WHO STEPS

Liberia Chronic Disease Risk Factor Surveillance
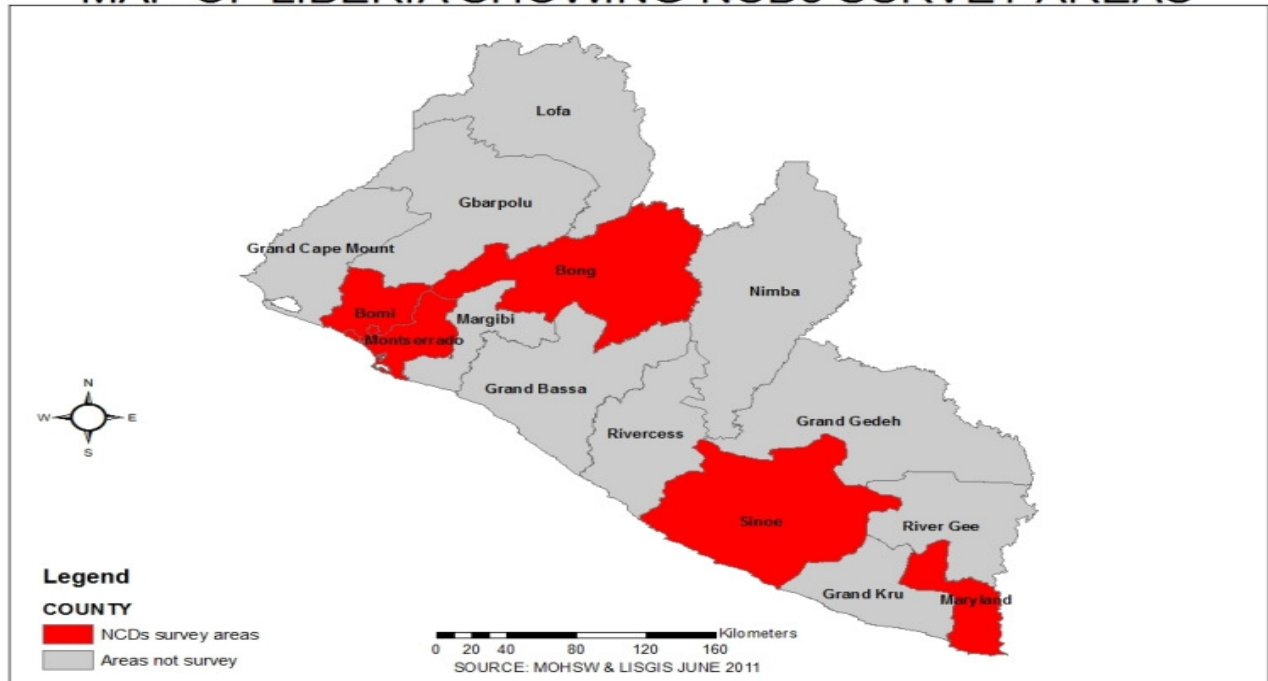
Ministry of Health and Social Welfare
Republic of Liberia

Figure 1.0: Map of Liberia

MAP OF LIBERIA SHOWING NCDs SURVEY AREAS

Legend

COUNTY

NCDs survey areas

Areas not survey

SOURCE: MOHSW & LISGIS JUNE 2011

Acknowledgement

The NCDs risk factors surveillance was conducted from February to March 2011. It is the first national survey on NCDs to provide important information and data for formulating programs and policies that will help alleviate suffering associated with chronic non-communicable diseases and improve the lives of our people.

The Ministry of Health and Social Welfare extends sincere gratitude to WHO for both technical and financial support, Faith Kamara, NCDs Focal Person at the Ministry, Liberia Institute for Statistics and Geo-Services (LISGIS), and the entire survey management team for a successful survey.

Extra gratitude is due the author, Mr. C. Sanford Wesseh, the technical support team, Dr. Peter Clement (WHO-Country Office) and Melanie Cowan (WHO-Headquarters, NCDs Technical Officer) for their meaningful contributions and efforts towards the development of this report. Lastly, all Liberians who participated in this worthy endeavour merit special thanks and appreciation for their time and tolerance to provide essential and requisite information to data collectors.

We hope that data and information contained in this report will be appreciated, meaningful and fully utilized in health development planning, programming and decision making for all stakeholders to improve the health and wellbeing of all Liberians.

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List of Abbreviations

BMI	Body Mass Index
BP	Blood Pressure
CVD	Cardiovascular Disease
DBP	Diastolic Blood Pressure
EPHS	Essential Package of Health Services
ETS	Environmental Tobacco Smoke
FCTC	Framework Convention for Tobacco Control
GPAG	Global Physical Activity Questionnaire
HBP	High Blood Pressure
LDHS	Liberia Demographic and Health Survey
LISGIS	Liberia Institute for Statistics and Geo-information Services
MOH	Ministry of Health
MOHSW	Ministry of Health and Social Welfare
NCDs	Non-Communicable Diseases
PDA	Personal Digital Assistant
PSU	Primary Sampling Unit
SBP	Systolic Blood Pressure
SSU	Secondary Sampling Unit
STDs	Sexually Transmitted Diseases
UNDP	United Nations Development Program
WC	Waist Circumference
WHO	World Health Organization

Executive Summary

Chronic diseases are diseases of long duration and generally slow progression. Chronic diseases, such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes, are by far the leading cause of mortality in the world, representing 60% of all deaths. Out of the 35 million people who died from chronic disease in 2005, half were under 70 and half were women.

In Liberia, the burden of NCDs is unknown though some piece-meal hospital based studies were conducted especially in the JFK Medical Center, St. Joseph's Catholic Hospital and the Firestone Hospital. Scopes of these studies were limited to complications related to hypertension and diabetes mellitus. Before 2010, there was no program on NCDs, partly because of many years of conflict coupled with weak health system. It is likely that the burden of NCDs could be increasing silently among the general population. d

A multistage sampling strategy with 3 stages consisting of county, district and chiefdom/clans was employed during this survey. The World Health Organization STEPwise Approach (STEPS) was used as the design basis for the survey. The 5 randomly selected counties for the survey were Bomi, Bong, Maryland, Montserrado and Sinoe. The survey targeted individuals aged 25-64 years.

A total of 2,503 adult aged 25-64 years participated in the survey with an overall respond rate of 87.1%. There were 57.5% (n=1,438) females and 42.5% (n=1,065) males involvement in the survey. Approximately 38% of the respondents had no formal education with a significant proportion being females (48.8%). The proportion of respondents with high school education level completion was 22.7% while university level education attainment amongst the survey participants was only 7.3% with a huge disparity between males and females. The sampled population that was never married constitutes 33.8% while 43.9% were currently married and 13.4% cohabiting ("living together"). Litoltle over half (50.6%) of the respondents were self employed and 16.7% were employed either in the public sector (8%-government employees) or in the private sector (8.7%-non-government employees). One-third (32.7%) of the respondents were unpaid (unemployed).

The survey shows that 11.5% of the respondents are current tobacco users with 9.9% engaged in smoking tobacco products such as cigarettes, cigars or pipes of tobacco. Only 2.1% of the interviewed population use smokeless tobacco product with males constituting 1.1% and female 3.1%. Among the current and daily smokers, males dominated with 17.2% and 13.9% respectively, compare with 2.8% female current smokers and 1.3% daily smokers. The average age at which tobacco smoking was initiated was 21 years with 91.8% of daily smokers smoking approximately 6 sticks of manufactured cigarette daily. Exposure to Environmental Tobacco Smoke (ETS) was prevalence among the survey participants with 37.5% of respondents were expose to smoking at home and 43.1% at the workplace.

The proportion of respondents who currently drink alcohol such as beer, whisky, spirit and local beverages, is 24% with males constituting 34.3% and females 14%. The proportion of lifetime

abstainers is 63.2% with a significant proportion being females (75.2%). Among the current alcohol consumers, 23% of males and 9.7% of females were engaged in episodic drinking (i.e. men who had 5 or more bottles and women who had 4 or more alcoholic drinks on any day in the past 30 days prior to the survey). Furthermore, 14.3% (17.2%-males and 7.9%-females) of the respondents drank alcohol daily in the past 12 months prior to the survey.

The mean number of days, fruits and vegetables were consumed by all respondents was 2 and 4 days respectively. In addition to fruit consumption, the mean number of serving of fruits and/or vegetables on average per day was 1.

The survey revealed that less than half of the sampled population (47.3%) was engaged in high level physical activities. High level physical activity defined by the survey include 3 day of intense physical activities such as lifting or carrying heavy loads, digging and/or construction works, or 7 day of walking or jogging. Although, less than 50% of the respondents were not involved with high level physical activities, more than fifty percent (51.6%) of interviewed men compare to 43.1% of women were engaged in high level physical activity. For moderate and low physical activities such as brisk walking or carrying light loads, travel to and from places, activity at work, and recreational activity were undertaken by 19.5% (18.6%-male and 20.3%-females) and 33.2% (29.8%-male and 36.6%-female) of respondents respectively. Overall, 59.9% of respondents (54.4%- male and 65.4%-female) were not engaged in any vigorous physical activity.

The mean blood pressure of all respondents including those who were on medication for hypertension was 128.7/79.7 for both sexes, 129.7/79.5 for males and 127.8/79.9 mmHg for females respectively. The proportion of respondents with SBP of ≥ 140 mmHg and/or DBP ≥ 90 mmHg including those currently on medication for hypertension was 30.7% for both sexes, 30.3% for males and 31% for females respectively. On the other hand, those with hypertension (SBP ≥ 140 and/or DBP ≥ 90 mmHg) who are not currently on medication for hypertension was 88.2% for both sexes, 90.5% for males and 86% for females. Only 11.8% of those respondents (9.6%-male and 13.9%-female) with hypertension were on antihypertensive drugs.

A significant proportion of the respondents (91.5%) had never measured their glucose level. The mean fasting blood glucose, including those currently on medication for diabetes was 96.7 for both sexes, 97 for males and 96.4 for females. Furthermore, the percentage of respondents that are currently on medication was 19.2% for both sexes, 19% for males and 19.3% for females.

The analysis of the survey (STEPS) provides data and information on the prevalence of NCDs risk factors in Liberia. With the emerging concern of non-communicable diseases risk factors in Liberia, a critical step that is require to prevent, control and mitigate these casual factors is a national policy and strategy formulation. Tools are now available to collect important risk factors of non-communicable diseases such as was used in this survey. The Ministry of Health and Social Welfare should work with the relevant institution to enforce the regulation/legislation on tobacco use (ban on public smoking, sale to minor, etc), create awareness on the importance of fruits and vegetables consumption and promote healthy lifestyle by exercises, regulation of diet, etc. in order to prevent and control the wide spread of NCDs.

Chapter 1: Introduction

Liberia is located on the West Coast of Africa, and borders Côte d'Ivoire, Guinea and Sierra Leone. With a total land area of 111,369 square kilometers, the country is divided administratively into 15 counties.

The 2008 Population and Housing Census of Liberia shows a population of 3,476,608. In terms of sex ratio, women account for 49.9% of the population while men account for 50.1%. The fertility rate is currently 5.2 indicating a substantial reduction since 1986 from 6.2 in 1999-2000 and 6.6 in 1986.

The country's health indicators though improving, but remain unsatisfactory. According to the 2007 Liberian Health and Demographic Survey, childhood mortality has decreased substantially. Infant mortality has declined from 144 in 1986 to 71 per 1000 live birth in 2007. Under-five mortality also declined from 220 in 1986 to 110 per 1000 live birth in 2007. On the other hand, while child mortality rates are reducing, Maternal Mortality Rate is on the increase. Maternal mortality rate increased from 260 in 1986 to 994 deaths per 100,000 live births in 2007, representing one of the highest Maternal Mortality Rate in Sub-Saharan Africa. Similarly, one in every nine Liberian children dying before reaching age five signals that government continues to face a crisis related health care delivery in Liberia[1]. Life expectancy at birth has increased from 55 in 1980 to 59 years in 2010 (UNDP).

Communicable diseases constitute the high burden of morbidity and mortality. Malaria, acute respiratory infections, diarrhea, tuberculosis, sexually-transmitted diseases (STDs), intestinal worms, skin diseases, malnutrition, and anemia are the most common causes of ill health. In fact, the more prevalent infectious diseases and malnutrition in developing countries are going to be replaced by non-communicable disease in the near future. By the year 2020, non-communicable diseases are expected to account for 7 out of every 10 deaths in the developing regions, compared with less than half at present.

Many of African countries are in a transitional period with respect to the epidemiology of chronic diseases such as diabetes mellitus, cardiovascular diseases, and the associated risk factors like obesity, smoking etc.,. Though Liberia's health services have been severely disrupted by many years of conflict, it is gradually being restored.

A national health policy and strategic plan were developed with the Essential Package of Health Services (EPHS) as its cornerstone. The policy provides a platform for development of other program specific policies and strategies.

In Liberia, the burden of NCDs is unknown though some piece-meal hospital based studies were conducted especially in the JFK Medical Center, St. Joseph's Catholic Hospital and the Firestone

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[1] Demographic and Health Survey, 2007

Hospital. Scope of these studies was limited to complications related to hypertension and diabetes mellitus. Before 2010, there was no program on NCDs, partly because of many years of conflict coupled with weak health system. It is likely that the burden of NCDs could be increasing silently among the general population.

Except for one hypertension study done in 1989 by Giles WH et al, published by the America Journal of science, which reveals that 12.5% of the study population (n=5,388) among rural and plantation workers in Liberia had hypertension, there is not a survey conducted on non communicable disease risk factors. Similarly, no data on non-communicable disease risk factors.

Among other actions, the government has ratified the Framework Convention for Tobacco Control (FCTC) and has enacted legislation that ban smoking in public places.

The Ministry of Health and Social Welfare conducted the STEPS surveillance for the chronic non communicable disease risk factors in order to provide evidence based information for estimating the magnitude of chronic disease risk factors among the general population, for publication, planning and strategic interventions.

1.1   Background of the Survey

Chronic diseases are diseases of long duration and generally slow progression. Chronic diseases, such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes, are by far the leading cause of mortality in the world, representing 60% of all deaths. Out of the 35 million people who died from chronic disease in 2005, half were under 70 and half were women.

The prevalence of cardiovascular disease and other chronic diseases is growing worldwide but more rapidly in developing countries, where people are affected at much younger ages than in developed countries[2]. Globally, tobacco use and alcohol consumption have increased in recent decades, particularly among men in developing countries, contributing to the increasing prevalence of chronic diseases and cancers[3]. A few risk factors account for a large proportion of chronic diseases. Smoking, high blood pressure, and high cholesterol cause approximately 75% of heart attacks and strokes[4].

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[2] Joshi R, Cardona M, Iyengar S, Sukumar A, Raju CR, Raju KR, et al. Chronic diseases now a leading cause of death in rural India — mortality data from the Andhra Pradesh Rural Heath Initiative. Int J Epidemiol 2006;35(6):1522-9

[3] Teo KK, Ounpuu S, Hawken S, Pandey MR, Valentin V, Hunt D, et al. Tobacco use and risk of myocardial infarction in 52 countries in the INTERHEART study: a case-control study. Lancet 2006; 368 (9536):647-58.

World Health Report 2002: reducing risks, promoting healthy life. Geneva (CH): World Health Organization; 2002

[4] Vartiainen E, Sarti C, Tuomilehto J, Kuulasmaa K. Do changes in cardiovascular risk factors explain changes in mortality from stroke in Finland? [Published erratum in: BMJ 1995;311(7016):1339]. BMJ 1995;310(6984):910-4

Non-Communicable diseases (NCDs) and Mental Health are the leading causes of death worldwide, causing 60% of the global deaths and 46% of the global burden of disease (Nigel U, 2001a, WHO 2001, Murray CJL, et al., 1996). NCDs include cardiovascular disease, such as stroke, and heart attacks, diabetes, chronic lung disease, cancer, diseases of bones and joints and mental illness (Nigel U, 2001a). The biggest single killer is coronary heart disease, followed by cancer and chronic lung disease. Diabetes is a major contributor to deaths from cardiovascular disease, but also causes its own unique complications. Common risk factors of these NCDs include smoking, physical inactivity, obesity and diets high in saturated fat and sodium and low in fruit and vegetables intake (Nigel U, 2001a).

The emergence of NCDs as the predominant health problem in wealthy countries accompanied economic development and hence they have been referred to as *diseases of the affluent* (Nigel U, 2001). This is a misleading notion, which suggests that there is no problem in developing countries, which are resource constrained. The second school of thought classifies NCDs as diseases of *urbanization.* Studies have indicated that urbanization was directly associated with increase in NCDs (Nigel U, 2001a, WHO 2000, Nigel U 2001b, Fourie J, et al, 1995).

Many developing countries are affected by a double burden of disease; the combination of long established infectious diseases, with a rapidly growing new epidemic of chronic NCDs (WHO 2000). Until recently, risk factors such as raised blood pressure, cholesterol, tobacco use, excess alcohol consumption, obesity, and the diseases linked to them were associated with developed countries. In the World Health Report of 2002 it was shown that even in the poorest regions of the world, these common risk factors are now causing a rising burden of serious disease and untimely deaths (WHO 2003). In Tanzania studies have indicated that in the adult population the probability of death from non-communicable diseases is higher than in developed countries (Nigel U, 2001a, Setel P, et al, 2000).

The burden of non-communicable diseases in the Sub-Saharan Africa countries is already substantial. They bore more than 40% of the total global burden of diseases in 1990 and patients with these conditions make significant demands on health care resources (Nigel U, 2001b, Murray CJL 1996). Data from some African countries suggests that predominantly in urban settings, the prevalence of diabetes and hypertension has increased markedly over the past ten years (Nigel U, 2001b).

In Liberia, the burden of NCDs is unknown. There has been no program on NCDs, partly because of many years of conflict coupled with weak health system. It is likely that the burden of NCDs could be increasing silently among the general population. Also, hypertension, cancers and diabetes currently account for 5%[5] of health facility visits. No survey on prevalence of non communicable diseases or its risk factors has been conducted, and there is also no documented data on non communicable diseases risk factors.

The Ministry of Health and Social Welfare has prioritized a national STEPS surveillance to provide evidence-based data for establishing the magnitude and prevalence of non-

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[5] MOH&SW morbidity reports 2009

communicable chronic diseases risk factors among the general population, particularly among persons 25 to 64 years for program interventions and policy formulation.

1.2   Goal and Objectives of the Survey

The goal of the STEPS surveillance is to facilitate development of health sector policy and planning that will contribute to improved health status of the general population.

The overall objective is to assess Non Communicable Disease risk factors in the adult population of Liberia using the WHO Stepwise approach to non-communicable diseases surveillance.

The specific objectives are as follows:

- o   To determine the prevalence and determinants of hypertension
- o   To determine the prevalence of tobacco use
- o   To determine the prevalence of alcohol consumption
- o   To determine the magnitude and prevalence of chronic diseases risk factors
- o   To establish baseline for chronic non communicable diseases risk factors
- o   To identify dietary practice that are risk factors for selected NCDs
- o   To determine the prevalence and determinants of diabetes

1.3   Methodology

1.3.1   Survey Design

This survey was designed based on the WHO STEPS Survey approach. The survey utilize the STEPS procedures for calculating sample size at the primary (district-PSU) and secondary (Chiefdom-SSU) levels, the Kish Method for household level sampling, a generic questionnaire that are adaptable by countries and Personal Digital Assistance (PDAs) that are approved by WHO for data collection and submission including blood pressure monitors (omron), blood pressure monitor cuffs and weighing scales.

The survey was conducted on a sample of adult Liberians population aged 25 to 64, residing in five selected Counties out of the fifteen Counties of Liberia. Counties selected were; Bomi, Bong, Maryland, Montserrado and Sinoe. The survey was conducted from February to March 2011.

STEPS is a sequential process starting with gathering information on key risk factors by the use of questionnaires (Step 1), then moving to simple physical measurement (Step 2) and then the collection of blood samples for biochemical assessment (Step 3). In addition to the three steps used in risk factor assessment, the conceptual framework of STEPS also includes three modules in the assessment of each risk factor, namely core, expanded and optional.

1.3.2   Sample Size

The sample size of the survey was 2,597 covering five counties; Montserrado-1,553, Bomi-157, Bong -485, Sinoe-168 and Maryland 234. However, 2,503 questionnaires were completed and analyzed.

1.3.3   Sampling Method

Random multi-cluster sampling method was used to collect data during this survey in 5 of the 15 counties of Liberia with the district serving as the primary sampling unit. Different sampling frames were designed and used at the district (Primary Sampling Unit-PSU), Chiefdoms (Secondary Sampling Unit-SSU) and household levels. Households listing generated from the 2008 National Population Census was used, and in each household, the list of individuals' resident was obtained and the Kish Method was used. Kish Method is a household sampling technique developed by WHO for STEPS.

The field team selected households by using nutrition sampling method (throwing a pencil to get a selected direction). When the household enumeration sampling point is established, the interviewer counts all the households and using interval sample to get the household number. In each household, one person was selected using the Kish method.

1.3.4   Survey Questionnaire

Liberia conducted all three steps of the surveillance (Steps 1, 2 and 3) during this survey. The exercise included both core and expanded questionnaires for the three steps. A brief explanation of each step has been elaborated below:

Step 1: This portion of the questionnaire focused on the demographic information and behavioural measurements which include tobacco smoking, alcohol consumption, fruits and vegetable consumption and physical inactivity.

Step 2: This component of the questionnaire gather data on physical measurements such as weight and height, waist circumference, blood pressure as well as hip circumference and heart rate.

Step 3: Focus on biochemical measurements (ie: blood sugar or glucose).

1.3.5   Field Staff Training

A three day Step surveillance survey training Workshop was organized and held to prepare interviewers and supervisors successfully conduct the Step survey. The training was attended by 25 field staff and facilitated by a Technical Assistance from WHO. During the training, field staffs were taught interviewing skills and techniques to administer questionnaire.

Specific areas of the training included the following:
 • Personal Digital Assistant (PDA) use;
 • Community entry and interview techniques and skills;
 • Use of interviewer instructions and show cards;

- Physical measurements in accordance with approved protocols;

1.3.6   Data Processing

The data was edited and coded as per the step surveillance manual and entered into the WHO recommended Epi Info software version 3.4. The data was analyzed and graphed using MS Excel.

Chapter 2:   Demographic Information of Respondents

The purpose of this chapter is to provide a descriptive summary of some demographic and socio-economic characteristics of the respondents. The STEPS questionnaire included questions on age, sex, educational status, and marital status for all persons interviewed.

2.1   Age and Sex

Age and sex are important variables that are used as the primary basis for demographic classification and analysis. The age-sex distribution of adults in the sampled households is shown in Table 2.1. Out of the 2,503 adults interviewed, 1,834 were aged 25-44 years, and 669 aged 45-64 years. The majority of the sampled population was women constituting 53.5% and men 42.5%.

Table 2.1: Age and Sex Distribution of Respondents						
Age Group	Men		Women		Both Sexes	
(years)	N	%	n	%	n	%
25-44	754	41.1	1080	58.9	1834	73.3
45-64	311	46.5	358	53.5	669	26.7
25-64	1065	42.5	1438	57.5	2503	100

2.2   Educational Status

Education is a key determinant of the lifestyle and status an individual enjoys in a society. Studies have consistently documented that educational attainment has a strong effect on health behaviors and attitudes. Results from the STEPS Survey assess respondents' educational accomplishment. Liberia's education system has been unstable for a little more than 15 years because of the civil crisis; however, a major restructuring of the infrastructure and program is being undertaken by the government. Presently, the government of Liberia has adopted a free primary education policy in all public schools with a special program for female education. The government is undertaking massive renovation of damaged infrastructure including school buildings.

Figure 2.1 below shows a very high proportion of sampled females (48.8%) and males (22.6%) that had no formal education. Approximately 11.2% of males and 4.5% females completed university education. Significant proportion of the sampled population completed high school education compare to the other levels.

Figure 2.1: Distribution of Respondents by Education Level Completed

n= 1055 Male, 1411 Female

Education Level	Male	Female
No Formal Edu.	22.6	48.8
Primary	11.4	9.3
High School	30.8	16.7
University	13.7	5.1
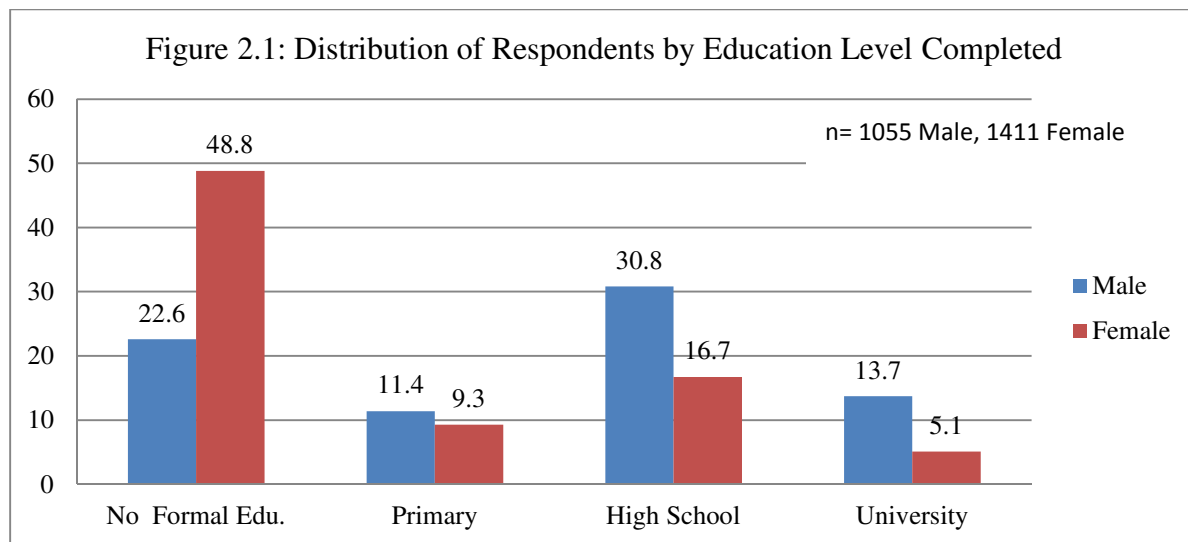
2.3   Marital Status

The internationally accepted definition for marriage is; a legal union of persons of opposite sexes, with legality established by civil, religious and other means as recognized by Laws of a given country, which Liberia subscribes to. The meaning of marriage includes consensual union, common-law and other de facto unions which, although not registered, make up majority of marriages in some countries (Shryock et al.: 1976).

In Liberia, there are three major types of marriages: the Western (religious and civil), traditional (dowry) and consensual (living together) marriages. The marital statuses were classified as never married, married, cohabiting, divorced, separated and widowed.

Figure 2.2 presents the percentage distribution of respondents by marital status. The survey results show that significant proportion of the respondents were married (43.9%) and 33.8% were never married and 13.4% were cohabiting (living together).

Figure 2.2: Distribution of Respondents by Marital Status

Marital Status	Percentage
Married	43.9
Cohabiting	13.4
Never Married	33.8
Separated	2.3
Widowed	4.7
Divorced	1.9

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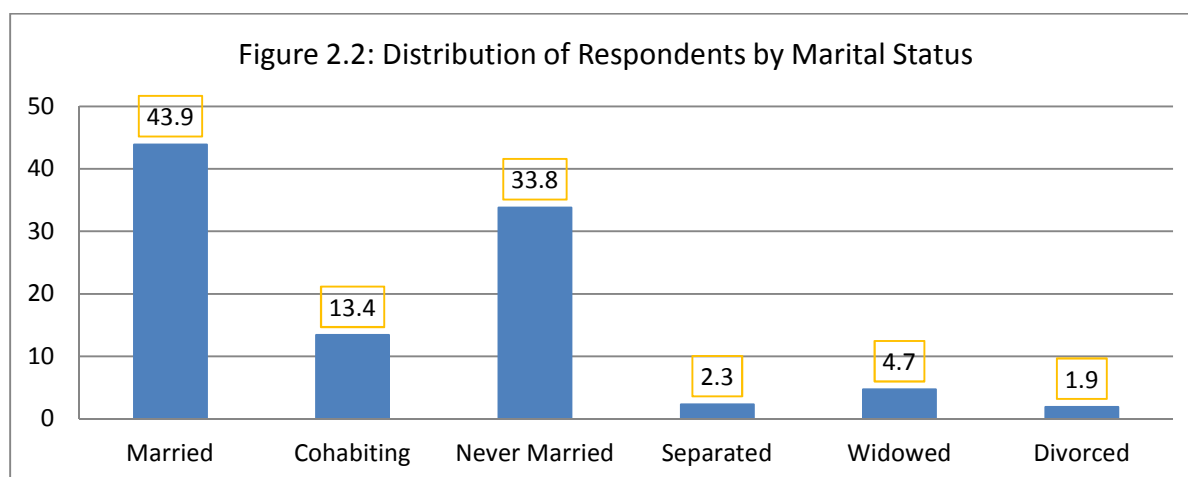
2.4   Employment Status

During the survey, respondents were asked about their employment status. The measurement of employment, however, is difficult because some work, especially work on family farms, family businesses, or in the informal sector, is often not perceived as employment and hence not reported as such. To avoid underestimating respondents' employment status, the study asked whether respondent currently work outside of their home. Employed individuals are those who said they are currently working outside their home. The result shows that 16.7% of the respondents were employed (8.0%-Government and 8.7%-Non-Government). The study also reveals gender disparities in employment status. About 13% of males were employed compare to only 4.3% females. This confirms the very high unemployment rate reported by many surveys such as the 2007 LDHS, 2010 Labor force survey and the Core Welfare Indicator Survey. Figure 2.3 presents employment status of respondents.

Figure 2.3: Employment Status of Respondents
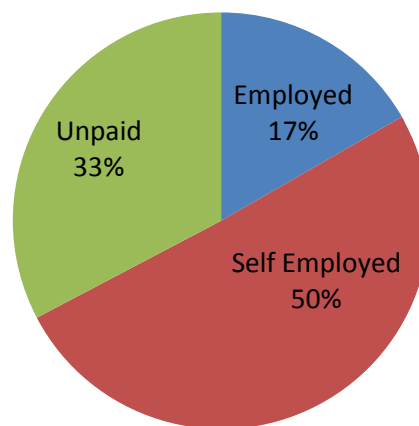
Chapter 3:   NCDs Risk Factors

This section focuses on the results of the survey, particularly on tobacco use and exposure to tobacco smoke, alcohol consumption, fruit and vegetable consumption, physical activity, blood pressure, diabetes history, physical and biochemical measurements and NCDs summary risk factors.

3.1   Tobacco Use and Exposure to Tobacco Smoke

Tobacco use and smoking are very dangerous addictions which commonly cause a wide variety of diseases, cancer and death. The vast majority of tobacco users and smokers are hooked when they are children. During this time period they are easily influenced by peer pressure and advertising. Once hooked, the majority of tobacco users become hopelessly addicted.

More than 5 million children living today will die prematurely because of a decision they will make as adolescents---the decision to use tobacco and smoke cigarettes.

Current Smokers: The   survey asked questions about tobacco use and smoking among adult males and females. Results from the survey show that 9.9% of sampled adults are current smokers. The data further reveal that more men (17.2%) are current smokers than women (2.8%). Table 3.1 presents percentage of current smokers by age and sex.

Table 3.1: 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
25-44	752	14.6	12.1-17.1	1078	2.5	1.4-3.7	1830	8.5	7.0-10.1
45-64	311	22.8	17.4-28.2	358	3.4	1.6-5.2	669	12.7	9.3-16.1
25-64	**1063**	**17.2**	**14.7-19.7**	**1436**	**2.8**	**1.6-3.9**	**2499**	**9.9**	**8.2-11.6**

Exposure to Environmental Tobacco Smoke (ETS): secondhand smoke exposure causes serious disease and death, including heart disease and lung cancer in nonsmoking adults and sudden infant death syndrome, acute respiratory infections, ear problems, and more frequent and severe asthma attacks in children.

Many studies have documented that nonsmokers are also adversely affected by environmental tobacco smoke. There are 4000 chemicals in tobacco with 100 identified poisons and 63 known drugs which cause cancer. The most talked about drug in tobacco is nicotine. Each year, because of exposure to environmental tobacco smoke, an estimated 3,000 nonsmoking

Americans die of lung cancer, and 300,000 children suffer from lower respiratory tract infections[6]. Particularly alarming is the fact that more than 3 million young people under age 18 smoke half a billion cigarettes each year and that more than one-half of them consider themselves dependent upon cigarettes. The decision to use tobacco is nearly always made in the teen years, and about one-half of young people usually continue to use tobacco products as adults.

The survey asked questions on whether someone smokes in their presence and on how many occasions. From the data, 37.5% of the sampled population was exposed to environmental tobacco smoke. Table 3.2 presents exposure to environmental tobacco smoke in home on 1 or more of the past 7 days.

Table 3.2: 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	n	% Exposed	95% CI
25-44	537	41.7	36.7-46.7	686	33.7	30.0-37.4	1223	37.9	34.3-41.5
45-64	201	38.3	31.2-45.5	228	35.1	27.9-42.2	429	36.6	31.3-42.0
25-64	**738**	**40.7**	**35.6-45.8**	**914**	**34.1**	**30.4-37.8**	**1652**	**37.5**	**34.0-41.0**

Smoking has a significant impact on workplace productivity and the staff's health. The survey asked questions on exposure to environmental tobacco smoke at the workplace. According to the survey results, 43.1% of the sampled population was exposed to environmental tobacco smoke. Table 3.3 shows the exposure to ETS in workplace on 1 or more occasions during the past 7days.

Table 3.3: Exposed to ETS in the workplace on 1 or more of the past 7 days

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[6] CDC, Behavioral Risk Factor Surveillance System (data on persons aged 18 years or older who reported having smoked 100 or more cigarettes and who reported currently smoking every day or some day), Youth Risk Behavior Surveillance System (data on young people in grades 9-12 who reported smoking cigarettes on one or more of the 30 days preceding the survey).

Age Group	Men			Women			Both Sexes		
(years)	n	% Exposed	95% CI	n	% Exposed	95% CI	n	% Exposed	95% CI
25-44	464	49.1	41.2-57.0	562	36.3	30.0-42.6	1026	43.2	37.2-49.3
45-64	165	47.9	37.8-57.9	174	37.9	29.5-46.4	339	42.9	35.7-50.1
25-64	**629**	**48.8**	**40.8-56.8**	**736**	**36.8**	**31.0-42.7**	**1365**	**43.1**	**37.4-48.9**

The survey asked questions about daily smokers amongst current smokers. Result from the survey show that 7.5% of current smokers smoke daily. The proportion of males (13.9%) daily smokers is higher than females (1.3%). Figure 3.1 below presents current daily smokers amongst smokers.

Figure 3.1: Percentage of Current Daily Smokers Among Smokers
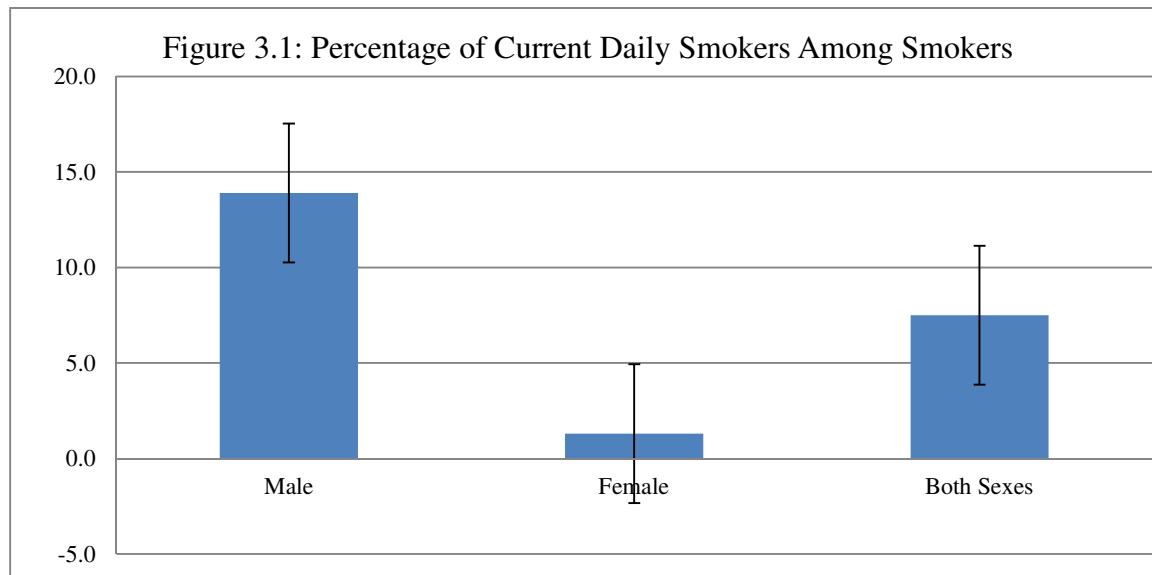
Studies have documented that majority of those who are addicted to tobacco use or smoking got initiated during their adolescent age. The survey asked respondents at what age did they start smoking. The majority of the sampled population initiated at age 21. Table 3.4 shows average age at which respondents started smoking.

Table 3.4: Average age respondent started smoking									
Age Group	Men			Women			Both Sexes		
(years)	n	Mean age	95% CI	n	Mean age	95% CI	N	Mean age	95% CI
25-44	74	19.7	18.4-21.1	*	*	*	85	19.8	18.4-21.1
45-64	51	23.7	21.9-25.5	*	*	*	57	23.4	21.5-25.3
25-64	**125**	**21.4**	**20.3-22.5**	*	*	*	**142**	**21.3**	**20.3-22.4**

The percentage of daily smokers smoking manufactured cigarettes is 91.8% and the mean number of manufactured cigarettes smoked per day by those that smoke manufactured cigarettes is 5.7% for both sexes.

The use of smokeless tobacco product (ie: snuff, chewing tobacco, etc) was assessed among the sampled population. Approximately 14.2% of men, 3.7% of women and 8.8% of both sexes were engaged in the daily use of non-smoking tobacco product. Also, 17.5% of men, 5.7% of women and 11.5% of both sexes were current tobacco users.

Sub-Sahara Africa appears to differ from other regions of the world in having reached only the early stages of the cigarette epidemic. Estimates suggest that deaths from smoking-attributed causes reach only 5–7% for men and 1–2% for women[7]. By comparison, smoking deaths reach at least 15% for males in developing regions of the Americas, the Eastern Mediterranean, the Western Pacific, and Southeast Asia. The smoking deaths for females in other developing parts of the world seldom exceed 5% but still double or triple the percentage in Africa.

3.2   Alcohol Consumption

Alcohol is one of the most widely used drug substances in the world. Alcohol use has health and social consequences for those who drink, for those around them, and for the nation as a whole. Approximately 100,000 deaths each year are attributed to alcohol use, making it the third leading cause of preventable mortality in the United States. Worldwide, 750,000 deaths are attributed to alcohol use each year. Alcohol-related deaths occur from cancer, cirrhosis of the liver, pancreatitis, motor-vehicle crashes, falls, drowning, suicide, and homicide. Alcohol affects nearly every system in the body, and contributes to a range of medical problems, including altered immune system functioning, bone disease, hypertension, stroke, cardiovascular disease, reduced cognitive functioning, fetal abnormalities, traumatic injury, depression, gastrointestinal disorders, and cancers of the neck, head, stomach, pancreas, colon, breast, and prostate. Alcohol also produces significant social problems, including domestic violence, child abuse, marital and

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[7] Ezzati & Lopez, 2004: Harvard School of Public Health, Population and International Health, 665 Huntington Avenue, Boston, Massachusetts 02115, USA. mezzati@hsph.harvard.edu

family disruption, violent crime, worksite productivity losses, absenteeism, and lowered school achievement.

Women and the elderly are also at greater risk for experiencing alcohol harm because of their lower levels of body water, meaning that smaller amounts of alcohol result in higher levels of intoxication than in younger men. Drinking during pregnancy has been linked to higher rates of miscarriage, stillbirth, and premature births, and fetal alcohol syndrome—a set of birth defects caused by maternal consumption of alcohol during pregnancy. For the elderly, drinking even modest amounts of alcohol may cause considerable problems due to chronic illness, interactions with medications, and grief and loneliness from the death of loved ones.

The STEPS Survey gathered responses on alcohol consumption among the sampled population. The result shows that life time abstainer among the sampled population is 63.2%. Women constitute 75.2% of life time abstainer and just little over half (50.8%) of the sampled men.

Among the sampled population, 24% were current drinkers or adults who drank in the past 30 day. The survey revealed that 34.3% of men and 14% of women were current drinker. Also, 5.9% of those interviewed drank in the past 12 months, which include 7.3% men and 5.9 women. The proportion of 12 months abstainers were 6.9% for sexes (7.6% men and 6.3% women).

Table 3.5 below presents current drinkers, those who drank in the past 12 months but not current drinker and those who are abstainer by age and sex.

Among those who are current alcohol consumers, the survey also identified men and women who were engaged in heavy periodic drinking. Respondents' were classified as heavy episodic drinkers if a man drank 5 or more bottles any day within 30 days before the survey while for women those who drank 4 or more bottles.

The survey result shows that 23.0% of men and 9.7% of women were engaged in heavy episodic drinking within the past 30 days preceding the survey.

Table 3.5: Alcohol consumption status by age and sex

Men

Age Group (years)	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
25-44	752	32.7	27.7-37.7	6.8	4.6-9.0	6.5	4.8-8.2	54.0	48.8-59.2
45-64	310	37.7	29.3-46.2	8.4	5.2-11.6	10.0	5.9-14.1	43.9	36.0-51.7
25-64	**1062**	**34.3**	**29.1-39.5**	**7.3**	**5.4-9.2**	**7.6**	**6.2-9.0**	**50.8**	**45.9-55.7**

Alcohol consumption status

Women

Age Group (years)	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
25-44	1076	15.4	11.6-19.3	4.6	3.4-5.9	5.5	4.0-6.9	74.4	69.6-79.2
45-64	358	11.2	8.7-13.6	4.2	1.6-6.8	7.8	4.6-11.1	76.8	71.4-82.2
25-64	**1434**	**14.0**	**11.2-16.8**	**4.5**	**3.2-5.8**	**6.3**	**4.7-7.8**	**75.2**	**70.9-79.6**

Alcohol consumption status

Both Sexes

Age Group (years)	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
25-44	1828	24.0	20.1-28.0	5.7	4.1-7.3	6.0	4.7-7.3	64.2	59.9-68.6
45-64	668	23.9	19.3-28.4	6.2	4.2-8.2	8.9	6.0-11.7	61.1	55.8-66.3
25-64	**2496**	**24.0**	**20.4-27.5**	**5.9**	**4.5-7.2**	**6.9**	**5.7-8.1**	**63.2**	**59.1-67.4**

3.3   Fruits and Vegetables Consumption

Like 80% of our body is water so does 80% of fruit consist of water! If you think about it, it's logical for the human body to consume food that contains as much water as the body itself. The nutrition that meets that requirement is fruit. There is no other food than fruit on this planet that

contains on average 80% water. Vegetables also contain a lot of water and are therefore second best.

The benefit accrue from vegetables and fruits include: Lower blood pressure; reduced risk of heart disease, stroke, and probably some cancers; lower risk of eye and digestive problems; and a soft effect on blood sugar that can help keep appetite in check.

The average number of days fruits and vegetables were consumed in a typical week by all respondents was determined during the administration of this survey. In a typical week the mean number of days fruits were consumed was 2.2 for males, 2.3 for females and 2.3 for both sexes respectively. Similarly, the mean number of days vegetables were consumed by males was 3.4, for females 3.6 and for both sexes 3.5. Tables 3.6 and 3.7 present mean number of days fruit and vegetables were consumed in a typical week.

Table 3.6: Mean number of days fruit consumed in a typical week											
	Men				Women				Both Sexes		
Age Group (years)	n	Mean number of days	95% CI		N	Mean number of days	95% CI		N	Mean number of days	95% CI
25-44	659	2.2	2.1-2.4		950	2.5	2.3-2.6		1609	2.3	2.2-2.5
45-64	267	2.3	2.1-2.5		316	2.1	1.9-2.3		583	2.2	2.0-2.4
25-64	**926**	**2.2**	**2.1-2.4**		**1266**	**2.3**	**2.1-2.5**		**2192**	**2.3**	**2.2-2.4**

Table 3.7: Mean number of days vegetables consumed in a typical week											
	Men				Women				Both Sexes		
Age Group (years)	N	Mean number of days	95% CI		N	Mean number of days	95% CI		N	Mean number of days	95% CI
25-44	657	3.2	3.0-3.5		970	3.6	3.4-3.8		1627	3.4	3.2-3.6
45-64	268	3.6	3.3-4.0		311	3.7	3.4-4.0		579	3.7	3.4-3.9
25-64	**925**	**3.4**	**3.1-3.6**		**1281**	**3.6**	**3.4-3.8**		**2206**	**3.5**	**3.3-3.7**

The mean number of servings of fruits and/or vegetables on average per day was 0.7 for males, 0.7 for females and 0.7 for both sexes. The mean number of serving of vegetables for men was 1.0 for both sexes. Also, for both fruits and vegetables, the mean number serving per day is 1.6 for males, 1.7 for females and 1.6 for both sexes. Tables 3.8, 3.9 and 3.10 provide information on mean number of servings of fruit and vegetable on average per day.

Table 3.8: Mean number of servings of fruit on average per day

Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	N	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	621	0.7	0.6-0.8	913	0.8	0.7-0.9	1534	0.7	0.7-0.8
45-64	260	0.8	0.5-1.1	300	0.6	0.5-0.7	560	0.7	0.5-0.9
25-64	**881**	**0.7**	**0.6-0.9**	**1213**	**0.7**	**0.6-0.8**	**2094**	**0.7**	**0.6-0.8**

Table 3.9: Mean number of servings of vegetables on average per day

Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	N	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	624	1.0	0.8-1.1	928	1.0	0.9-1.2	1552	1.0	0.9-1.1
45-64	258	1.0	0.9-1.1	304	1.0	0.9-1.2	562	1.0	0.9-1.1
25-64	**882**	**1.0**	**0.9-1.1**	**1232**	**1.0**	**1.0-1.1**	**2114**	**1.0**	**0.9-1.1**

Table 3.10: Mean number of servings of fruit and/or vegetables on average per day

Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	N	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	662	1.6	1.4-1.7	976	1.7	1.5-1.9	1638	1.6	1.5-1.8
45-64	275	1.7	1.4-2.1	319	1.6	1.4-1.7	594	1.6	1.4-1.8
25-64	**937**	**1.6**	**1.4-1.8**	**1295**	**1.7**	**1.5-1.8**	**2232**	**1.6**	**1.5-1.8**

3.6   Physical Activity

Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons including strengthening muscles and the cardiovascular system, honing athletic skills, weight loss or maintenance, as well as for the purpose of enjoyment. Frequent and regular physical exercise boosts the immune system, and helps prevent the "diseases of affluence" such as heart disease, cardiovascular disease, Type 2 diabetes and obesity[8]. It also improves mental health, helps prevent depression, helps to promote or maintain positive self esteem. It is also important for maintaining physical fitness and can contribute positively to maintaining a healthy weight, building and maintaining healthy bone density, muscle strength, and joint mobility, promoting physiological well-being, reducing surgical risks, and strengthening the immune system.

The global physical activity questionnaire (GPAQ) section of the STEPS instrument was used for assessment of physical activity, and total physical activity was presented in MET (metabolic equivalent) minutes per week. The instrument looks into three major domains of day-to-day activities; work (including domestic work), transport, and recreational activities. Level of total physical activity was subsequently classified into high, moderate, or low using the GPAQ analysis guideline provided along with the STEPS instrument.

High: A person reaching any of the following criteria is classified in this category:
- Vigorous-intensity activity on at least 3 days achieving a minimum of at least 1,500 MET-minutes/week OR 7 or more days of any combination of walking, moderate- or vigorous-intensity activities achieving a minimum of at least 3,000 MET-minutes per week.

Moderate: A person not meeting the criteria for the "high" category, but meeting any of the following criteria is classified in this category:
- 3 or more days of vigorous-intensity activity of at least 20 minutes per day OR 5 or more days of moderate-intensity activity or walking of at least 30 minutes per day OR 5 or more days of any combination of walking, moderate- or vigorous-intensity activities achieving a minimum of at least 600 MET-minutes per week.

Low: A person not meeting any of the above mentioned criteria falls in this category.

Based on the listed criteria, respondents were grouped into the three categories (low, moderate and high). The result shows that 47.3% of the sampled population was involved with high level

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[8] Stampfer, M. J.; Hu, F. B.; Manson, J. E.; Rimm, E. B.; Willett, W. C. (2000). "Primary Prevention of Coronary Heart Disease in Women through Diet and Lifestyle". *New England Journal of Medicine* **343** Hu., F., Manson, J., Stampfer, M., Graham, C., et al. (2001). Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. *The New England Journal of Medicine, 345*(11), 790–797.

activities and 33.2% in low level activities. The proportion of males (51.6%) in high level activities was more than their females (43.1%) counterpart. Figure 3.2 present percentage of respondents with low and high levels of activities.

Figure 3.2: Percentage of Respondents with Low and High Levels of Activity

	Male	Female	Both Sexes
High	51.6	43.1	47.3
Low	29.8	36.6	33.2
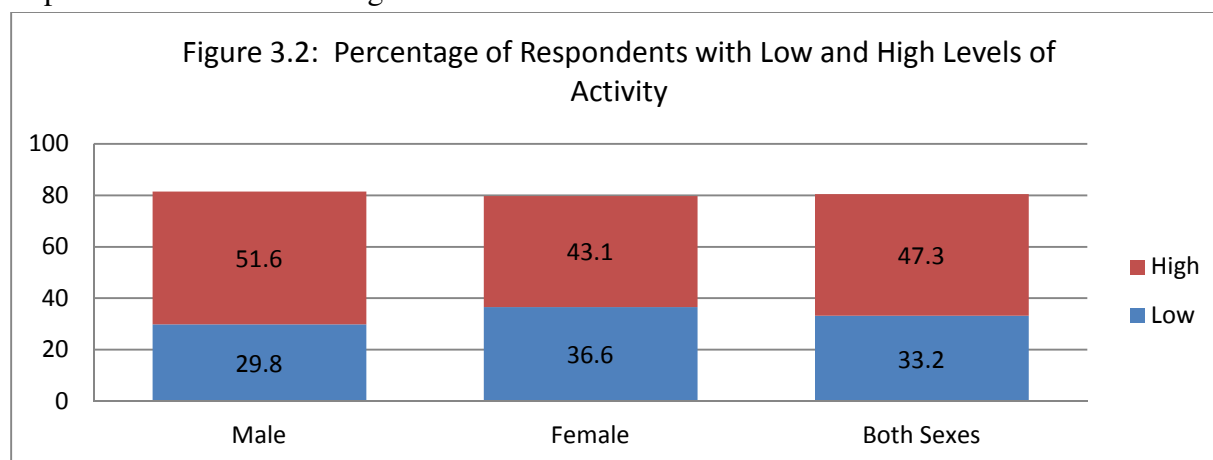
Those that were engaged in physical activities were classified as work, transport and recreation related physical activities. The mean minutes spent in these physical activities were assessed. The majority of the respondents spent more minutes with work-related activities than transport and recreational activities. The mean minutes spent in recreation related activities for both sexes was 10.4 on average per day, 42.5 minutes on average per day on transport related and 140.7 on work related activities respectively. Figure 3.3 presents mean minutes spent in work-related physical activities on average per day.

Figure 3.3: Mean Minutes spent in Work-related Physical Activity on Average Per Day

	Male	Female	Both
Recreation-related	14	6.9	10.4
Transport-related	46.6	38.5	42.5
Work-related	152.8	128.8	140.7
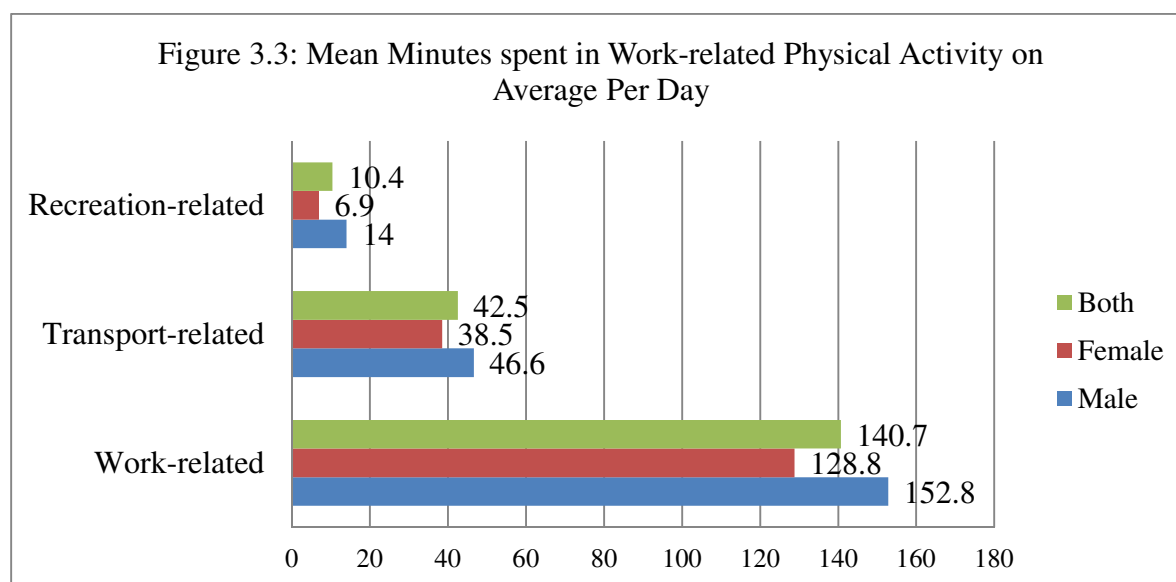
The percentage of respondents not engaging in vigorous activities was 59.9%, of which 54.4% were males and 65.4% females respectively. Figure 3.4 below shows the percentage of respondents not engaged in vigorous activities.

Figure 3.4: Percentage of Respondents not in Vigorous Activities

	Male	Female	Both Sexes
	54.4	65.4	59.9
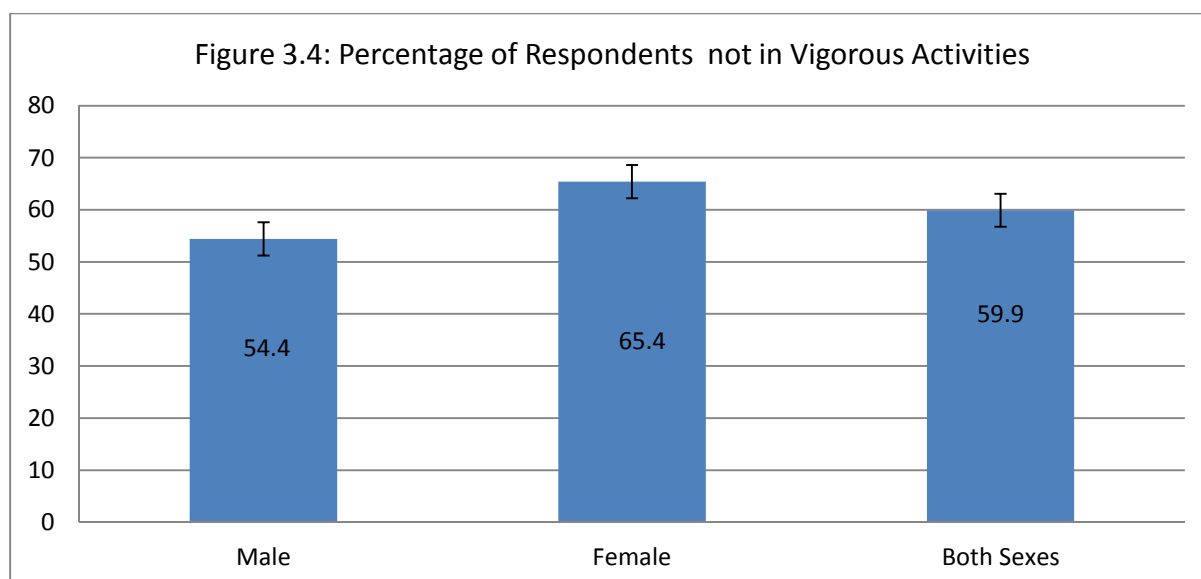
The survey shows that a significant proportion of respondents who were classified as doing no work-recreation and transportation related physical activities. Approximately 80% of those that were not doing any work were found in no recreation physical activities while 29.5% were found in no transport related physical activities. Figure 3.5 presents percentage of respondents classified as doing no work-related physical activities.

Figure 3.5: Percentage of Respondents Classified as Doing No Work-related Physical Activity

	No Work-related	No Transport-related	No Recreation-related
Male	40.1	28.7	70.9
Female	41.1	30.3	88.9
Both	40.6	29.5	80
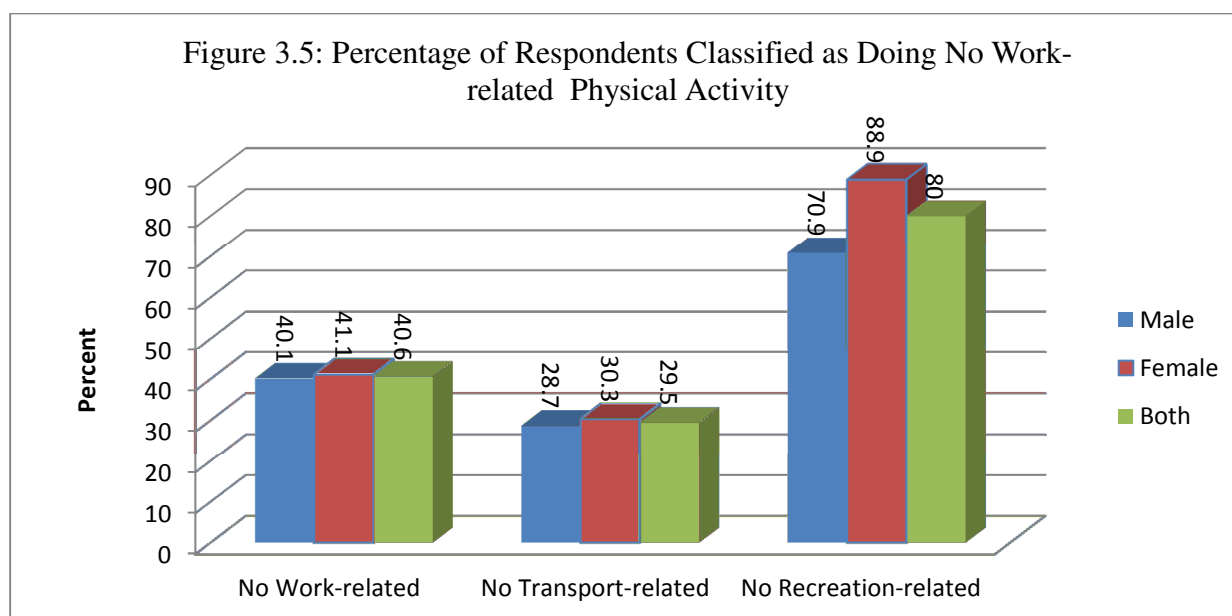
3.7   Physical Measurements

The WHO STEPS instrument was used to collect data on selected socio-demographic characteristics and lifestyle behaviors including, physical activity, and physical measurements of weight, height, waist and hip circumference, as well as blood pressure. Weight and height were measured with participants standing without shoes and wearing light clothing. Participants stood

upright with the head in Frankfort plane for height measurement. Height was recorded to the nearest 0.5 cm, and weight was recorded to the nearest 100g. Body-mass index (BMI) was calculated as weight in kilograms over height in meters squared [weight (kg)/ (height (m)^2]. Waist circumference was measured at the level of the iliac crest using a non-elastic tape measure. Hip circumference was measured at the maximum circumference of the hip. Waist-to-hip ratio (WHR) was calculated as a ratio of waist and hip circumference.

3.7.1 Body Mass Index (BMI)

Body Mass Index is used to estimate your total amount of fat. This calculator is designed for men and women over the age of 18. A healthy BMI for an adult is between 20 and 25.

Once you have measured an individual BMI, you can determine his/her healthy weight range. If BMI is:

- Under 18 - you are very underweight and possibly malnourished.
- Under 20 - you are underweight and could afford to gain a little weight.
- 20 to 25 - you have a healthy weight range for young and middle-aged adults.
- 26 to 30 - you are overweight
- Over 30 - you are obese.

The survey assessed respondents' height, weight and determined their correspondent body mass index based on their height and weight. The result shows that men were generally taller and with more weight than women. On the other hand, women had more BMI (27.3 kg/m^2) than men (25.4 kg/m^2). Figure 3.6 presents respondents' height, weight and body mass index.

Figure 3.6: Respondents' Height, Weight and BMI
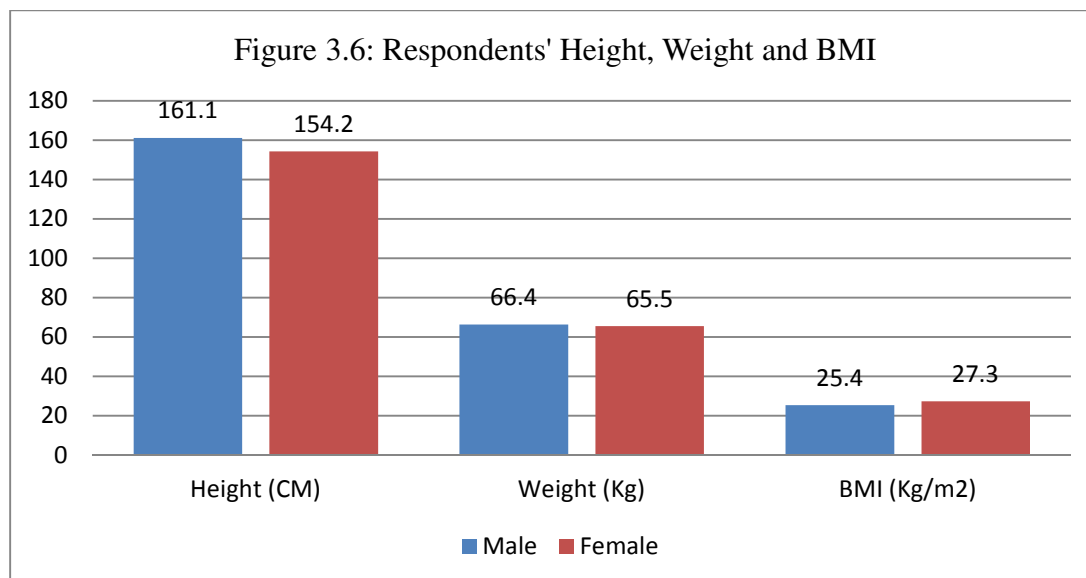
Table 3.11 below depicts the mean body mass index of the sampled population by age and sex. Result from the survey shows that men had an average BMI of 25.4 (kg/m^2) and women 26.4 (kg/m^2).

Table 3.11: Mean Body Mass Index (BMI) (kg/m^2) by Age and Sex of Respondents										
Age Group	Men				Women				Both Sexes	
(years)	N	Mean	95% CI		n	Mean	95% CI		n	Mean	95% CI
25-44	696	25.4	24.7-26.2		898	27.1	26.5-27.8		1594	26.2	25.7-26.8
45-64	286	25.5	24.6-26.4		339	27.7	26.6-28.8		625	26.6	25.9-27.4
25-64	**982**	**25.4**	**24.8-26.1**		**1237**	**27.3**	**26.7-28.0**		**2219**	**26.4**	**25.9-26.9**

The survey determined different BMI classification of the sampled population. Results from the body measurements indicate that 4% of men were underweight, 53% had normal weight and 15.4% were obese. Compare to men, the result shows that 4.2% of women were underweight, 38.7% had normal weight and 28.7% were obese. Table 3.12 presents BMI classification of the sampled population by age and sex. Among the surveyed population, 4.1% were underweight, 45.9% had normal weight and 22% were obese.

Table 3.12: BMI classifications

Age Group (years)	n	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% BMI 25.0-29.9	95% CI	% Obese ≥30.0	95% CI
Men									
25-44	696	4.5	2.1-6.8	52.7	47.5-58.0	28.2	24.3-32.0	14.7	10.1-19.2
45-64	286	3.1	0.8-5.5	53.5	46.0-61.0	26.2	20.4-32.1	17.1	11.6-22.6
25-64	**982**	**4.0**	**2.3-5.8**	**53.0**	**48.9-57.1**	**27.6**	**24.6-30.6**	**15.4**	**11.6-19.3**
Women									
25-44	898	4.5	3.3-5.6	38.0	34.3-41.6	31.1	28.4-33.7	26.5	22.8-30.2
45-64	339	3.8	0.0-8.4	40.1	33.8-46.4	23.3	18.9-27.7	32.7	27.0-38.5
25-64	**1237**	**4.2**	**2.2-6.3**	**38.7**	**35.4-42.1**	**28.3**	**25.9-30.7**	**28.7**	**25.1-32.4**
Both Sexes									
25-44	1594	4.5	3.2-5.7	45.7	42.5-48.9	29.5	27.5-31.6	20.3	17.2-23.4
45-64	625	3.5	1.4-5.7	46.4	40.8-52.1	24.7	20.8-28.6	25.4	21.5-29.2
25-64	**2219**	**4.1**	**2.9-5.3**	**45.9**	**43.1-48.8**	**27.9**	**26.0-29.8**	**22.0**	**19.2-24.8**

Figure 3.7 below presents the percentage of respondents that were overweight by sex. The result show that 43% of men were overweight, 57% of women and 49.9% of both sexes were overweight.

Figure 3.7: Percentage of Respondents Being Classified as Overweight (BMI≥25)

Male	~43
Female	~57
Both Sexes	~50
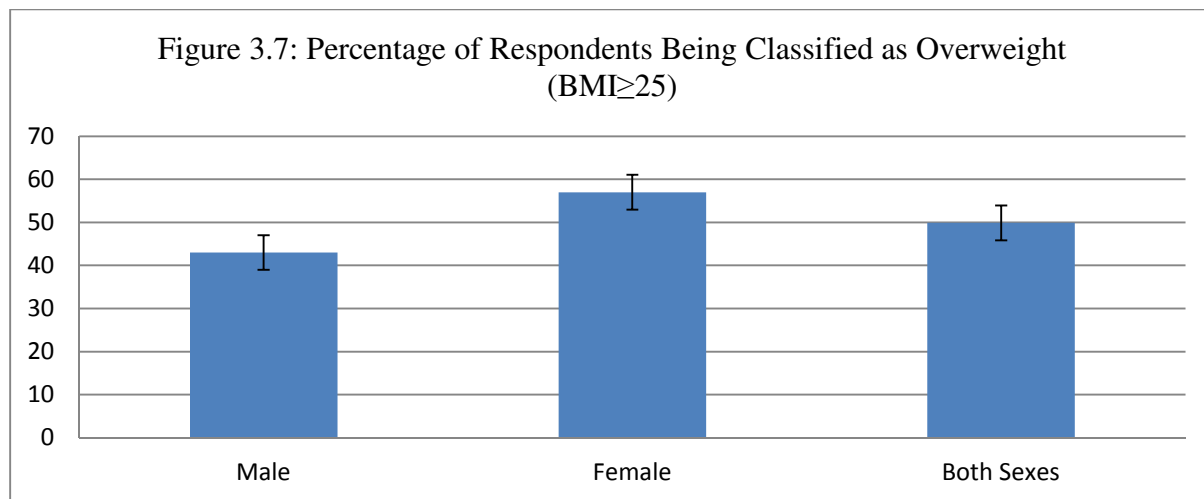
3.7.2 Waist Circumference Measurement

High Waist Circumference (WC) is associated with an increased risk for type 2 diabetes, dyslipidemia, hypertension and cardiovascular disease when the BMI is between 25 and 34.9. Waist Circumference can be useful for those people categorized as normal or overweight in terms of BMI. For example, an athlete with increased muscle mass may have a BMI greater than 25 - making him or her overweight on the BMI scale - but a Waist Circumference measurement would most likely indicate that he or she is, in fact, not overweight. Changes in Waist Circumference over time can indicate an increase or decrease in abdominal fat. Increased abdominal fat is associated with an increased risk of heart disease.

Waist circumference and BMI are interrelated, but waist circumference provides an independent prediction of risk over and above that of BMI. This is because body fat that accumulates around the stomach area poses a greater health risk than fat stored in the lower half of the body.

Waist circumference measurement is particularly useful in patients who are categorized as overweight on the BMI scale, although increased waist circumference can also be a marker for increased risk even in persons of normal weight. However, for someone with a BMI of 35 or over (obese), waist circumference has little added predictive power of disease risk beyond that of BMI. It is therefore not necessary to measure waist circumference in individuals with BMIs of 35 or over.

To determine your Waist Circumference, locate the upper hip bone and place a measuring tape around the abdomen (ensuring that the tape measure is horizontal).

Women: a waist circumference of over 31 inches (about 80cm) indicates slight health risk and a waist of over 35 inches (about 90cm) indicates substantially increased health risk.

Men: a waist of over 37 inches (about 94cm) indicates slight health risk and a waist of over 40 inches (about 102cm) indicates substantially increased health risk.

During the survey, respondents' waists were measured to determine their health status. Result from these measurements show a mean waist circumference of 73.3 centimeters for men and 80.4 centimeters for females. Table 3.13 presents respondents waist circumference by age and sex.

Table 3.13: Respondents' Waist circumference (cm) by Age and Sex							
Age Group (years)	Men				Women		
	N	Mean	95% CI		N	Mean	95% CI
25-44	712	71.2	67.4-74.9		923	77.9	75.1-80.8
45-64	294	78.1	75.4-80.8		341	85.1	82.7-87.5
25-64	1006	73.3	70.4-76.2		1264	80.4	78.1-82.8

3.7.3 Hip Circumference Measurement

The waist circumference is widely viewed as a simple but effective measure for assessing obesity-related health risks, whereas measurement of the hip circumference is not currently prioritized. Abdominal obesity is increasingly recognized as a major risk factor for cardiovascular disease (CVD). Compared with body mass index (BMI), anthropometric measures of abdominal obesity (e.g. waist circumference and waist-to-hip ratio), appear to be more strongly associated with metabolic risk factors. Waist to hip ratio is an important tool that helps determine the overall health risk. Individuals with more weight around their waist are at greater risk of lifestyle related diseases such as heart disease and diabetes than those with weight around their hips. Hip measurement is a simple but useful measure of fat distribution.

During the survey, respondents' hip circumference was determined. Result from the anthropometric measurements show that the mean hip circumference of men was 86.8 cm and 94.9 cm for women. Table 3.14 presents respondents hip circumference by age and sex.

Table 3.14: Respondents Hip circumference (cm) by Age and Sex							
Age Group (years)	Men				Women		
	N	Mean	95% CI		N	Mean	95% CI
25-44	712	84.5	80.4-88.6		923	93.2	90.0-96.4
45-64	294	92.1	89.1-95.1		341	97.9	94.8-101.1
25-64	1006	86.8	83.7-90.0		1264	94.9	92.0-97.8

3.8   Blood Pressure

High blood pressure (HBP) is a serious condition that can lead to coronary heart disease (also called coronary artery disease), heart failure, stroke, kidney failure, and other health problems.

"Blood pressure" is the force of blood pushing against the walls of the arteries as the heart pumps blood. If this pressure rises and stays high over time, it can damage the body in many ways.

Knowing your blood pressure numbers is important, even when you're feeling fine. If your blood pressure is normal, you can work with a health care provider to keep it that way. If your blood pressure is too high, treatment may help prevent damage to your body's organs.

Blood pressure is measured as systolic (sis-TOL-ik) and diastolic (di-a-STOL-ik) pressures. "Systolic" refers to blood pressure when the heart beats while pumping blood. "Diastolic" refers to blood pressure when the heart is at rest between beats.

Blood pressure measurements usually have the systolic and diastolic numbers. The systolic number is above or before the diastolic number, such as 120/80 mmHg. (The mmHg is millimeters of mercury—the units used to measure blood pressure.)

Blood pressure tends to rise with age. A healthy lifestyle helps some people delay or prevent this rise in blood pressure. People who have HBP can take steps to control it and reduce their risk of related health problems. Key steps include following a healthy lifestyle, having ongoing medical care, and following your treatment plan.

Three consecutive measurements of blood pressure were taken from 2,489 (99.4%) of the survey population. The remaining individuals refused to participate in the measurement of blood pressure, mainly due to misconception, discomfort associated with the repeated measurements of blood collection, among others.

The percentage of the sampled population with raised blood pressure or hypertension (SBP $\geq$ 140 and/or DBP $\geq$ 90 mmHg) and currently on medication for raised BP or hypertension was 30.7% for both sexes with 30.3% men and 31% women having hypertension. Also, significant proportions (88.2%) of those with raised blood pressure or hypertension are not on medication. Of this proportion, 90.5% of men and 86% of women with hypertension are not on medication. Table A-1 in Annex A provides details on respondents with treated and/or controlled raised BP.

Blood pressure among all respondents, including those currently on medication for raised blood pressure was assessed. Data from these measurements indicate that the mean systolic blood pressure for men was 129.7 mmHg, 127.8 mmHg for women and 128.7 mmHg for both sexes. Table 3.15 shows respondents mean systolic blood pressure.

Table 3.15: Respondents Mean Systolic Blood Pressure (mmHg)										
Age Group	Men			Women			Both Sexes		
(years)	N	Mean	95% CI	n	Mean	95% CI	N	Mean	95% CI
25-44	715	125.5	124.1-126.8	1036	122.0	120.8-123.2	1751	123.7	122.7-124.7
45-64	302	138.8	135.4-142.3	343	139.7	136.7-142.6	645	139.3	136.6-142.0
25-64	1017	129.7	128.0-131.4	1379	127.8	126.3-129.2	2396	128.7	127.3-130.1

Apart from the systolic blood pressure measurement, diastolic pressure was also assessed. Result from the survey show that the mean diastolic blood pressure for men was 79.5 mmHg, 79.9 mmHg for women and 79.7 mmHg for both sexes. Table 3.16 presents respondents mean diastolic blood pressure.

Table 3.16: Respondents Mean diastolic blood pressure (mmHg)										
Age Group	Men			Women			Both Sexes		
(years)	N	Mean	95% CI	n	Mean	95% CI	N	Mean	95% CI
25-44	715	77.1	76.3-77.9	1036	77.7	76.7-78.7	1751	77.4	76.6-78.2
45-64	302	84.8	82.7-86.9	343	84.3	82.8-85.8	645	84.6	83.3-85.8
25-64	1017	79.5	78.5-80.6	1379	79.9	78.9-80.9	2396	79.7	78.9-80.6

Blood pressure measurement and diagnosis among all respondents was assessed based on three questions: 1). Have you ever had your blood pressure measured by a doctor or other health worker? 2). Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension? and 3). Have you been told in the past 12 months about your BP?

Result from the survey show that 29.9% of the respondents never measured their blood pressure, 59.7% measured their blood pressure but were not diagnosed, 3.4% of respondents were diagnosed, but not within the past 12 months and 7% were diagnosed within the past 12 month. There were variations amongst men and women regarding blood pressure measurements and diagnosis. Approximately thirty–five (34.7%) percent of the sampled men have never measured their blood pressure compare to 25.3% women. Table 3.17 shows respondents blood pressure measurement and diagnosis by age and sex.

Table 3.17: Respondents Blood Pressure Measurement and Diagnosis by Age and Sex

Men									
Age Group (years)	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
25-44	750	40.1	34.5-45.8	55.1	48.8-61.3	2.8	1.3-4.3	2.0	1.1-2.9
45-64	310	22.6	18.2-26.9	58.4	53.2-63.6	5.2	2.8-7.6	13.9	9.6-18.1
25-64	**1060**	**34.7**	**30.2-39.1**	**56.1**	**51.8-60.4**	**3.5**	**2.3-4.8**	**5.7**	**3.8-7.6**

Women									
Age Group (years)	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
25-44	1072	29.4	25.2-33.5	64.3	59.8-68.7	1.4	0.7-2.1	4.9	2.5-7.4
45-64	357	17.1	12.2-21.9	60.8	54.4-67.1	7.0	4.5-9.5	15.1	10.7-19.6
25-64	**1429**	**25.3**	**21.6-29.0**	**63.1**	**58.7-67.5**	**3.2**	**2.2-4.2**	**8.3**	**5.7-10.9**

Both sexes									
Age Group (years)	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
25-44	1822	34.7	30.3-39.2	59.7	54.9-64.5	2.1	1.2-2.9	3.5	1.9-5.0
45-64	667	19.7	16.0-23.4	59.6	55.4-63.8	6.1	4.4-7.8	14.5	11.1-17.9
25-64	**2489**	**29.9**	**26.2-33.6**	**59.7**	**55.5-63.8**	**3.4**	**2.4-4.4**	**7.0**	**5.0-9.1**

Among those that were diagnosed by doctors and health workers of raised blood pressure or hypertension, only 49% (46.7% men and 50.9% women) are currently taking medication prescribe by doctors or health workers to control or prevent hypertension.

Those respondents that were diagnosed of raised blood pressure or hypertension and sought medical advice from a doctor or health worker to treat raised blood pressure, received lifestyle advice on reduce salt intake, weight lose, cessation of smoking and the initiation of exercise.

Over half (56.6%) of those that were diagnosed of raised blood pressure or hypertension, received advice on the start or do exercise (30.1%), 18.7% on stop smoking and 28.6% on weight lose. For reduce salt intake, 60.2% of men and 53.9% of women received advice, 28.5% men and 11% women on smoking, 37.8% men and 24.1% women on the initiation of exercise and 31.7% men and 26.2% women on weight lose.

Apart from those who when to health workers or doctors for advice, a small proportion of respondents sought advice or received treatment from traditional healers for raised blood pressure among those previously diagnosed of hypertension. Men and women who received advice for hypertension from traditional healers account for 6.2% and 9.9% respectively. For treatment, 7.6% (5.3% of men and 9.4% of women) of diagnosed hypertension patient received herbal or traditional treatment.

3.9   Biochemical Measurement

The biochemical measurement in this survey includes the collection of blood sample from adults to measure a type of sugar in the body call glucose. There are several different types of blood glucose tests available but this survey used the fasting blood sugar (FBS), which measures blood glucose after you have not eaten for at least 8 hours. It is often the first test done to check for pre-diabetes and diabetes.

In general, up to 100 milligrams per deciliter (mg/dL) are considered normal for a fasting blood glucose test and persons with levels between 100 and 125 mg/dL have impaired fasting glucose, or pre-diabetes. These levels are considered to be risk factors for type 2 diabetes and its complications. Diabetes is diagnosed in persons with fasting blood glucose levels that are 126 mg/dL or higher.

3.9.1   Diabetes

Diabetes is a lifelong condition in which sugar (glucose) remains in the blood rather than entering the body's cells to be used for energy. This results in persistently high blood sugar, which, over time, can damage many body systems.

Symptoms of diabetes include increased thirst and frequent urination (especially at night); unexplained increase in appetite; unexplained weight loss; fatigue; erection problems; blurred vision; and tingling, burning, or numbness in the hands or feet.

People who have diabetes are at increased risk for many serious health problems, including hardening of the arteries (atherosclerosis) and heart problems, eye problems that can lead to blindness, circulation and nerve problems, and kidney disease and kidney failure.

All forms of diabetes have been treatable since insulin became available in 1921, and type 2 diabetes may be controlled with medications. Both type 1 and 2 are chronic conditions that usually cannot be cured. Adequate treatment of diabetes is thus important, as well as blood pressure control and lifestyle factors such as smoking cessation and maintaining a healthy body weight.

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following:

- Fasting plasma glucose level $\geq$ 7.0 mmol/L (126 mg/dL).
- Plasma glucose $\geq$ 11.1 mmol/L (200 mg/dL) two hours after a 75 g oral glucose load as in a glucose tolerance test.
- Symptoms of hyperglycemia and casual plasma glucose $\geq$ 11.1 mmol/L (200 mg/dL).
- Glycated hemoglobin (Hb A1C) $\geq$ 6.5%.

People with fasting glucose levels from 100 to 125 mg/dL (5.6 to 6.9 mmol/L) are considered to have impaired fasting glucose. Patients with plasma glucose at or above 140 mg/dL (7.8 mmol/L), but not over 200 mg/dL (11.1 mmol/L), two hours after a 75 g oral glucose load are considered to have impaired glucose tolerance. Of these two pre-diabetic states, the latter in particular is a major risk factor for progression to full-blown diabetes mellitus as well as cardiovascular disease.

In 2000, according to the World Health Organization, at least 171 million people worldwide suffer from diabetes, or 2.8% of the population. Its incidence is increasing rapidly, and it is estimated that by 2030, this number will almost double. Diabetes mellitus occurs throughout the world, but is more common (especially type 2) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030. The increase in incidence of diabetes in developing countries follows the trend of urbanization and lifestyle changes, perhaps most importantly a "Western-style" diet. This has suggested an environmental (i.e., dietary) effect, but there is little understanding of the mechanism(s) at present, though there is much speculation, some of it most compellingly presented[9].

History of diabetes mellitus was obtained from 88.8% (2,222) of the survey respondents. Using a fasting blood glucose definition of diabetes mellitus with a cutoff level of ≥5.6 mmol/L (100 mg/dl) and <6.1 mmol/L (110 mg/dl) produce a mean fasting blood glucose, including those currently on medication for raised blood glucose of 96.7 mg/dL for both sexes and 97 mg/dL for men and 96.4 mg/dL for women. Table 3.18 presents respondents mean fasting blood glucose.

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[9] Wild S, Roglic G, Green A, Sicree R, King H (May 2004). "Global prevalence of diabetes: estimates for 2000 and projections for 2030". *Diabetes Care* 27 (5): 1047–53

Table 3.18: Respondents Mean fasting blood glucose (mmol/L)										
Age Group	Men			Women			Both Sexes		
(years)	n	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
25-44	641	5.2	5.1-5.4	970	5.2	5.1-5.4	1611	5.2	5.1-5.4
45-64	284	5.7	5.5-6.0	327	5.6	5.3-5.8	611	5.6	5.5-5.8
25-64	**925**	**5.4**	**5.3-5.5**	**1297**	**5.4**	**5.2-5.5**	**2222**	**5.4**	**5.3-5.5**
Mean fasting blood glucose (mg/dl)									
Age Group	Men			Women			Both Sexes		
(years)	n	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
25-44	641	94.3	91.8-96.9	970	94.4	92.4-96.4	1611	94.4	92.4-96.4
45-64	284	102.8	98.3-107.2	327	100.4	95.9-104.9	611	101.5	98.6-104.4
25-64	**925**	**97.0**	**94.8-99.1**	**1297**	**96.4**	**94.1-98.7**	**2222**	**96.7**	**94.9-98.5**

The percentage of sampled population with impaired fasting glycaemia defined as: capillary whole blood value ≥5.6 mmol/L (100 mg/dl) and <6.1 mmol/L (110 mg/dl), was 14% for men, 15.7% for women and 14.9% for both sexes while those with raised fasting blood glucose and currently on medication for raised blood glucose was 19% for men, 19.3% for women and 19.2% for both sexes.   Table 3.19 and 3.20 shows respondents with impaired fasting glycaemia by age and sex.

Table 3.19: Respondents with Impaired Fasting Glycaemia by Age and Sex									
Age Group	Men			Women			Both Sexes		
(years)	n	%	95% CI	n	%	95% CI	N	%	95% CI
25-44	642	14.5	12.3-16.7	970	14.9	13.3-16.6	1612	14.7	13.5-16.0
45-64	284	13.0	8.2-17.9	328	17.1	12.1-22.1	612	15.1	11.6-18.7
25-64	**926**	**14.0**	**12.1-15.9**	**1298**	**15.7**	**13.3-18.0**	**2224**	**14.9**	**13.3-16.4**

Table 3.20: Respondents with Raised blood glucose or currently on medication for diabetes by Age and Sex

Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	N	%	95% CI
25-44	642	16.8	12.0-21.7	970	16.8	12.6-21.0	1612	16.8	12.8-20.8
45-64	284	23.9	19.4-28.5	328	24.4	19.0-29.7	612	24.2	20.3-28.1
25-64	**926**	**19.0**	**15.3-22.8**	**1298**	**19.3**	**15.8-22.8**	**2224**	**19.2**	**16.0-22.3**

3.10   Summary of Risk Factors

Finding from the survey indicates that only 1.1% of the sample population had zero risk factors, 65.4% had 1-2 risk factors and 33.5% had 3-5 risk factors. Table 3.21 presents summary of combined risk factors.

Table 3.21: Summary of Combined Risk Factors

Age Group (years)	Men						
	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	581	1.2	0.3-2.1	72.1	67.9-76.3	26.7	22.4-31.0
45-64	236	0.4	0.0-1.3	58.9	50.9-66.9	40.7	32.5-48.9
25-64	**817**	**1.0**	**0.3-1.6**	**68.0**	**63.9-72.2**	**31.0**	**26.7-35.3**
Age Group (years)	Women						
	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	755	1.2	0.5-1.9	67.8	63.4-72.3	31.0	26.6-35.4
45-64	277	1.4	0.0-2.8	53.1	47.9-58.2	45.5	39.7-51.2
25-64	**1032**	**1.3**	**0.6-1.9**	**62.6**	**58.8-66.5**	**36.1**	**32.1-40.0**
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	1336	1.2	0.6-1.8	70.1	66.2-73.9	28.7	24.9-32.6
45-64	513	1.0	0.1-1.8	55.8	50.3-61.4	43.2	37.4-49.0
25-64	**1849**	**1.1**	**0.7-1.5**	**65.4**	**61.7-69.1**	**33.5**	**29.7-37.3**

Chapter 4:   Discussions

Demographic: Respondents, age, sex, level of formal education acquired, marital status, place of resident and employment status are variables that impact the lives and health status of individuals. These variables to some extend determine the population health seeking behavior and lifestyle and provide data for further analysis into the research subject. The survey asked questions on most of these demographic variables and findings will inform further discussion of the results. A total of 2,503 adult aged 25 -64 years participated in the survey with an overall respond rate of 87.1%. There were 57.5% (n=1,438) females and 42.5% (n=1,065) males involvement in the survey. Approximately 38% of the respondents had no formal education with a significant proportion been females (48.8%). The proportion of respondents with high school education level completion was 22.7% while university level education attainment amongst the survey participants was only 7.3% with a huge disparity between males and females. The sampled population that was never married constitutes 33.8% while 43.9% were currently married and 13.4% cohabiting ("living together"). Little over half (50.6%) of the respondents were self employed and 16.7% were employed either in the public sector (8%-government employees) or in the private sector (8.7%-non-government employees). One-third (32.7%) of the respondents were unpaid (unemployed).

The high proportion of respondents with no formal education confirms the 2007 LDHS result and other national studies that have documented high level of illiteracy in the population. Therefore, health promotion messages on good health seeking behavior, healthy lifestyle and prevention and control of NCDs should be formulated considering the education and literacy level of the population. As marriage couples are less likely to engage in risky behaviors 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 married couples. With the low employment rate coupled with high prevalence of poverty amongst the population, NCDs policies and strategy should prioritize the primary health care approach with a prevention focus due to the high cost associated with NCDs control and cure. In addition, a cost effective strategy should be developed and made accessible to the population especially those vulnerable, high risk and unemployed adults.

Tobacco Use: The survey shows that 11.5% of the respondents are current tobacco users with 9.9% engaged in smoking tobacco products such as cigarettes, cigars or pipes of tobacco. Only 2.1% of the interviewed population use smokeless tobacco products with males constituting 1.1% and females 3.1%. Among the current and daily smokers, male dominated with 17.2% male current smokers and 13.9% daily smoker compare with 2.8% of female current smokers and 1.3% daily smoker respectively. The average age at which tobacco smoking was initiated was 21 years with 91.8% of daily smokers smoking approximately 6 sticks of manufactured cigarette a daily. Exposure to Environmental Tobacco Smoke (ETS) was prevalence among the survey participants with 37.5% at home and 43.1% at the workplace expose to tobacco smoke.

The gender disparity in current tobacco users, smokers and daily smoking documented in this survey is similar to result from NCDs Risks factors studies conducted in other African countries such as Sierra Leone, Cote d' Ivoire, Nigeria, Ethiopia, Benin, and Swaziland. For example in Sierra Leone, the NCDs Study revealed that 34% of the respondents currently use tobacco products with 26% engaged in smoking tobacco (43%-male and 11%-female), while in Ethiopia

a 2006 NCDs study documented 13% of current male smokers compare with less than 1% females. Although the current study did not look into the outcomes of smokeless tobacco and tobacco smoke, smoking is associated with wide variety of diseases, cancer and death. Secondhand smoke exposure causes serious disease and death, including heart disease and lung cancer in nonsmoking adults and sudden infant death syndrome, acute respiratory infections, ear problems, and more frequent and severe asthma attacks in children. Each year, because of exposure to environmental tobacco smoke, an estimated 3,000 nonsmoking Americans die of lung cancer, and 300,000 children suffer from lower respiratory tract infections. 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 (Karki, Y. B. et al).

With very high proportion of the respondents (80.6%) being exposed to ETS either at home or workplace, the enforcement of the ban on smoking in public places should be implemented. Also, the formulation of a NCDs policy should consider smoking in pregnancy and at home to reduce the effect of second hand smoke particularly among children. 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 the use of manufactured tobacco.

Alcohol consumption: The proportion of respondents who currently drink alcohol such as beer, whisky, spirit and local beverages, is 24% with male constituting 34.3% and female 14%. The proportion of lifetime abstainers is 63.2% with a significant proportion being female (75.2%). Among the current alcohol consumers, 23% of males and 9.7% of females were engaged in episodic drinking (i.e. men who had 5 or more bottles and women who had 4 or more alcoholic drinks on any day in the past 30 days prior to the survey). Furthermore, 14.3% (17.2% -males and 7.9%-females) of the respondent drank alcohol daily in the past 12 months prior to the survey.

The high consumption of alcohol among males in this survey has been reported in other studies conducted in many African countries to include, Sierra Leone, Malawi, Ethiopia and Cote d'Ivoire. However, the prevalence of current alcohol consumption among male respondents (34.3%) is higher than females (24%). The consequences of alcohol consumption and/or the harmful use of alcohol was not investigated during this survey but it is important to note that alcohol use has health and social consequences for those who drink, for those around them, and for the nation as a whole. Approximately 100,000 deaths each year are attributed to alcohol use, making it the third leading cause of preventable mortality in the United States. Worldwide, 750,000 deaths are attributed to alcohol use each year. Alcohol-related deaths occur from cancer, cirrhosis of the liver, pancreatitis, motor-vehicle crashes, falls, drowning, suicide, and homicide.

To reduce morbidity and mortality associated with alcohol use, government should levy higher tariff on alcoholic products to deter episodic drinkers, develop messages that are specific to danger associated with alcohol consumption and NCDs policy and strategy when elaborated should focus on alcohol-related diseases prevention and services.

Fruits and Vegetables consumption: The mean number of days, fruits and vegetables were consumed by all respondents was 2 and 4 days respectively. In addition to fruit consumption, the

mean number of serving of fruits and/or vegetables on average per day was 1. This is similar to reports from other African countries survey findings. The effects of low fruits and vegetables consumption was not assessed by this survey, however, the benefit accrue from vegetables and fruits consumption include: Lower blood pressure; reduced risk of heart disease and stroke. Lower risk of eye and digestive problems; and a soft effect on blood sugar that can help keep appetite in check and the reverse leads to severe health consequences.

Therefore, health promotion at all levels of health care delivery, especially for pregnant women should be promoted. In addition to health promotion at the service delivery levels, Liberia should develop a culture of fruits and vegetable consumption, through the dissemination of key messages on food and nutrition, fruit and vegetable consumption and healthy lifestyle practices.

Physical activity: The survey revealed less than half of the sampled population (47.3%) were engaged in high level physical activities. High physical as defined by the survey include 3 day of intense physical activities such as lifting or carrying heavy loads, digging and/or construction works, or 7 day of walking or jogging. Although less than 50% of the respondents were not involved with high level physical activities, more than fifty percent (51.6%) of interviewed men compare to 43.1% of women were engaged in high level physical activity. For moderate and low physical activity such as brisk walking or carrying light loads, travel to and from places, activity at work, and recreational activity. Respondents who undertook moderate activity was 19.5% (18.6%-male and 20.3%-females) and for low activity 33.2% (29.8%-male and 36.6%-female) respectively. Overall, 59.9% of respondents (54.4%- male and 65.4%-female) were not engaged in any vigorous physical activity.

The mean and median times spent on physical activity by the respondents were 193.6 and 87.9 minutes respectively; with males spending sufficient time (213.3-mean and 111.4-median minutes) on physical activity than females (174-mean and 75-median minutes). On the average respondents spent a mean time of 198 minutes (192.8-male and 203.1-female) and a median time of 120 minutes (120-male and 135-female) per day on inactive activities respectively.

Frequent and regular physical exercise boosts the immune system, and helps prevent the "diseases of affluence" such as heart disease, cardiovascular disease, diabetes and obesity. It also improves mental health, helps prevent depression, helps to promote or maintain positive self esteem. It is also important for maintaining physical fitness and can contribute positively to maintaining a healthy weight, building and maintaining healthy bone density, muscle strength, and joint mobility, promoting physiological well-being, reducing surgical risks, and strengthening the immune system.

Globally, physical inactivity causes about 1.9 million avoidable deaths per annum [15] and increases the risk of all-cause mortality by 20-30% [7]. It also serves as a major risk factor in promoting obesity [7]. 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 this survey, it is not unlikely that the high physical inactivity seen in this survey coupled with other risk factors may predispose respondents 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 [4 &12], osteoporosis and its related features [7].

Blood Pressure: The mean blood pressure of all respondents including those who were on medication for hypertension was 128.7/79.7 for both sexes, 129.7/79.5 for males and 127.8/79.9 mmHg for females respectively. The proportion of respondents with SBP of $\geq$ 140 mmHg and/or DBP $\geq$ 90 mmHg including those currently on medication for hypertension was 30.7% for both sexes, 30.3% for males and 31% for females respectively. On the other hand, those with hypertension (SBP $\geq$ 140 and/or DBP $\geq$ 90 mmHg) who are not currently on medication for hypertension was 88.2% for both sexes, 90.5% for males and 86% for females. Only 11.8% of those respondents (9.6%-male and 13.9%-female) with hypertension were on antihypertensive drugs. Raised blood pressure has been documented to be directly related to the risk of stroke and coronary heart disease [19].

Diabetes: A significant proportion of the respondents (91.5%) had never measured their glucose level. The mean fasting blood glucose, including those currently on medication for diabetes was 96.7 for both sexes, 97 for males and 96.4 for females. Furthermore, the percentage of respondents that are currently on medication was 19.2% for both sexes, 19% for males and 19.3% for females. Although the health consequences of diabetes amongst the sampled population was not assesses, however, people who have diabetes are at increased risk for many serious health problems, including hardening of the arteries (atherosclerosis) and heart problems, eye problems that can lead to blindness, circulation and nerve problems, and kidney disease and kidney failure. Therefore, NCDs policy and strategy should address the emerging concerns of diabetes.

Chapter 5:   Recommendations

The analysis of the survey (STEPS) provides data and information on the prevalence of NCDs risk factors in Liberia. With the emerging concern of non-communicable diseases risk factors in Liberia, a critical step that is require to prevent, control and mitigate these casual factors is a national policy and strategy formulation. Tools are now available to collect important risk factors of non-communicable diseases such as was used in this survey.

Below are specific recommendations that should be considered for reducing the prevalence NCDs and the general wellbeing of the general population.

- The Ministry of Health and Social Welfare should work with the relevant institution to enforce the regulation/legislation on tobacco use (ban on public smoking, sale to minor, etc)
- The Ministry should create awareness on the importance of fruit and vegetables consumption
- Promote healthy lifestyle by exercises, regulation of diet, etc.
- The Ministry should encourage the public to monitor their blood pressure, sugar and cholesterol levels.
- Health promotion messages on change in lifestyle should be developed in local languages and also designed according to the educational level of the population.
- Peer education on healthy living and lifestyle changes as well as community and home management of chronic diseases should be promoted particularly among married 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.
- 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.
- With a high proportion of the respondents indicating their explosure to ETS either at home or workplace, NCDs policy discouraging smoking at home, workplace or public places should be adopted.
- Routine and regular physical examinations including measurements of blood sugar, weights, and blood pressure should be promoted.
- NCDs policy and strategic plan addressing the common risks of NCDs should be developed and implemented.

Reference

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Annex A: Respondents with treated and/or controlled raised blood pressure

Table A-1: Respondents with treated and/or controlled raised blood pressure							
Men							
Age Group (years)	N	% On medication and SBP<140 and DBP<90	95% CI	% On medication and SBP≥140 and/orDBP≥90	95% CI	% Not on medication and SBP≥140 and/orDBP≥90	95% CI
25-44	146	2.7	0.0-5.4	4.1	0.6-7.6	93.2	88.4-97.9
45-64	151	1.3	0.0-4.0	10.6	6.8-14.4	88.1	82.4-93.7
25-64	**297**	**2.0**	**0.2-3.7**	**7.6**	**4.6-10.5**	**90.5**	**86.3-94.6**
Respondents with treated and/or controlled raised blood pressure							
Women							
Age Group (years)	N	% On medication and SBP<140 and DBP<90	95% CI	% On medication and SBP≥140 and/orDBP≥90	95% CI	% Not on medication and SBP≥140 and/orDBP≥90	95% CI
25-44	224	3.1	0.3-6.0	6.3	2.8-9.7	90.6	86.9-94.4
45-64	165	1.8	0.0-4.5	16.4	9.9-22.9	81.8	73.4-90.3
25-64	**389**	**2.4**	**0.0-5.1**	**11.5**	**7.8-15.3**	**86.0**	**80.7-91.4**
Respondents with treated and/or controlled raised blood pressure							
Both Sexes							
Age Group (years)	N	% On medication and SBP<140 and DBP<90	95% CI	% On medication and SBP≥140 and/orDBP≥90	95% CI	% Not on medication and SBP≥140 and/orDBP≥90	95% CI
25-44	370	2.9	1.0-4.9	5.2	3.3-7.1	91.8	89.1-94.6
45-64	316	1.6	0.0-4.2	13.5	9.5-17.5	84.9	78.7-91.1
25-64	**686**	**2.2**	**0.2-4.2**	**9.6**	**7.1-12.1**	**88.2**	**84.2-92.1**

Annex B: Sample Size Determination

Given that the sample size is approximately 4320, the district will serve as PSU, Chiefdom as SSU and Households as TSU. Assuming that 80 PSUs are selected from the sample size of 4320, then 54 individuals will be selected/PSU (4320/80).

Since 6 individuals will be selected per Chiefdom, it means 9 Chiefdoms should be selected from each PSU.

Therefore, sample allocation will be 80 PSUs x 9 Chiefdoms x 6 individuals = 4320.

Tentatively, the estimated sample size for this study will be approximately 4320 people based on the following statistical parameters: level of confidence measure of 1.96, margin error of 0.05, baseline levels of indicators of 0.5. Design effect of 1.5, expected response rate of 0.8 and number of age.sex estimates as 5.

The initial calculation is 384.16. Adjusting this figure to the design effect and number of age/sex estimates will be 384.16x1.5x6 = 3,457.44. (The age/sex stratum will be (25-39, 40-54 and 55-69 for males and females).

Therefore adjusting this figure to the non-response rate in order to get the final sample size: 3,457.44/0.8 = 4,321.8.

The approximate sample size will be 4,320.

Annex C: STEPS Questionnaire

<table>
<tr><td colspan="4" style="background:green; color:white; text-align:center">Survey Information</td></tr>
<tr><td colspan="2">Location and Date</td><td>Response</td><td>Code</td></tr>
<tr><td>1</td><td>County/Cluster</td><td>└─┴─┴─┘</td><td>I1</td></tr>
<tr><td>2</td><td>District/Clan</td><td></td><td>I2</td></tr>
<tr><td>3</td><td>Interviewer ID</td><td>└─┴─┴─┘</td><td>I3</td></tr>
<tr><td>4</td><td>Date of completion of the instrument</td><td>└─┴─┘ └─┴─┘ └─┴─┴─┘

dd   mm   year</td><td>I4</td></tr>
</table>

- ✂

<table>
<tr><td colspan="4" style="text-align:right">Participant Id Number └─┴─┘ └─┴─┘ └─┴─┘</td></tr>
<tr><td colspan="2">Consent, Interview Language and Name</td><td>Response</td><td>Code</td></tr>
<tr><td>5</td><td>Consent has been read and obtained</td><td>Yes 1

No 2   If NO, END</td><td>I5</td></tr>
<tr><td rowspan="2">6</td><td>Interview Language [English]</td><td>English 1

[Add others] 2

[Add others] 3

[Add o16 local dialects will be used] 4</td><td rowspan="2">I6</td></tr>
<tr><td></td></tr>
<tr><td>7</td><td>Time of interview
(12 hour clock)</td><td>└─┴─┘ : └─┴─┘

hrs   mins</td><td>I7</td></tr>
<tr><td>8</td><td>Family Surname</td><td></td><td>I8</td></tr>
<tr><td>9</td><td>First Name</td><td></td><td>I9</td></tr>
<tr><td colspan="4">Additional Information that may be helpful</td></tr>
<tr><td>10</td><td>Contact phone number where possible</td><td></td><td>I10</td></tr>
</table>

Record and file identification information (I5 to I10) separately from the completed questionnaire.

Step 1   Demographic Information

CORE: Demographic Information

Question		Response	Code
11	Sex (*Record Male / Female as observed*)	Male 1 Female 2	C1
12	What is your date of birth? *Don't Know 77 77 7777*	└─┴─┘ └─┴─┘ └─┴─┴─┴─┘ *If known, Go to C4* dd mm year	C2
13	How old are you?	Years └─┴─┴─┘	C3
14	In total, how many years have you spent at school or in full-time study (excluding pre-school)?	Years └─┴─┴─┘	C4

EXPANDED: Demographic Information

15	What is the **highest level of education** you have completed? *[INSERT COUNTRY-SPECIFIC CATEGORIES]*	No formal schooling 1 Less than primary school 2 Primary school completed 3 Junior high completed 4 Senior high completed 5 College/University completed 6 Post graduate degree 7 Refused 88		C5
16	What is your *tribe?*	Kissi	1	C6
		Mano	2	
		Kpele	3	
		Madingo	4	
		Kru	5	
		Bassa	6	

		Gio	7	
		Sapo	8	
		Loma	9	
		Gbandi	10	
		Vai	11	
		Grepo	12	
		Gola	13	
		Other	14	
		Refused	88	
17	What is your **marital status**?	Never married	1	C7
		Currently married	2	
		Separated	3	
		Divorced	4	
		Widowed	5	
		Cohabitating	6	
		Refused	88	
18	Which of the following best describes your **main work** status over the past 12 months? *[INSERT COUNTRY-SPECIFIC CATEGORIES]* *(USE SHOWCARD)*	Government employee	1	C8
		Non-government employee	2	
		Self-employed	3	
		Non-paid	4	
		Student	5	
		Homemaker	6	
		Retired	7	
		Unemployed (able to work)	8	
		Unemployed (unable to work)	9	
		Refused	88	
19	How many people older than 18 years, including yourself, live in your household?	Number of people └──┴──┘		C9

EXPANDED: Demographic Information, Continued		
Question	**Response**	**Code**
20	Taking **the past year**, can you tell me what the average earnings of the household have been? *(RECORD ONLY ONE, NOT ALL 3)*	Per week └─┴─┴─┴─┴─┴─┴─┘ *Go to T1*	C10a
		OR per month └─┴─┴─┴─┴─┴─┴─┘ *Go to T1*	C10b
		OR per year └─┴─┴─┴─┴─┴─┴─┘ *Go to T1*	C10c
		Refused 88	C10d
21	If you don't know the amount, can you give an **estimate** of the annual household income if I read some options to you? Is it *(READ OPTIONS)*	≤ LD 500 1 LD 500 - 999 2 LD 1000 - 1999 3 LD 2000 - 2999 4 More than LD 3000 5 Don't Know 77 Refused 88	C11

Step 1   Behavioural Measurements

CORE: Tobacco Use		
Now I am going to ask you some questions about various health behaviours. This includes things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with tobacco.		
Question	**Response**	**Code**
22	Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes? *(USE SHOWCARD)*	Yes 1 No 2 *If No, go to T6*	T1
23	Do you currently smoke tobacco products **daily**?	Yes 1 No 2 *If No, go to T6*	T2
24	How old were you when you **first started** smoking daily?	Age (years) └─┴─┘ *If Known, go to T5a* Don't know 77	T3
25	Do you remember how long ago it was?	In Years └─┴─┘ *If Known, go to T5a*	T4a
		OR in Months └─┴─┘ *If Known, go to T5a*	T4b

			Code
	(RECORD ONLY 1, NOT ALL 3)	OR in Weeks └─┴─┘	T4c
26	On average, **how many** of the following do you smoke each day? *(RECORD FOR EACH TYPE, USE SHOWCARD)* *Don't Know 77*	Manufactured cigarettes └─┴─┘	T5a
		Hand-rolled cigarettes └─┴─┘	T5b
		Pipes full of tobacco └─┴─┘	T5c
		Cigars └─┴─┘	T5d
		Other *If Other, go to T5other,* └─┴─┘ *else go to T9*	T5e
		Other (please specify): └─┴─┴─┴─┴─┴─┘ *Go to T9*	T5other

EXPANDED: Tobacco Use		
Question	**Response**	**Code**
27	In the past, did you **ever** smoke **daily**?	Yes 1 No 2 *If No, go to T9*	T6
28	How old were you when you **stopped** smoking **daily**?	Age (years) Don't Know 77 └─┴─┘ *If Known, go to T9*	T7
29	How **long ago** did you stop smoking daily? *(RECORD ONLY 1, NOT ALL 3)* *Don't Know 77*	Years ago └─┴─┘ *If Known, go to T9*	T8a
		OR Months ago └─┴─┘ *If Known, go to T9*	T8b
		OR Weeks ago └─┴─┘	T8c
30	Do you **currently use** any **smokeless tobacco** such as *[snuff,]*? (USE SHOWCARD)	Yes 1 No 2 *If No, go to T12*	T9
31	Do you **currently use smokeless tobacco** products **daily?**	Yes 1 No 2 *If No, go to T12*	T10
32	On average, how many **times a day** do you use ….	Snuff, by mouth └─┴─┘	T11a

		Snuff, by nose $\sqcup\sqcup\sqcup$		T11b
	(RECORD FOR EACH TYPE, USE SHOWCARD)	Chewing tobacco $\sqcup\sqcup\sqcup$		T11c
		Betel, quid $\sqcup\sqcup\sqcup$		T11d
	Don't Know 77	Other $\sqcup\sqcup\sqcup$ *If Other, go to T11other, else go to T13*		T11e
		Other (specify) $\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup$ *Go to T13*		T11other
33	In the **past**, did you **ever use** smokeless tobacco such as [snuff] **daily**?	Yes 1 No 2		T12
34	During the past 7 days, on how many days did someone **in your home** smoke when you were present?	Number of days $\sqcup\sqcup\sqcup$ Don't know 77		T13
35	During the past 7 days, on how many days did someone smoke in closed areas **in your workplace** (in the building, in a work area or a specific office) when you were present?	Number of days Don't know or don't work in a closed area 77	$\sqcup\sqcup\sqcup$	T14

CORE: Alcohol Consumption		
The next questions ask about the consumption of alcohol.		
Question	**Response**	**Code**
36	Have you **ever** consumed an alcoholic drink such as beer, wine, spirits (Cain juice)or (Palm wine) (USE SHOWCARD OR SHOW EXAMPLES)	Yes 1 No 2 *If No, go to D1*	A1a
37	Have you consumed an alcoholic drink within the **past 12 months**?	Yes 1 No 2 *If No, go to D1*	A1b
38	During the past 12 months, **how frequently** have you had at least one alcoholic drink? (READ RESPONSES, USE SHOWCARD)	Daily 1 5-6 days per week 2 1-4 days per week 3 1-3 days per month 4 Less than once a month 5	A2

39	Have you consumed an alcoholic drink within the **past 30 days**?	Yes 1 No 2 *If No, go to D1*	A3
40	During the past 30 days, on how many **occasions** did you have at least one alcoholic drink?	Number Don't know 77 └─┴─┘	A4
41	During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion? *(USE SHOWCARD)*	Number Don't know 77 └─┴─┘	A5
42	During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	Largest number Don't Know 77 └─┴─┘	A6
43	During the past 30 days, how many times did you have for **men**: **five or more** for **women**: **four or more** standard alcoholic drinks in a single drinking occasion?	Number of times Don't Know 77 └─┴─┘	A7

EXPANDED: Alcohol Consumption		
44	During the past 30 days, when you consumed an alcoholic drink, how often was it with meals? Please do not count snacks.	Usually with meals 1 Sometimes with meals 2 Rarely with meals 3 Never with meals 4	A8
45	During each of the **past 7 days**, how many standard alcoholic drinks did you have each day? *(USE SHOWCARD)* *Don't Know 77*	Monday └─┴─┘	A9a
		Tuesday └─┴─┘	A9b
		Wednesday └─┴─┘	A9c
		Thursday └─┴─┘	A9d
		Friday └─┴─┘	A9e
		Saturday └─┴─┘	A9f
		Sunday └─┴─┘	A9g

CORE: Diet			
The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of a typical week in the last year.			

Question		Response	Code
46	In a typical week, on how many days do you **eat fruit**? *(USE SHOWCARD)*	Number of days Don't Know 77　⌴⌴⌴　*If Zero days, go to D3*	D1
47	How many **servings** of fruit do you eat on **one** of those days? *(USE SHOWCARD)*	Number of servings　⌴⌴⌴ Don't Know 77	D2
48	In a typical week, on how many days do you **eat vegetables**? *(USE SHOWCARD)*	Number of days Don't Know 77　⌴⌴⌴　*If Zero days, go to D5*	D3
49	How many **servings** of vegetables do you eat on one of those days? *(USE SHOWCARD)*	Number of servings　⌴⌴⌴ Don't know 77	D4

EXPANDED: Diet			
50	What type of **oil or fat is most often** used for meal preparation in your household? *(USE SHOWCARD)* *(SELECT ONLY ONE)*	Vegetable oil Argo oil　1 Palm oil Coconut oil Pakana oil　2 Butter　3 Margarine　4 Other　5　*If Other, go to D5 other* None in particular　6 None used　7 Don't know　77	D5
		Other　⌴⌴⌴⌴⌴⌴⌴⌴	D5other
51	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.	Number Don't know 77　⌴⌴⌴	D6

CORE: Physical Activity

Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed].* In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Question		Response	Code
Work			
52	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work, cutting trees, brushing, cutting rice, scratching farm]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 4*	P1
53	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days └──┘	P2
54	How much time do you spend doing vigorous-intensity activities at work on a typical day?	└──┴──┘ : └──┴──┘ Hours : minutes hrs mins	P3 (a-b)
55	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 7*	P4
56	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days └──┘	P5
57	How much time do you spend doing moderate-intensity activities at work on a typical day?	└──┴──┘ : └──┴──┘ Hours : minutes hrs mins	P6 (a-b)
Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. *[Insert other examples if needed]*			
58	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7

59	In a typical week, on how many days do you walk or use a bicycle for at least 10 minutes continuously to get to and from places?	Number of days └──┘	P8
60	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes └──┴──┘ : └──┴──┘ hrs mins	P9 (a-b)

CORE: Physical Activity, Continued		
Question	**Response**	**Code**
Recreational activities		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), *[Insert relevant terms]*.		
61	Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 13*	P10
62	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?	Number of days └──┘	P11
63	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes └──┴──┘ : └──┴──┘ hrs mins	P12 (a-b)
64	Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, *[cycling, swimming, volleyball]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P16*	P13
65	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?	Number of days └──┘	P14
66	How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?	Hours : minutes └──┴──┘ : └──┴──┘ hrs mins	P15 (a-b)

EXPANDED: Physical Activity

Sedentary behaviour
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping. *[INSERT EXAMPLES]   (USE SHOWCARD)*

67	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes └─┴─┘ : └─┴─┘ hrs mins	P16 (a-b)

CORE: History of Raised Blood Pressure		
Question	**Response**	**Code**
68	Have you ever had your blood pressure measured by a doctor or other health worker?	Yes 1 No 2 *If No, go to H6*	H1
69	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes 1 No 2 *If No, go to H6*	H2a
70	Have you been told in the past 12 months?	Yes 1 No 2	H2b

EXPANDED: History of Raised Blood Pressure			
	Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker?		
71	Drugs (medication) that you have taken in the past two weeks	Yes 1 No 2	H3a
	Advice to reduce salt intake	Yes 1 No 2	H3b
	Advice or treatment to lose weight	Yes 1 No 2	H3c
	Advice or treatment to stop smoking	Yes 1 No 2	H3d
	Advice to start or do more exercise	Yes 1 No 2	H3e
72	Have you ever seen a traditional healer for raised blood	Yes 1	H4

	pressure or hypertension?	No 2	
73	Are you currently taking any herbal or traditional remedy for your raised blood pressure?	Yes 1 No 2	H5

CORE: History of Diabetes

Question		Response	Code
74	Have you ever had your blood sugar measured by a doctor or other health worker?	Yes 1 No 2 *If No, go to M1*	H6
75	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?	Yes 1 No 2 *If No, go to M1*	H7a
76	Have you been told in the past 12 months?	Yes 1 No 2	H7b

EXPANDED: History of Diabetes

	Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker?		
77	Insulin, injection	Yes 1 No 2	H8a
	Drugs (medication, tablet) that you have taken in the past two weeks	Yes 1 No 2	H8b
	Special prescribed diet	Yes 1 No 2	H8c
	Advice or treatment to lose weight	Yes 1 No 2	H8d
	Advice or treatment to stop smoking	Yes 1 No 2	H8e
	Advice to start or do more exercise	Yes 1 No 2	H8f
78	Have you ever seen a traditional healer for diabetes or	Yes 1	H9

	raised blood sugar?	No 2	
79	Are you currently taking any herbal or traditional remedy for your diabetes?	Yes 1 No 2	H10

Step 2 Physical Measurements			

CORE: Height and Weight

Question		Response	Code
80	Interviewer ID	⎿__⎿__⎿__⏌	M1
81	Device IDs for height and weight	Height ⎿__⎿__⏌ Weight ⎿__⎿__⏌	M2a M2b
82	Height	in Centimetres (cm) ⎿__⎿__⎿__⎿__⏌ . ⎿__⏌	M3
83	Weight *If too large for scale 666.6*	in Kilograms (kg) ⎿__⎿__⎿__⎿__⏌ . ⎿__⏌	M4
84	**For women:** Are you pregnant?	Yes 1 *If Yes, go to M 8* 2 No Don't know	M5

CORE: Waist

85	Device ID for waist	⎿__⎿__⏌	M6
86	Waist circumference	in Centimetres (cm) ⎿__⎿__⎿__⎿__⏌ . ⎿__⏌	M7

CORE: Blood Pressure

87	Interviewer ID	⎿__⎿__⎿__⏌	M8
88	Device ID for blood pressure	⎿__⎿__⏌	M9
89	Cuff size used	Small 1 Medium 2 Large 3	M10
90	Reading 1	Systolic (mmHg) ⎿__⎿__⎿__⏌	M11a
		Diastolic (mmHg) ⎿__⎿__⎿__⏌	M11b

91	Reading 2	Systolic (mmHg)	⎕⎕⎕⎕	M12a
		Diastolic (mmHg)	⎕⎕⎕⎕	M12b
92	Reading 3	Systolic (mmHg)	⎕⎕⎕⎕	M13a
		Diastolic (mmHg)	⎕⎕⎕⎕	M13b
93	During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2		M14

EXPANDED: Hip Circumference and Heart Rate				
94	Hip circumference	in Centimeters (cm)	⎕⎕⎕⎕.⎕	M15
95	Heart Rate			
	Reading 1	Beats per minute	⎕⎕⎕	M16a
	Reading 2	Beats per minute	⎕⎕⎕	M16b
	Reading 3	Beats per minute	⎕⎕⎕	M16c

Step 3 Biochemical Measurements			

CORE: Blood Glucose			
Question		**Response**	**Code**
96	During the past 12 hours have you had anything to eat or drink, other than water?	Yes 1 No 2	B1
97	Technician ID	⎕⎕⎕⎕	B2
98	Device ID	⎕⎕⎕	B3
99	Time of day blood specimen taken (12 hour clock)	Hours : minutes ⎕⎕⎕ : ⎕⎕⎕ hrs mins	B4
100	Fasting blood glucose *Choose accordingly: mmol/l or mg/dl*	mmol/l ⎕⎕⎕.⎕⎕⎕ mg/dl ⎕⎕⎕⎕.⎕	B5
101	Today, have you taken insulin or other drugs (medication, tablets) that have been prescribed by a doctor or other health worker for raised blood glucose?	Yes 1 No 2	B6

CORE: Blood Lipids			
102	Device ID	└─┴─┴─┘	B7
103	Total cholesterol *Choose accordingly: mmol/l or mg/dl*	mmol/l └─┴─┘ . └─┴─┘ mg/dl └─┴─┴─┘ . └─┘	B8
104	During the past two weeks, have you been treated for raised cholesterol with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	B9

EXPANDED: Triglycerides and HDL Cholesterol			
105	Triglycerides *Choose accordingly: mmol/l or mg/dl*	mmol/l └─┴─┘ . └─┴─┘ mg/dl └─┴─┴─┘ . └─┘	B10
106	HDL Cholesterol *Choose accordingly: mmol/l or mg/dl*	mmol/l └─┘ . └─┴─┘ mg/dl └─┴─┴─┘ . └─┘	B11