activities were small for both men and women.

More women reported “no vigorous physical activity” than men. Eight out of 10 women reported does “no vigorous physical activity” compared to 46% men. Seventy-three percent women reported “no recreation” compared to 55% men.

With regards to sedentary activities, it is the 25 to 34 year age group that seems to be at greatest risk. Interventions should therefore target this age group. In general, less time and effort were spent in recreational activities compared to work and transport-related activities, while sedentary activity was high among the younger persons.

According to the World Health Organization (WHO) “In order to improve cardiorespiratory and muscular fitness, bone health and reduce the risk of NCDs and depression the following are recommended:

1. Adults aged 18–64 years should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity.
2. Aerobic activity should be performed in bouts of at least 10 minutes duration.
3. For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic

physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity.

4. Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.” (WHO, 2010)

Body Mass Index (BMI) and Waist Circumference (WC)

Almost 70% women and 48% men are either overweight or obese. Women are almost 3 times more likely than men to be obese. Only a third of the women have normal weight compared to 50% men. The mean BMI for women and men are in the overweight range though that of women is higher than for men. With such a large proportion of the population being overweight or obese there is increased risk of health problems such as diabetes, heart disease, high blood pressure and cancer.

The waist circumference is a measure of abdominal obesity or central obesity. There is a strong correlation between waist circumference and chronic diseases such as cardiovascular diseases and type 2 diabetes. A waist circumference of 37 inches in men and 31.5 inches in women is associated with increased health risk of chronic diseases while a waist circumference of 39.5 inches in men and 34.6 inches in women with greatly increased risk. In this survey the mean waist circumference among men and women respondents (excluding pregnant women) is 35.3 inches and 37.3 inches respectively. This indicates that Grenadian women are at greatly increased risk for lifestyle chronic diseases.

Raised blood pressure

Although the mean systolic and diastolic blood pressure for men (134 mm Hg and 82 mm Hg) and women (128 and 80) was within normal limits, however, a large proportion of respondents had raised blood pressure. Thirty six percent men and 22% women have elevated blood pressure and are not on any medication. More critically 9% men and 7% women have systolic BP ≥ 160 mm Hg and diastolic BP ≥ 100 mm Hg. Such persons are at very high risk of high blood pressure and are not aware of their risk. In addition 41% men and 35% women have SBP ≥ 140 mmHg and DBP ≥ 90 mm Hg although on medication for high BP. Even more alarming, 17% men and 23% women have SBP ≥ 160 mm Hg and DBP ≥ 100 mm Hg although on antihypertensive medication.

The high prevalence of raised blood pressure in is of great concern. Two issues are highlighted here. Firstly, there are persons with elevated blood pressures who were not known to be hypertensive. Such persons should be followed up and advised to utilize the existing opportunities for screening to ascertain whether or not they are hypertensive. Secondly, there were those who were previously diagnosed with high blood pressure and on medication, but whose blood pressure were still elevated, some above SBP ≥ 160 mm Hg and DBP ≥ 100 mm Hg. Is this a situation of poor adherence to treatment by clients or inadequate follow up and control by health care providers? Such findings must be investigated. Known hypertensive persons with such levels of blood pressures are at risk of other adverse health problems.

Combined Risk

In summary therefore, looking at the combined risk factors, 3 out of every 10 men and 4 out of every 10 women are at very high risk for chronic diseases with 3 to 5 risk factors. Sixty-six percent men and 57% women have 1 to 2 risk factors and are at higher than normal risk. Only 3.7% have no risk at all.

All the risk factors studied are of concern especially high blood pressure, low total physical activity and alcoholism.

Conclusions and Recommendations

The STEPS survey highlighted the extent to which risk factors are impacting the lives of Grenadians. A large proportion of men and women are affected by the different factors studied.

Tobacco use: Nineteen percent (19%) currently smoke tobacco, **11.1%** smoke daily, **12.5%** percent were exposed to smoke at home, **21.4%** exposed to smoke at work.

Alcohol consumption: Forty-four percent (44%) drank alcohol in the past 30 days, **38.2%** engage in heavy episodic drinking (men who had 5 or more) 11.6% women had 4 or more drinks on any day in the past 30 days

Fruit and vegetable consumption: The mean number of servings of fruit is 2.2 per day, 1.5 servings of vegetable per day, 72% males and 79% females ate less than 5 servings of fruit and/or vegetables on average per day.

Physical activity: Forty-nine percent of respondents reported a high level of activity, 63% did not engage in vigorous activities.

Physical measurement: 58.7% are overweight ($BMI \geq 25 \text{ kg/m}^2$), 25.2% are obese ($BMI \geq 30 \text{ kg/m}^2$), Twenty-nine percent(29%) of persons who were not on medication, have elevated blood pressure. The blood pressure of 38% of persons with known high blood pressure and are on medication were still elevated.

The results of this survey will be used to inform policy and provide guidance regarding the implementation of appropriate measures aimed at addressing the issues identified. Targeted interventions have to be formulated to control and ultimately reverse the effects of these risk factors on the nation's health.

The following recommendations should therefore be given due consideration.

- Enact laws prohibiting smoking in public places and therefore reducing exposure to secondhand smoke at home and in the workplace.
- Increase health promotion activities targeting schools, churches, institutions, work places advocating healthy lifestyle and educating the public on the harmful effects of smoking and secondhand smoke, excessive alcohol consumption, too much fats and salt consumption and lack of physical activity.
- Strengthen physical education programmes in schools from kindergarten to tertiary level.

- Strengthen the implementation of the health promoting schools programme in all schools. Facilitate healthy eating at the tuck shops in all schools.
- Implement recommendations from expert consultation reports such as the WHO/FAO recommendations on diet, nutrition and prevention of chronic diseases.
- Set population nutrient goals and recommends intake of a minimum of 400 g of fruits and vegetables per day for the prevention of chronic diseases such as heart diseases, cancer, diabetes and obesity.
- Liaise with the Ministry of Sports and the police force to implement/strengthen after work and after school exercise sessions in all communities
- Strengthen collaboration with the private sector and NGOs such as, the Diabetes Association to increase screening for high blood pressure and other chronic diseases in all workplaces, shopping malls, institutions.
- Liaise with the appropriate ministries and institutions to ensure that public facilities such as playing fields and the stadium are available and accessible for recreational activities and that where new road are built that there will be sidewalks to facilitate walking.

The findings of this initial STEPS survey must not be ignored but utilized to guide policies and inform interventions in order to improve health and reduce chronic disease risk in Grenada. Dissemination of the findings and implementation of the recommendations will likely serve as a strong reinforcement for the sustainability of chronic disease surveillance. The results obtained from this study together with findings from similar studies such as the Grenada Heart Project must be optimally utilized in planning interventions and guiding future research.

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