MINISTRY OF HEALTH

MALAWI NATIONAL STEPwise SURVEY FOR NON-COMMUNICABLE DISEASES RISK FACTORS 2017 REPORT


STEPS

Contents

Contents

List of Figures

List of Tables

Acknowledgments

The Ministry of Health would like to acknowledge the efforts of the Individuals and organizations that contributed to the success of this Malawi National 2017 STEP Survey. The close cooperation between the Ministry of Health, WHO and National Statistics Office (NSO) was critical to the successful completion of the survey.

Special thanks to all Directorates within the ministry of health, Non-Communicable Unit, MEIRU, Partners In Health, UNC, Partners in Hope, College of Medicine, MEHN, WDF, DAM, all central Hospitals (Queen Elizabeth Central Hospital, Zomba Central Hospital, Kamuzu Central Hospital and Mzuzu central Hospital), Malawi Liverpool Welcome trust (MLW) and all data collectors and all survey teams.

The Ministry of Health and Population is grateful to the World Health Organization (WHO) for the financial and technical assistance throughout the process of orientation of the National Steering Committee, training of the data collectors, the monitoring of the data collection, and finally for the continued support during the analysis of the data. The secondary analysis on the identified areas of the research, which included socioeconomic status and mental health questions was done by Partners In Health Malawi. An extended thanks to the National Statistics Office, Central Monitoring and Evaluation Division and all partners involved in the finalization of the STEPS country report.

Foreword

This country report presents the findings of the Malawi STEPwise survey for non-communicable disease (NCD) risk factors 2017 (STEPS). The STEPS survey is a national activity which is expected to take place every five years. The first was in 2009 and this is the second survey for the year 2017. The objective of the survey is to collect comprehensive information on risk factors for NCDs.

The evidence is clear: NCDs and Injuries (NCDIs) are increasing worldwide, with ever-greater impacts on the poor and the young. Expanding the breadth and depth of the NCDI agenda is critical if we—as national and global citizens—are to achieve universal health coverage. With an inclusive agenda rooted in equity, we will better understand the true impact and resources needed to address NCDIs for all Malawians. We truly have a double burden of disease comprising both infectious and non-communicable conditions. This report provides the very essential information to inform policy geared towards halting and reversing a critical part of the burden of non-communicable diseases.

The STEPS country report provides selected prioritized and analyzed information including statistics on common NCDs and their risk factors, socioeconomic status of those living with NCDS, cervical cancer screening, suicide, and epilepsy among adults age 18-69. It supports pivotal change in current implementation of NCD interventions as this new information will equip policy makers, funders, and implementers with the necessary evidence base to tackle NCDs and advocate for Policy change within the nation of Malawi.

It is therefore, the expectation of the Ministry that information contained in this report will be used by all stakeholders to come up with targeted interventions and programs aimed at improving the health status of Malawians.

Dr. Charles Mwansambo
SECRETARY FOR HEALTH

Executive Summary

Non-communicable diseases (NCDs) are disease processes or health conditions that are not infectious or transferable from one human to another. Often chronic, they can be a result of random genetic abnormalities, heredity, lifestyle, or environmental, or a wide variety of other causes. Non-communicable diseases account for over 70% of deaths worldwide with an estimated 78% of these deaths occurring in low- and middle-income countries (LMICs).[1] 85% of premature NCD deaths (aged between 30 and 69 years) occur in LMICs.[2] The major four chronic NCDs are: cardiovascular diseases (CVD), diabetes, cancers, and chronic respiratory (lung) conditions. In Malawi, these account for approximately 40% of the disability adjusted life years (DALYs) due to Non-communicable diseases and injuries (NCDI)s.[3] The ageing of populations in developing countries results in a demographic and an epidemiological transition which will affect the impact of chronic and degenerative diseases on the health of populations.

Globally, life expectancy has increased and lifestyle associated conditions such as obesity, hypertension, and injuries tend to become more prevalent. These changes may also include a shift in health-related behavior, which may augment the dietary consumption of fats, alcohol, and increase in smoking and decreased physical activity. Changes in risk factor levels have increased the number of chronic diseases. Depending on the status of development of every country, these NCDs may rapidly increase or become established at high levels. Additionally, the HIV/AIDS pandemic, other infections, gender, and poverty are notable determinants of non-communicable diseases.

The objective of the STEPS survey was to determine the magnitude of NCDs and selected risk factors in Malawi among adults age 18-69. The specific objectives included: to assess the prevalence of life-style factors (physical inactivity, unhealthy diet, tobacco and harmful alcohol use) and anthropometric measurements (body mass index); to determine the prevalence of hypertension, diabetes and raised cholesterol levels; to determine the prevalence of screening for raised blood pressure, blood sugar, and cervical cancer; and to compare the burden of NCDs and their risk factors in 2017 vs 2009.

Methods: Using the WHO STEPwise approach to chronic disease risk factor surveillance, a population-based, nationwide cross-sectional survey was conducted between September and

[1] http://www.who.int/mediacentre/factsheets/fs355/en/

[2] http://www.who.int/mediacentre/factsheets/fs317/en/

[3] *Malawi Ministry of Health. Malawi NCDI Poverty Commission., "Malawi National NCDI Poverty Commission Report," 2018.*

October 2017 among participants aged 18–69 years. Sociodemographic and behaviour risk factors were collected in Step 1. Physical anthropometric and blood pressure measurements were taken in Step 2. Blood cholesterol, fasting blood glucose and sodium and creatinine in urine sample to determine salt intake were measured in Step 3.

Summary of findings: The survey had a total of 4206 participants sampled from 255 enumeration areas. A total of 4187 valid records were collected. The findings showed that 21.7% of men and 1.5% of women currently smoked tobacco. The prevalence of smoking in the urban population is at 6.1%, compared to 11.9% among the rural population however, 22.5% of rural men smoke tobacco. In comparison to the 2009 STEPS results that's for respondents aged 25-64 years, there has been a decline in the current tobacco status for women from 2.9% to 1.5% while for men there is an increase from 25.9% to 27.4%.

The current alcohol distribution and consumption status among the respondents shows that 17.3% of respondents were current drinkers of alcohol with a significant difference among sexes (32.8% of men and 2.8% in women). However, men in the age group 30-44 constitute the highest consumers of alcohol at 39%. This calls for intensified interventions against harmful use of alcohol within the context of the National Alcohol Policy.

Population salt intake was explored: 17.4% add salt always or often before eating or when eating (20.2% of men, 14.8% of women). The population mean salt intake per day is 10.4 grams, greater than double the WHO recommended limit (5 grams of salt per day). Men in the age group 18-29 are the most likely to add salt always or often before eating or when eating (21.6%). In addition, 38.2% of Malawians always or often consume processed food high in salt. This does not differ significantly between men and women, however there is significant difference between the urban and rural population (53.8% of urban population vs 36.2% of rural). Furthermore, regarding the dietary intake of vegetable and fruit, the mean number of days of vegetable consumption in a typical week is 5.2 days and that of fruits is 2.5 days per week.

The findings show that 18.5% of the respondents were overweight (BMI equal to or greater than 25), with a higher percentage among women (27.8%) compared to men (9.4%). In an urban versus rural analysis, there is a statistical difference between men in urban areas at 26.4% and in rural areas at 7.7% and women at 49.8% and 24.4%, respectively. However, the prevalence of overweight in Malawi among 25-64 years has not significantly changed from 21.9% in 2009 and 21.5% in 2017. There is a need for interventions to reduce the burden of overweight, particularly targeting urban settings. In a further secondary analysis of BMI by wealth quintile, the survey

revealed that more poor people are underweight and more wealthy people are overweight or obese.

The STEPS survey shows an overall improvement in people accessing services to measure their blood pressure is statistically significant, among 25-64 years, 74.7% (CI 73.0-76.4) in 2009 never measured while as in 2017, 62.4% (CI 58.3 – 66.6) never measured. Among those previously diagnosed with raised blood pressure, only 30.3% are currently on treatment prescribed by a medical doctor or health worker for raised blood pressure, and 8.3% reported to be taking herbal or traditional medicines. 16.1% of the population age 25-64 years have raised blood pressure (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised blood pressure). This is a lower prevalence than reported in the 2009 STEPS survey which was at 32.9%. However, 90.4% of those with raised blood pressure are not currently on blood pressure medication. There is a need to explore avenues to decentralize services for increased access and awareness for screening and treatment, and for initiatives that are tasked to regulate the herbal remedy industry in Malawi.

The prevalence of raised blood sugar among those aged 25-64 years in 2017 is 1.4% compared to 5.6% in 2009. Among all respondents, 96.0% reported having never been measured for raised blood glucose. The secondary analysis highlighted a need for increased services among the poor, with less respondents living in the poorest quintile accessing screening for elevated blood pressure or blood sugar than those in the wealthiest quintile. There is need to intensify diabetes screening in chronic care targeting first level hospitals and improve on the accessibility of diabetes treatment for those diagnosed.

The 2017 STEPS Survey shows that 12.2% of female respondents have ever been screened for cervical cancer. Furthermore, within the target age group of 30-49, only 16.4% have ever been screened for cervical cancer, representing a clear need for ongoing and augmented efforts to engage this group and provide screening services. Among women aged 30-49 years, more of them accessed screening for cervical cancer in urban areas (26.7%) than in rural areas (14.8%), providing one potential focus for increasing service availability. Furthermore, significantly more women living in the wealthiest quintile had accessed cervical cancer screening than women living the poorest quintile.

The 2017 STEPS survey, 8.0% of the population aged 25-64 years have 3-5 risk factors whereas in 2009 it was 16.5%. The secondary analysis investigated this by wealth quintile, showing those in the wealthiest quintile were more likely to have 3 or more of the risk factors than respondents in the poorest quintile.

The rate of severe mental illness in Malawi is worryingly high, with over 7% of Malawian adults seriously contemplating suicide within the past year, and almost 4% making a plan to commit suicide. This is worse among the poorest Malawians compared to the wealthiest.

The 2017 STEPS Survey was the first population survey of possible epilepsy cases in Malawi that we are aware of, with a striking 14% of households have someone in the household suspected to have epilepsy.

1 Chapter One – Introduction

1.1 Global burden of noncommunicable diseases

Non-communicable diseases (NCDs) – mainly cardiovascular diseases, cancers, chronic respiratory diseases and diabetes – are the major cause of death worldwide. In 2016, NCDs were responsible for 41 million of the world's 57 million deaths (71%). 15 million of those deaths were 'premature', between the ages of 30 and 69 years. 85% of premature NCD deaths occurred in low- and middle-income countries and could have largely been prevented. Cardiovascular diseases account for most NCD deaths, or 17.9 million deaths annually, followed by cancers (9 million), chronic respiratory diseases (3.8 million), and diabetes (1.6 million) [1]. Most NCD deaths are linked to common risk factors, namely tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol.

To strengthen national efforts to address the burden of NCDs, the 66th World Health Assembly endorsed the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 (resolution WHA66.10). The global action plan offers a paradigm shift by providing a road map and a menu of policy options for Member States, WHO, other UN organizations and intergovernmental organizations, NGOs and the private sector which, when implemented collectively between 2013 and 2020, will attain 9 global targets by 2025, including 10% relative reduction in harmful use of alcohol, 10% relative reduction in prevalence of insufficient physical exercise, 25% relative reduction in the prevalence of raised blood pressure, 30% relative reduction in mean population salt intake, in addition 16 best-buys, 9,000 lives can be saved by 2025, by implementing all of the 16 WHO best buys and 30% relative reduction in current tobacco use[2].

1.2 NCDs in Africa

In the WHO African Region, the burden of NCDs and their risk factors are now well documented. Based on data from WHO STEPwise approach to noncommunicable disease risk factor surveillance (STEPS) from 33 countries in the region and global school-based student health surveys (GSHS) from 19 countries, the prevalence of hypertension, or high blood pressure, in the African region is the highest worldwide, affecting an estimated 46% of adults. At least one in three adults was found to be hypertensive in half of the countries, prevalence of daily tobacco use among adults ranged from 5% to 26% (12% across the Region), people who are overweight ranged from 12% in Madagascar to 60% in Seychelles, with a median of 35%, while alcohol consumption the median prevalence is at 31% [3].

1.3 NCDs in Malawi

NCDs are estimated to account for 32% of all deaths in Malawi [1]. Efforts to address NCDs in our country included conducting a STEPS survey in 2009, to understand the status of NCDs and their risk factors. This survey revealed that one third (32.9%) of adults had raised blood pressure (BP) or currently on medication for raised BP. High blood pressure was significantly more common in males than females (37.2% vs 29.2%, $p<0.05$). Majority (94.9%) of the people with high blood pressure were not on medication and or were not aware that they were hypertensive. The prevalence of diabetes was estimated to be 5.6%. There were no significant differences observed between males and females (6.5% vs 4.7%, $p>0.05$). The magnitude of raised cholesterol was estimated at 8.7%. Raised cholesterol was significantly more common among females compared to males (11.0% vs 6.3%, $p<0.05$). In terms of risk factors, tobacco smoking and alcohol consumption were significantly more common in males than in females (25.9% vs 2.9%, 30.1% vs 4.2% respectively). Physical inactivity and overweight were significantly more common in females than males (12.6% vs 6.3%, 28.1% vs 16.1%). The overall (both sexes) national estimates of tobacco smoking, alcohol consumption, physical inactivity and overweight among adults aged 25-64 years were 14.1%, 16.9%, 9.5% and 21.9% respectively. About 16.5% of the participants had 3 or more NCD risk factors [4].

1.4 NCD Prevention and Control

The 2009 NCD STEPS survey led to establishment of NCD and Mental Health Unit in the Directorate of Clinical Health Services for strong leadership and coordination of NCD prevention and control activities. Non-communicable diseases have been prioritized with establishment of NCD and Mental Unit and have been included in Health Sector Strategic Plan (HSSP) II 2017-2022[5]. Furthermore, NCD strategic plan 2017 – 2022 has been developed in line with HSSP.

1.5 STEPS Survey 2017

With support from WHO, Ministry of Health planned a second STEPS survey, to be undertaken in September and October 2017.

Main objective: To determine the magnitude of non-communicable diseases and their risk factors in Malawi.

Specific objectives:

1. to assess the prevalence of life-style factors (physical activity, diet, tobacco and alcohol use), and anthropometric measurements (body mass index and central obesity);

2. to determine the prevalence and determinants of hypertension, diabetes and raised cholesterol levels; and

3. to compare the level of burden of NCDs and their risk factors determined in 2017 vs 2009.

Findings will be compared with the first survey only for the age group 25-64 years as these age groups were included on the 2009 survey and used to call for intensified promotion of healthy lifestyles, screening, treatment and control of NCDs and their risk factors.

2 Chapter Two – Methods

2.1 Survey design

This was a national community based cross-sectional survey, using WHO STEPwise approach for assessing risk factors for chronic non-communicable diseases. The approach includes the use of a questionnaire for gathering demographic and behavioural information (Step 1), then moving to physical measurements (Step 2) and then biochemistry tests (Step 3). In addition, there are three modules of risk factor assessment, namely core, expanded and optional. The STEPS Survey instrument was adapted and tested by the core team and data collectors.

2.2 Survey participants

Eligible participants for the survey were all adult males and females aged 18 to 69 years.

2.3 Sample size

The sample size was calculated by using the formula: $N = Z^2 \frac{P(1-P)}{e^2}$

Where N= sample size, Z= level of confidence, P= baseline level of the selected indicator and e= margin of error

Given the estimated prevalence of raised BP from the previous STEP survey, P= 0. 329, Z= 1.96 (at 95% confidence interval), e= 0.05, the initial estimated sample size was:

$n = 1.96^2 \frac{0.329(1-0.329)}{0.05^2} = 339$

Adjusting for: Design effect for complex sample design= 1.50 (multiply), Age-sex estimates 18-69 age range (8, 10 year- intervals; 18-29, 30-44, 45-59, 60-69) = 8 (multiply).

The estimated required sample size was therefore adjusted for design effect and age-sex estimates to: N=339* 1.5* 8= 4,071

Assuming a non-response rate of 20% (particularly for STEP 3), the final sample size was therefore adjusted to: 4,071/0.8= 5,088

Therefore, the final required sample size adjusted for design effect, age-sex and non-response was 5,088.

2.4 Sample design

This survey was designed to obtain data that would be a representation of the population aged 18-69 years in Malawi. To achieve this, a multi-stage sampling method was used to select enumeration areas (EAs), households and eligible participants (three stages).

Stage 1: Selection of enumeration areas (EAs):

Sampling frame:
Administratively, Malawi is divided into twenty-eight districts. In turn, each district is subdivided into smaller administrative units called traditional authorities (TAs). Each administrative unit is sub-divided into enumeration areas (EAs) by the National Statistical Office (NSO). Enumeration areas are classified as urban or rural. Each EA has a sketch map drawn by NSO. The sketch map shows the EA boundaries, location of buildings, and other landmarks. The list of EAs was obtained from NSO. This list was used as a sampling frame for random selection of EAs for the NCD STEPs Survey as described below.

Number of enumeration areas to be selected
In accordance with WHO STEPS Manual the recommended number of participants to be selected at each primary sampling unit (in our case in each EA) is 20. Given that the estimated required sample size was 5,088 (including the 20% non-response rate), the total number of EAs selected was 5,088/20=255. Thus a total of 255 EAs was therefore be randomly selected from the list of all EAs in Malawi.

Sampling method for EA selection:
Probability Proportional to Size (PPS) sampling method was used to randomly select the 255EAs from the whole country as follows:
The EAs in Microsoft Excel® was first sorted in descending order of population (largest to the smallest).

- Then the total population of all EAs in Malawi was calculated.
- A column of cumulative total population of EAs was then created.
- Then the sampling interval was calculated by dividing total population by 255 (total number of EAs to be selected).
- Random number (the seed) was generated by computer in the excel® using the formula RANDBETWEEN (sampling interval).
- The EA whose cumulative total contained the seed was the first to be selected.

- The 2nd, 3rd, up to 255th EA was selected systematically by adding the random number to the sampling interval.

Stage 2: Selection of households

The EA sampling frame obtained from NSO had information on the total number of households in each EA. Twenty households were selected from each EA (as described above under the number of EAs to be selected). The sampling interval for household selection in each EA was therefore determined by dividing the total number of households in the EA by 20. Systematic sampling method (every nth household) was then used to randomly select the required 20 households.

Stage 3: Selection of eligible participants at household level

Only one eligible participant (an adult aged 18-69 years) in the selected households was enrolled in the survey. In households with more than one eligible participant, participants were randomly selected using an Android device.

2.5 Survey period

The survey protocol was developed and submitted to the National Ethics Committee by the end of 2nd quarter of 2017 and ethical clearance obtained by July/August 2017. Recruitment, training of data collectors and collection of data started immediately after obtaining ethical clearance in September/October 2017.

2.6 Staff Recruitment and Training

The survey team comprised of Health Surveillance Assistants (HSAs), health workers such as nurses, clinicians, lab technicians, environmental health officers and village guiders. A training workshop for data collectors and supervisors was held. The main training objective of the workshop was to equip the survey team with the necessary skills to execute the expected deliverables for the STEPS survey. The following topics were covered with the data collectors

(a) overview of the study (b) how to gain entry into the study areas and households (c) how to conduct interviews (d) how to observe research ethics (e) how to collect data using electronic devices (f) how to collect blood samples (g) how to collect urine samples (h) how to keep records (i) how to ensure quality control of all field processes.

Interviewers conducted mock interviews and practiced taking both physical measurements and collection of blood and urine samples. Team supervisors were further trained on: (a) checking and collecting interview data (b) editing questionnaires (c) problem solving in the field.

2.7 Pilot Study

The field team was then afforded the opportunity to pilot the instrument and equipment in the community. A pilot study was then conducted in one EA that not part of the survey. WHO STEPS included specific software and supporting materials to undertake data collection electronically (eSTEPS) using Android devices. The following positive outcomes were noted during the pilot study:

- immediate error checking during data collection (e.g. inadvertently skipped questions or out of range responses);
- marked reduction of materials to be carried by data collectors;
- remote data submission;
- no additional data entry from paper-based questionnaires was needed, and therefore
  - ➢ no additional cost for data entry;
  - ➢ fewer errors arising from data entry;
  - ➢ final dataset can be created quickly following completion of data collection.

2.8 Instrument and Data Collection

The generic WHO STEPS survey instrument version 3.2 was adapted by STEPS Survey Coordinating Committee. The survey instrument was translated into the two main vernacular languages spoken in Malawi Chichewa and Tumbuka.

2.9 Organization

The survey teams were divided into 10 teams (of 8 people) as follows. Each team was expected to cover a total of 26 EAs (255/10). Each team was provided with a field kit containing assorted items (a carrier bag, letters to the relevant authorities (Road blocks, Zone Managers, DHOs and local leaders), referral letter for those with abnormal results, consent forms, checklist, list of the selected EAs, EA maps, team field log book, operational manual, pens, pencils, clipboards, notebooks, tapes for measuring height and girth, scales for weight, blood pressure machines, lancets for finger pricks, sharp containers, gloves, tablets and power banks). Furthermore, team members were provided with a project bag, identity card and a unique code.

In a particular EA surveys were conducted for 2 days as follows; first day for questionnaire and body measurements and second day for cholesterol, fasting blood sugar testing, collection of urine samples and accelerometers. Data collection required 52 days (including 5 days for travel from one EA or region to another).

2.9.1 Data Collection setting:

Informed consent

Informed written consent was obtained from eligible selected participants. Consent forms were in English, *Chichewa* and *Tumbuka* and participants were informed in the language most convenient to them.

Step1: Questionnaire-based assessment:

The survey questionnaire was programmed for Android applications (eSTEPS and ODK collect). The e-questionnaire consisted of core variables (age, sex and education in years and current exposure to tobacco and alcohol, diet and physical activity). Additionally, expanded variables (rural/urban setting, occupation, average household income) and optional variables (marital status, medical and health history, past history of smoking and alcohol consumption) were incorporated. The medical and health history component include questions on medication, cigarette use, diabetes, hypertension and other cardiovascular conditions. Each data collector had the hard copy of translated questionnaire for reference.

Step 2: Physical measurements

Physical body measurements included blood pressure, height, weight, waist and hip circumference and accelerometry.

Blood pressure

Blood pressure measurements were taken using battery powered digital blood pressure machine (Omron® M4-I). Three readings were taken 3-5 minutes apart. During the analysis the average of the last two readings was used as the final blood pressure reading.

Height

The height was measured with the participant standing upright, barefoot, with the back and head in the frankfort position with heels together against the wall where height mark was made. Participants were appropriately positioned and their height marked with a white chalk. The measurements were taken in centimeters to the nearest decimal point from the marked point to the floor using a tape measure.

Weight

Weight measurements were taken on a pre-calibrated weighing scale (bathroom scale). The scales were calibrated daily using a known weight (1kg packet of sugar). Participants were weighed dressed in light clothing and barefoot in kilograms to the nearest decimal point.

Waist Circumference

The waist circumference was measured using tape measure in centimetres to the nearest decimal point; in the mid-axillary line midway between the last rib and the superior iliac crest.

Hip measurement

Hip measurement was made using a tape-measure in centimetres to the nearest decimal point placed horizontally at the point of maximum circumference over the buttocks.

Urine specimens

After the interview and physical measurements, the participant was given instructions for urine collection and a container. Urine was collected in the evening before the fasting starts. Participants brought the full container with them the next day to the place where blood collection was done (where biochemical assessments were done). Urine containers were then shipped to a central location where urine biochemistry analysis was conducted.

Step 3: Biochemical assessment

On the first day of the survey after STEP 1 and STEP 2, participants were asked to starve overnight of that day. i.e. people were asked not to consume any food except for water after taking super/dinner of that day until the survey team come again in morning of the following day (day 2). People in a selected EA converged at the agreed place in the EA where finger blood samples for biochemistry tests were taken. Those that were able to comply with the instructions of starving overnight were eligible for finger prick blood sample collection. Total cholesterol and fasting blood glucose were measured using Cardiochek.

2.9.2 Data Management

Downloading and Merging of data

Data was collected using smart phone with android application. There were two sets of smart phone used to collect data: one set of was used to collect data for Step 1 (questionnaire) and Step 2 (height, weight, waist and hip circumference) and another set for data collection for Step 3 (biochemistry measurements). A total of 52 smart phones were used. Data on smart phones was exported to a central server. The files of each participant (questionnaire, body measurements, biochemistry tests) was merged using the participant identity (PID, the QR code cross checked

with [redacted]), EA number or village/township name and other particulars where necessary.

Data cleaning and Weighting

The merged data was matched with common variables and inconsistencies corrected in the dataset. This process was carried out between December 2017 to February 2018. Sample weights were calculated for all records using the probability of selection at each stage of sampling. Thus, for each participant his/her weight was calculated by first multiplying the probability of EA selection, the probability of household selection, the probability of selection within their household and age-sex distribution of the population in Malawi. The participant's weight was the inverse of this product.

Data Analysis

Data analysis was conducted in Epi Info, version 3.5. Preliminary survey report contained simple descriptive statistics with means, proportions and frequency distributions. 95% Confidence Intervals (CI) was used as a measure of precision on the estimated population parameters. Appropriate analysis was done to take into consideration the complex sample design of the survey.

In the full report, further analysis was performed as follows: T-tests to compare continuous data such as systolic Blood Pressure, cholesterol level between groups. Chi-square tests were used to assess relationships between variables and analysis of variance (ANOVA) for continuous variables for comparisons across more than two groups. In situations where the normality assumptions were not met, the non-parametric equivalents of the above tests were used (Fisher's exact test, Kruskal Wallis test, etc.). Logistic regression analysis was employed to assess predictors of diabetes and hypertension in each particular group controlling for potential confounders.

3 Chapter Three – Results

3.1 Demographic

3.1.1 Response Rate

A total of 4206 participants were sampled from 255 enumeration areas. 4187 valid records were collected. Data regarding non-respondents was lost, and so response rate cannot be reported.

3.1.2 Age and Sex distribution of respondents

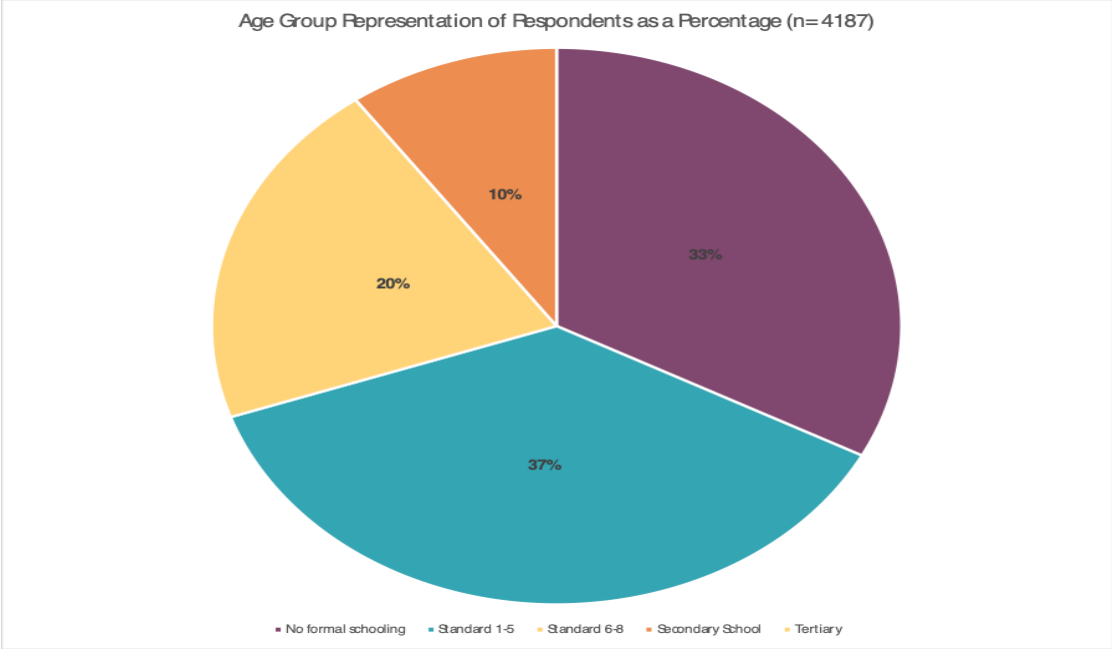
Table 1 shows the distribution of respondents age 18-69 by age group and sex. Women contributed 2702 (64.2%) of the respondents whereas men 1485 (35.4%).

Table 1: Age group and sex of respondents

Age group and sex of respondents						
	Men		Women		Both Sexes	
Age Group (years)	N	%	N	%	N	%
18-29	449	30	922	34	1371	100
30-44	568	38	980	36	1548	100
45-59	324	22	531	20	855	100
60-69	144	9.7	269	10	413	100
18-69	1485	100	2702	100	4187	100

Figure 1 below highlights the respondents by age in which the 30-44 age group is the largest age group at 37%, while as the 60-69 age group represented the least at 10%.

Figure 1: Age group representation of respondents



3.1.3 Area of residence

The table 2 below show that 20% of the respondents were from urban while 80% from rural. In terms of age group 21.1% aged 18-29 were the highest in urban while 81.4% aged 60-69 were highest in the rural area.

Table 2 Area of residence for the respondents

Age group and area of residence of respondents						
Age Group (years)	Urban		Rural		All	
	n	%	n	%	n	%

18-29	289	21.1	1082	78.9	1371	100
30-44	313	20.2	1235	79.8	1548	100
45-59	165	19.3	690	80.7	855	100
60-69	77	18.6	336	81.4	413	100
18-69	**844**	**20.2**	**3343**	**79.8**	**4187**	**100**

3.1.4 Education

Table 3 shows the education levels of the respondents aged 18-69. Overall 13.9% of the respondents have no formal schooling however the results show that 17.3% of women have no formal schooling compared to 7.7% for men. In terms of tertiary education men are more than twice as likely as women to pursue tertiary education at 5.7% as opposed to women at 2.3%.

Table 3: Highest level of education of respondents

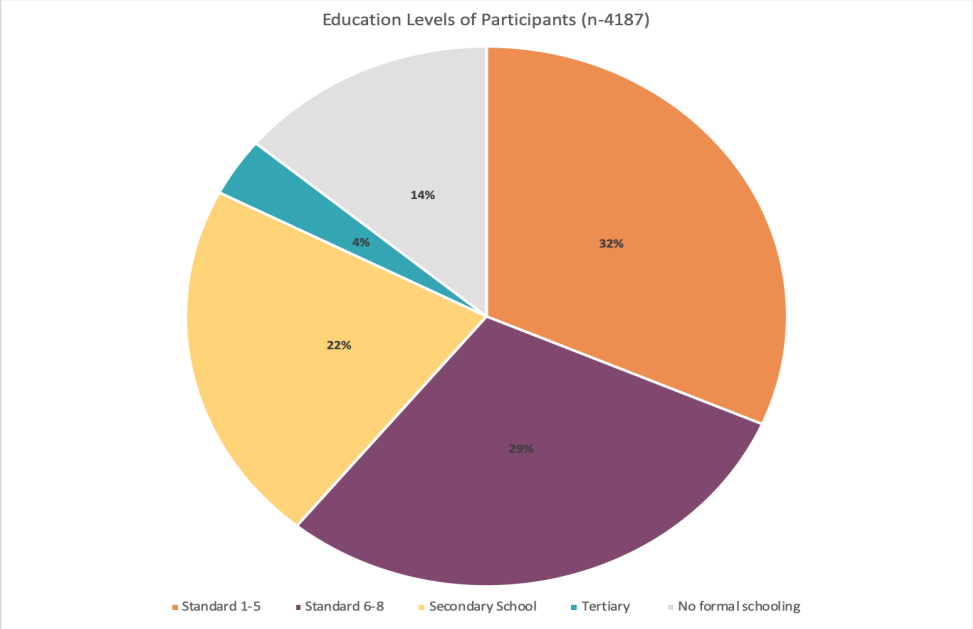
Highest level of education						
Men						
Age Group (years)	N	% No formal schooling	% Standard 1-5	% Standard 6-8	% Secondary school	% Tertiary
18-29	449	2.9	22.0	31.6	39	4.5
30-44	568	4.8	29.0	29.6	30.5	6.2
45-59	324	14.2	31.5	36.4	11.7	6.2
60-69	144	19.4	36.1	26.4	11.1	6.9
18-69	**1485**	**7.7**	**28.1**	**31.4**	**27.1**	**5.7**
Women						
Age Group (years)	N	% No formal schooling	% Standard 1-5	% Standard 6-8	% Secondary school	% Tertiary
****	921	5.8	28.1	35.5	27.6	3.0
30-44	980	13.9	33.4	29.2	21.1	2.4
45-59	530	30.4	38.5	22.8	6.2	2.1
60-69	267	43.8	41.2	10.1	4.9	0.0

18-69	**2698**	**17.3**	**33.4**	**28.2**	**18.8**	**2.3**

Both Sexes

Age Group (years)	N	% No formal schooling	% Standard 1-5	% Standard 6-8	% Secondary school	% Tertiary
18-29	1370	4.8	26.1	34.2	31.3	3.5
30-44	1548	10.5	31.8	29.3	24.5	3.8
45-59	854	24.2	35.8	28.0	8.3	3.6
60-69	411	35.3	39.4	15.8	7.1	2.4
18-69	**4183**	**13.9**	**31.5**	**29.3**	**21.7**	**3.5**

Figure 2: Education level of participants

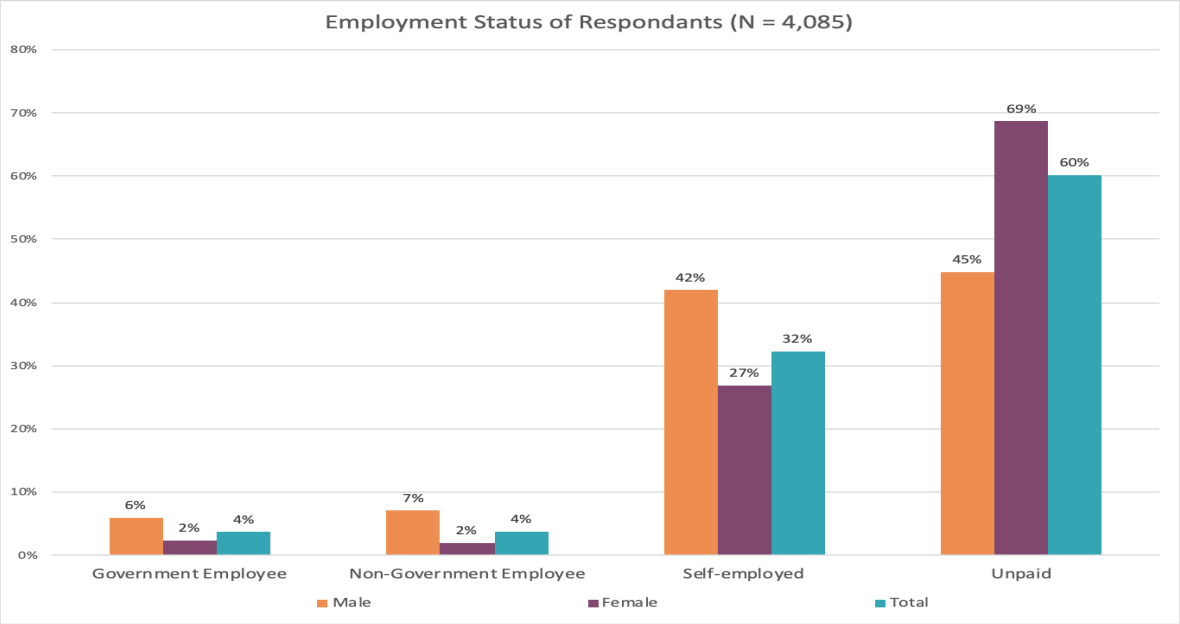


3.1.5 Employment

Figure 3 shows employment status of the respondents in the 18-69 age groups. The figure shows that women are more likely to be unpaid at 69% than men at 45%. In government; men are three times more employed than women, with 6.0% of male respondents in government compared to 2.4% of female respondents.

Table 4: Employment status of respondents

Figure 3: Employment status of respondents



3.2 Risk Factors

3.2.1 Tobacco Use

Tobacco use is a health issue, Tobacco kills more than 8 million people each year. Tobacco is a hindrance to economic development; with premature deaths resulting in family income loss, and increased healthcare burden. Malawi is an agricultural area with tobacco being one of the highest earners and therefore contributors to the economy; tobacco farming accounts for 81% of Malawi's foreign exchange.

The Tobacco Act regulates growing and exportation but does not contain any restrictions on advertising, smoking in public places or health warning label requirements as such there are currently no smoke-free zones in the healthcare facilities, educational facilities, indoors, workplaces, restaurants and bars. However, Malawi is in the process to ratify to the Framework Convention on Tobacco Control (FCTC).

This section analyzes the tobacco use status in Malawi among respondents. The emphasis is on frequency of smoking, type of tobacco products used, age distribution amongst smokers, age at which smokers first used tobacco products and duration period of smoking.

3.2.1.1 Current Smokers

Table 4 highlights the distribution of current tobacco smokers by age group and sex. The results show that 11.2% of Malawians are current smokers. The percentage of tobacco smokers in men is 21.7% whilst 1.5% in women.

Table 4: Current smokers among all respondents

Percentage of current smokers									
	Men			Women			Both Sexes		
Age Group (years)	N	% Current smoker	95% CI	N	% Current smoker	95% CI	N	% Current smoker	95% CI
18-29	449	12.7	8.4-17.0	922	0.5	0.0-1.1	1371	6.5	4.1-8.8
30-44	568	29.7	22.1-37.3	980	0.2	0.0-0.5	1548	14.4	10.4-18.4
45-59	324	30.0	21.7-38.4	531	4.7	2.0-7.4	855	16.8	12.5-21.2
60-69	144	24.9	12.4-37.5	269	8.2	3.4-12.9	413	15.8	8.8-22.8
18-69	**1485**	**21.7**	**17.3-26.1**	**2702**	**1.5**	**0.9-2.1**	**4187**	**11.2**	**8.7-13.7**

The prevalence of smoking in the urban population is at 6.1%, compared to 11.9% among the rural population (Table 5). The prevalence of smoking is highest among men both in urban and rural at 13.1% and 22.5% respectively.

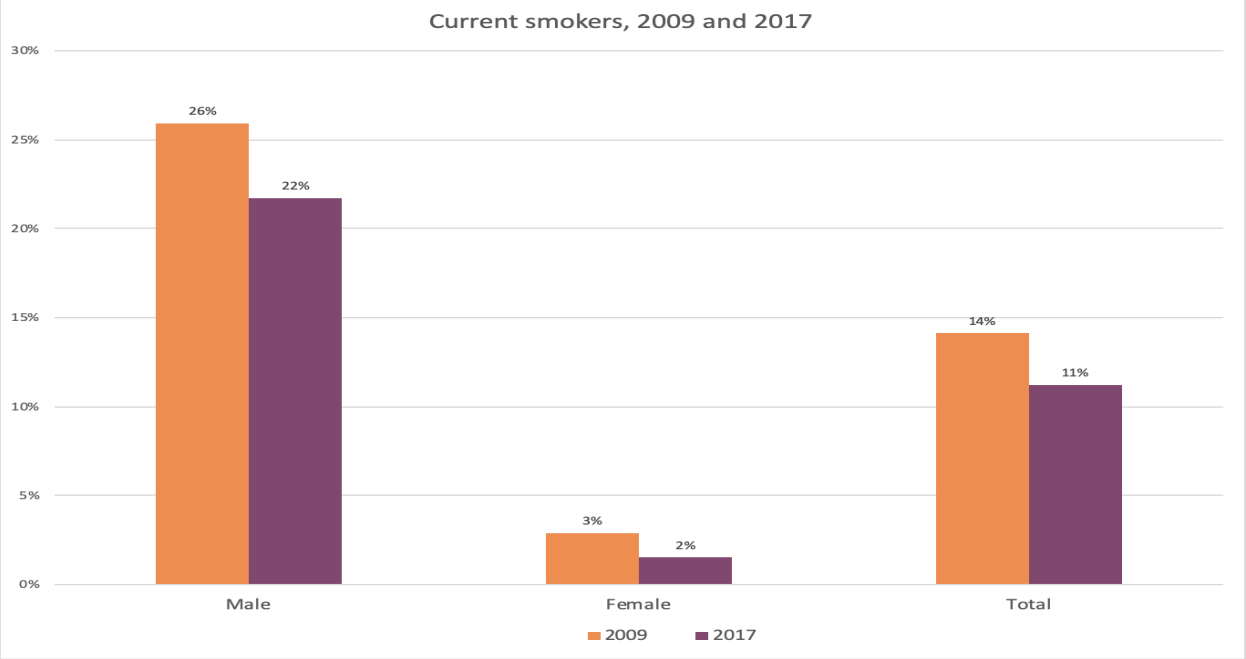
Table 5: Current smokers among all respondents by residence,

Percentage of current smokers						
	Urban			Rural		
Age Group (years)	N	% Current smoker	95% CI	N	% Current smoker	95% CI
18-29	289	6.1	0.3-12.0	1082	6.5	4.0-9.0
30-44	313	5.9	2.0-9.7	1235	15.5	11.1-19.9

45-59	165	3.1	0.0-6.4	690	18.4	13.9-23.0
60-69	77	17.1	0.1-34.1	336	15.7	8.1-23.3
18-69	**844**	**6.1**	**2.5-9.7**	**3343**	**11.9**	**9.2-14.6**

In comparison to 2009 results; there's a slight decline in smoking habits across the population despite the difference not being statistically significant as shown in Figure.

Figure 4: Current smokers in 2009 and 2017



3.2.1.2 Smoking status

Table 6 below shows that 8.4% smoke daily whereas in 2009 it was 12.4%. Among the daily smokers, 95% of respondents aged between 18-29 smoke manufactured cigarettes; cigarette smoking decreases with age. There is a significant difference in smoking habits between men and women with 16% (CI 12.2-20.2) of men smoke daily compared to 1% (CI 0.5-1.5) for women. The results

further show that 98% (CI 96.9-98.4) of women have never smoked in comparison to men where 69.6% (CI 65.2-70.4) have never smoked.

Table 6: Smoking status of all respondents

Smoking status									
Men									
		Current smoker					Non-smokers		
Age Group (years)	N	% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
18-29	449	7.4	3.2-11.6	5.3	2.0-8.6	6.5	2.2-10.9	80.8	75.7-85.8
30-44	568	24.6	17.0-32.2	5.1	2.8-7.4	6.9	4.6-9.3	63.4	55.9-70.8
45-59	324	23.1	14.9-31.4	6.9	1.3-12.5	13.1	7.5-18.7	56.8	49.3-64.4
60-69	144	20.2	7.7-32.8	4.7	0.8-8.6	26.3	15.6-37.1	48.7	35.8-61.7
18-69	**1485**	**16.2**	**12.2-20.2**	**5.5**	**3.6-7.3**	**8.7**	**6.0-11.3**	**69.6**	**65.2-74.0**
Women									
		Current smoker					Non-smokers		
Age Group (years)	N	% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
18-29	922	0.0	0.0-0.1	0.5	0.0-1.1	0.1	0.0-0.3	99.3	98.7-100.0
30-44	980	0.2	0.0-0.5	-	-	0.3	0.0-0.6	99.5	99.1-99.9
45-59	531	3.7	1.2-6.3	1	0.0-2.0	1.4	0.2-2.5	93.9	90.9-97.0
60-69	269	6.5	2.6-10.5	1.6	0.0-3.6	8.6	3.6-13.7	83.2	75.8-90.6
18-69	**2702**	**1/0**	**0.5-1.5**	**0.5**	**0.1-0.8**	**0.9**	**0.4-1.3**	**97.7**	**96.9-98.4**
Both Sexes									
		Current smoker					Non-smokers		
Age Group (years)	N	% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI

18-29	1371	3.6	1.5-5.7	2.8	1.1-4.5	3.3	1.2-5.3	90.3	87.6-93.0
30-44	1548	11.9	8.0-15.9	2.5	1.4-3.5	3.5	2.4-4.6	82.1	78.1-86.1
45-59	855	13.0	8.6-17.5	3.8	1.2-6.4	7.0	4.3-9.7	76.2	71.8-80.5
60-69	413	12.8	6.0-19.6	3.0	1.0-5.1	16.7	10.6-22.9	67.4	59.0-75.9
18-69	**4187**	**8.4**	**6.1-10.6**	**2.9**	**1.9-3.8**	**4.6**	**3.4-5.8**	**84.1**	**81.7-86.5**

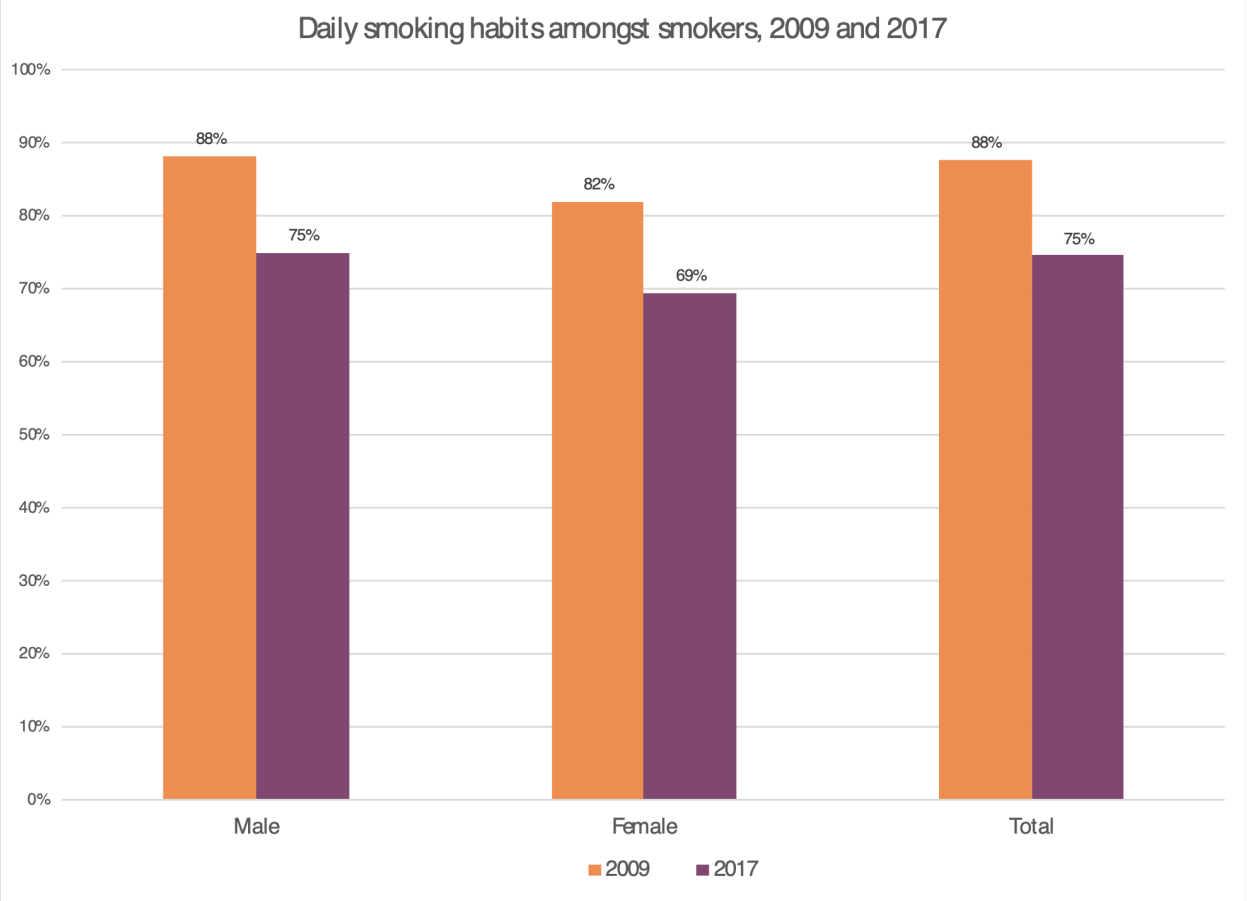
3.2.1.3 Daily smoking

Within the population of smokers, 74.5% smoke tobacco daily and there's not much difference between men and women in 2017. Among men there's statistical significance between 2009 and 2017, 2017 74.9% (CI 66.8-82.9) whereas in 2009, 88.2% (CI 85.2-91.2) smoked daily.

Table 7: Current daily smokers among smokers

Current daily smokers among smokers									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	% Daily smokers	95% CI	N	% Daily smokers	95% CI	N	% Daily smokers	95% CI
18-29	41	58.3	34.1-82.5	6	9.4	0.0-26.0	47	56.3	32.8-79.7
30-44	154	82.8	74.6-91.1	3	100	100.0-100.0	157	82.9	74.8-91.1
45-59	80	77.0	59.4-94.6	22	79.1	58.1-100.0	102	77.3	62.1-92.5
60-69	33	81.2	64.0-98.3	21	79.9	60.0-99.9	54	80.8	67.2-94.4
18-69	**308**	**74.9**	**66.8-82.9**	**52**	**69.4**	**50.5-88.3**	**360**	**74.5**	**66.8-82.2**

Figure 5: Current daily smokers among smokers in 2009 and 2017



3.2.1.4 Initiation of smoking

The average age at which respondents of both sexes started smoking in Malawi is 22.6, as presented in table 8. There is not a significant difference in the age men and women start smoking. The average age of starting to smoke among 25-64 years is 22.4

Table 8: Age of initiation of smoking among smokers

Mean age started smoking									
	Men			Women			Both Sexes		
Age Group (years)	n	Mean age	95% CI	n	Mean age	95% CI	N	Mean age	95% CI
18-29	20	19.7	18.3-21.2	2	12.2	8.4-15.9	22	19.7	18.2-21.1

30-44	114	22.5	21.0-23.9	3	19.3	17.5-21.1	117	22.4	20.9-23.9
45-59	58	22.5	20.4-24.6	11	29.6	19.2-40.1	69	23.4	21.0-25.8
60-69	24	31.1	24.3-37.9	15	22.0	9.2-34.8	39	29.0	21.7-36.2
18-69	**216**	**22.4**	**21.2-23.6**	**31**	**25.7**	**18.0-33.5**	**247**	**22.6**	**21.3-23.9**

3.2.1.5 Smoked tobacco consumption

Table 9 highlights the use of tobacco products in Malawi among current smokers. There's a statistically significance difference in the use of manufactured cigarettes between men 69.7% (CI 61.4-78.1) and women 22.3% (CI 4.8-39.8). Interestingly the use of manufactured cigarettes decreases with age whereas the hand-rolled increases with age, for both men and women.

Table 9: Smoked tobacco consumption among current smokers by type of product

Percentage of current smokers smoking each of the following products												
Men												
Age Group (years)	N	Manufactured cigarettes		Hand-rolled cigarettes		Pipes of tobacco		Cigars, cheroots, cigarillos		Shisha		Other	
		Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
18-29	41	83.5	69.2-97.7	53.5	29.5-77.4	0.7	0.0-2.1	5.4	0.0-11.4	0.0	0.0-0.0	14.8	0.0-37.2
30-44	154	73.2	62.7-83.8	74.8	63.8-85.7	1.4	0.0-3.1	4.9	0.0-10.4	0.6	0.0-1.3	10.0	1.2-18.9
45-59	80	56.7	36.4-76.9	80.0	66.4-93.6	0.0	0.0-0.0	14.7	1.5-27.9	0.0	0.0-0.0	7.9	0.0-19.7
60-69	33	26.6	4.6-48.6	77.7	58.8-96.6	0.0	0.0-0.0	25.0	0.0-63.6	0.0	0.0-0.0	7.9	0.0-19.1
18-69	**308**	**69.7**	**61.4-78.1**	**70.3**	**61.2-79.5**	**0.8**	**0.0-1.7**	**8.3**	**3.1-13.5**	**0.3**	**0.0-0.6**	**10.7**	**0.6-20.9**
Women												
Age Group (years)	N	Manufactured cigarettes		Hand-rolled cigarettes		Pipes of tobacco		Cigars, cheroots, cigarillos		Shisha		Other	

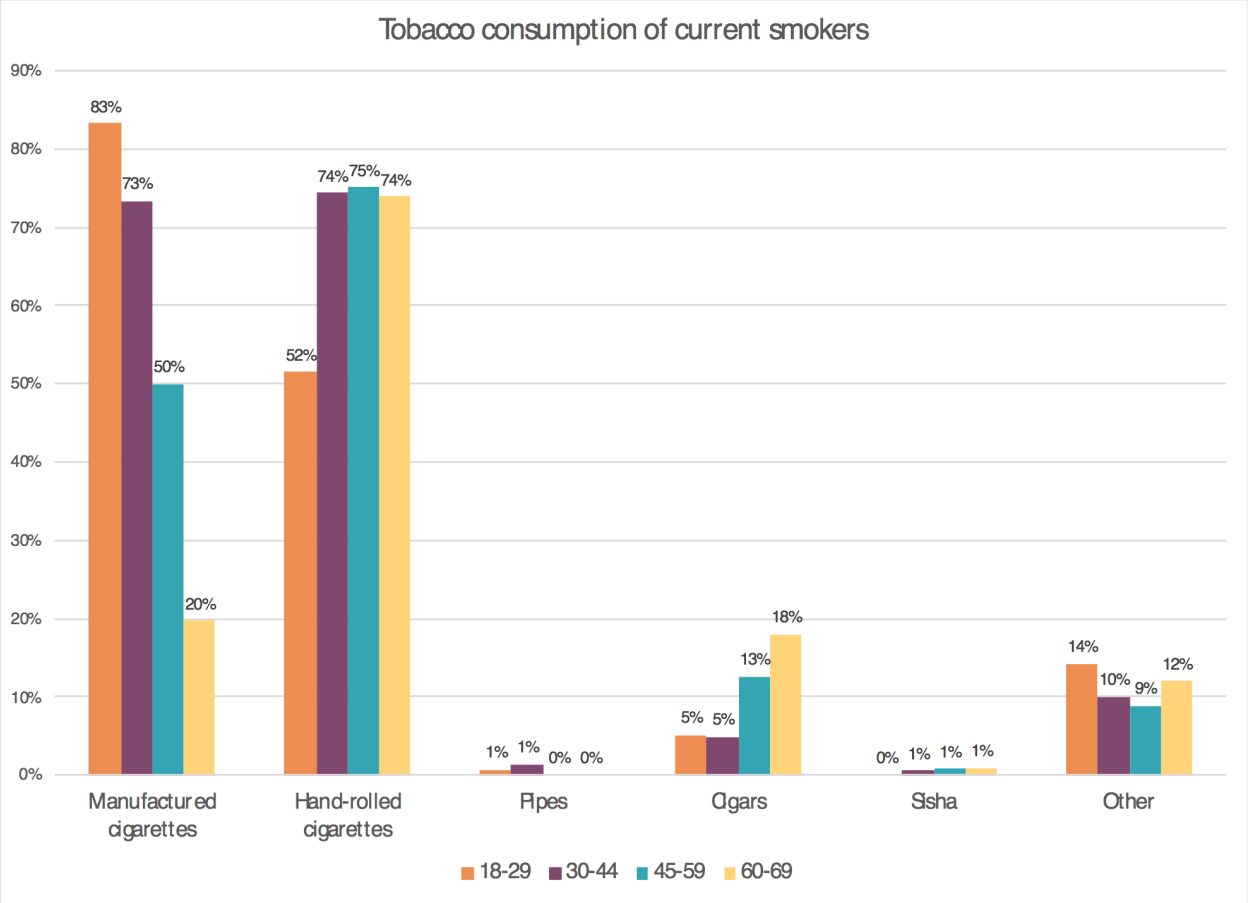
		Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI
18-29	6	78.7	41.2-100.0	5.3	0.0-17.4	0.0	0.0-0.0	0.0	0.0-0.0	0.0	0.0-0.0	4.1	0.0-13.6
30-44	3	92.7	74.2-100.0	15.1	0.0-46.6	0.0	0.0-0.0	0.0	0.0-0.0	0.0	0.0-0.0	7.8	0.0-27.8
45-59	22	10.6	0.0-23.1	46.5	15.3-77.7	0.0	0.0-0.0	0.0	0.0-0.0	5.6	0.0-14.8	14.8	0.0-31.6
60-69	21	2.2	0.0-6.7	64.6	39.1-90.2	0.0	0.0-0.0	0.0	0.0-0.0	3.1	0.0-9.7	22.7	0.0-46.6
18-69	**52**	**22.3**	**4.8-39.8**	**44.2**	**25.0-63.4**	**0.0**	**0.0-0.0**	0.0	**0.0-0.0**	**3.7**	**0.0-8.8**	**15.2**	**2.8-27.7**

Both Sexes

Age Group (years)	N	Manufactured cigarettes		Hand-rolled cigarettes		Pipes of to-bacco		Cigars, che-roots, cigaril-los		Shisha		Other	
		Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI	Per-cent	95% CI
18-29	47	83.3	69.5-97.0	51.5	28.3-74.7	0.7	0.0-2.0	5.2	0.0-10.9	0.0	0.0-0.0	14.3	0.0-35.9
30-44	157	73.4	62.9-83.8	74.4	63.4-85.3	1.4	0.0-3.1	4.9	0.0-10.3	0.6	0.0-1.3	10	1.2-18.8
45-59	102	50.0	30.2-69.8	75.1	61.4-88.8	0.0	0.0-0.0	12.6	0.8-24.3	0.8	0.0-2.2	8.9	0.0-19.3
60-69	54	19.8	4.6-34.9	74.0	57.6-90.5	0.0	0.0-0.0	18.0	0.0-48.2	0.9	0.0-2.7	12.0	1.2-22.9
18-69	**360**	**66.5**	**58.2-74.8**	**68.5**	**60.2-76.8**	**0.8**	**0.0-1.6**	**7.7**	**2.9-12.6**	**0.5**	**0.0-1.0**	**11.0**	**1.7-20.3**

Figure 6 indicates that manufactured cigarettes and hand-rolled cigarettes are commonly used products of tobacco in Malawi. Among the 18-29 age groups, the most commonly used product is the manufactured cigarette whilst the hand-rolled cigarette is common amongst the 30-44, 45-59 and 60-69 age groups. Use of cigar is more popular in the older age groups (50-59 and 60-69 age groups).

Figure 6: Tobacco consumption of current smokers



3.2.1.6 Second-hand smoke exposure

Table 10 highlights that twice as many men are exposed to second hand smoke in the work place at 24.8% (CI 17.9-31.7) as opposed to women at 10.7% (CI 8.6-12.8). Interestingly the risk of exposure decreases with age in men but increases with age in women in the workplace. Exposure to second smoke in the home is relatively the same for both women (12.3) and men (16.2).

Table 10: Second-hand smoke exposure in the workplace and at home

Exposed to second-hand smoke *in the workplace* during the past 30 days									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	% Exposed	95% CI	n	% Ex-posed	95% CI	n	% Ex-posed	95% CI

18-29	348	28.7	15.3-42.1	697	8.7	5.5-11.8	1045	18.7	10.9-26.6
30-44	429	23.8	17.3-30.3	753	12.7	8.9-16.6	1182	17.9	14.5-21.4
45-59	242	18.6	9.9-27.3	404	10.5	6.4-14.5	646	14.3	10.1-18.6
60-69	114	11.7	3.4-20.0	198	15.8	8.9-22.7	312	13.8	7.7-20.0
18-69	**1133**	**24.8**	**17.9-31.7**	**2052**	**10.7**	**8.6-12.8**	**3185**	**17.6**	**13.5-21.6**

Exposed to second-hand smoke *in home* during the past 30 days

Age Group	**Men**			**Women**			**Both Sexes**		
(years)	n	% Exposed to 25.	95% CI	n	% Exposed	95% CI	n	% Exposed	95% CI
18-29	449	17.2	5.3-29.1	922	10.2	7.2-13.1	1371	13.6	7.2-20.0
30-44	568	13	8.5-17.4	980	13.6	9.2-18.0	1548	13.3	9.5-17.1
45-59	324	21.2	13.2-29.2	531	14.3	10.4-18.3	855	17.6	13.2-22.1
60-69	144	12.2	5.0-19.5	269	16.3	10.2-22.4	413	14.4	9.9-19.0
18-69	**1485**	**16.2**	**10.6-21.7**	**2702**	**12.3**	**10.1-14.5**	**4187**	**14.2**	**11.0-17.3**

3.2.2 Alcohol consumption

The effects of harmful alcohol use filter through the development philosophy of our core obligation and responsibility as espoused in the Malawi Growth and Development Strategy II. In many respects, harmful use of alcohol causes an increased risk of some cancers, liver disease and stroke. It is also associated with the weakening of the immune system as well as increased violent behavior such as rape and increased indulgence in other forms of drug abuse. Alcohol and drug abuse are among determinants facilitating the spread of HIV in Malawi. Unpublished reports from Malawi Police Service show that alcohol contributes significantly to crime in the country. A report of 2011 shows that alcohol was linked to 25% of murder cases, 40% of suicides, 27% road traffic accidents, 7% of sexual violence and 38% of physical assault cases.

3.2.2.1 Alcohol consumption status

Table 11 below shows distribution of alcohol consumption among the respondents. It shows that 17% of respondents are current drinkers of alcohol (drank in the past 30 days) with a significant difference among sexes (33% of men against 3% in women. 70% of the respondents are lifetime abstainers with the percentage of abstinence among women being nearly twice that among men

(92% and 47% respectively). Age group 30-44 among the men constitute the highest consumers of alcohol at 39%.

Table 11: Alcohol consumption status

Alcohol consumption status									
Men									
		Current drinker (past 30 days)		**Drank in past 12 months, not current**		**Past 12 months abstainer**		**Lifetime abstainer**	
Age Group (years)	N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
18-29	449	27.1	19.8-34.5	6.3	3.4-9.2	12	0.1-23.8	54.6	45.7-63.6
30-44	568	39	32.3-45.7	8.9	5.6-12.3	10.9	7.6-14.3	41.1	33.7-48.6
45-59	324	38.3	28.9-47.8	2.7	0.7-4.7	22.7	14.6-30.7	36.3	29.1-43.5
60-69	144	26.6	15.0-38.1	3.4	0.0-7.1	27.4	17.2-37.7	42.6	30.4-54.9
18-69	**1485**	**32.8**	**27.7-37.9**	**6.5**	**4.5-8.5**	**14.1**	**8.8-19.3**	**46.7**	**43.2-50.2**
Women									
		Current drinker (past 30 days)		**Drank in past 12 months, not current**		**Past 12 months abstainer**		**Lifetime abstainer**	
Age Group (years)	N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
18-29	922	1.1	0.3-2.0	2.2	1.1-3.4	2.4	1.3-3.6	94.2	92.2-96.2
30-44	980	3.8	0.8-6.8	1.0	0.2-1.7	3.1	1.8-4.3	92.2	88.8-95.5
45-59	531	4.1	1.7-6.4	1.8	0.5-3.1	3.7	1.7-5.6	90.5	87.0-93.9
60-69	269	5.8	2.8-8.8	3.3	0.6-6.0	6.4	2.6-10.2	84.4	78.6-90.3
18-69	**2702**	**2.8**	**1.6-3.9**	**1.8**	**1.2-2.5**	**3.0**	**2.2-3.9**	**92.4**	**90.6-94.2**
Both Sexes									
		Current drinker (past 30 days)		**Drank in past 12 months, not current**		**Past 12 months abstainer**		**Lifetime abstainer**	
Age Group (years)	N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
18-29	1371	13.8	9.7-17.9	4.2	2.8-5.7	7.1	1.0-13.2	74.9	68.9-80.9

30-44	1548	20.7	17.0-24.5	4.8	3.2-6.4	6.9	5.0-8.7	67.6	63.3-71.9
45-59	855	20.5	15.0-25.9	2.2	1.1-3.3	12.8	9.2-16.3	64.5	59.7-69.3
60-69	413	15.3	9.4-21.2	3.3	1.1-5.5	16.0	10.8-21.3	65.3	58.3-72.4
18-69	**4187**	**17.3**	**14.3-20.3**	**4.1**	**3.1-5.0**	**8.4**	**5.6-11.1**	**70.3**	**67.3-73.3**

3.2.2.2 Frequency of alcohol consumption in the past 7 days

Table 12 shows frequency of alcohol consumption in the past 7 days. 5.3% of current alcohol drinkers consume alcohol daily with significant difference among men and women (5.7% of men and 0.5% of women). Nearly half (46.1%) of current drinkers consume alcohol 1 to 2 days in a week, while fourteen percent consumed for 5 to 6 days and 3-4 days. 20% of current drinkers did not consume alcohol at all in the past 7 days.

Table 12: Alcohol consumption in the past 7 days among current (past 30 days) drinkers

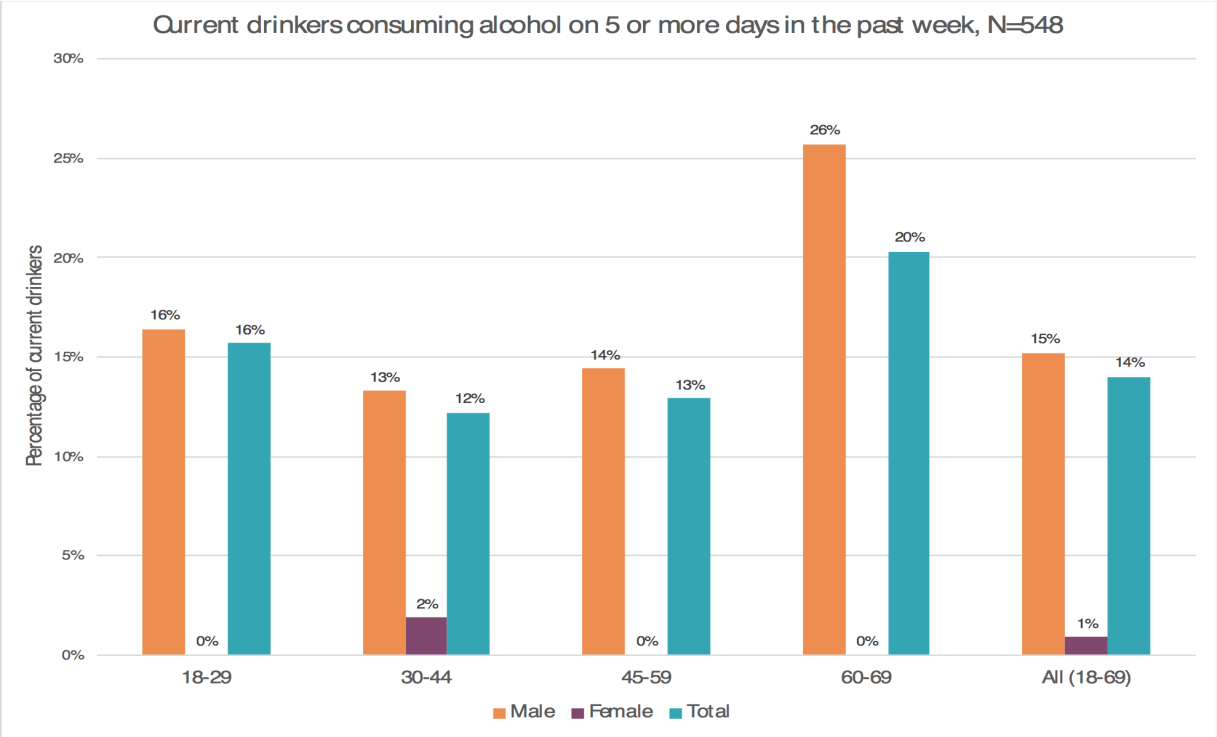
Frequency of alcohol consumption in the past 7 days											
	Men										
Age group (years)	N	% Daily	95% CI	% 5-6 days	95% CI	% 3-4 days	95% CI	% 1-2 days	95% CI	0% days	95% CI
18-29	99	0.7	0.0-2.0	16.4	5.8-27.1	6.4	1.0-11.8	60.1	47.9-72.4	16.4	5.8-27.0
30-44	215	7.9	1.4-14.5	13.3	3.4-23.2	20.9	12.4-29.3	39.0	28.2-49.7	18.9	11.3-26.5
45-59	106	12.8	2.4-23.1	14.4	0.2-28.5	16.2	4.1-28.3	32.1	15.0-49.2	24.6	15.5-33.7
60-69	37	0.3	0.0-1.0	25.7	0.0-54.8	11.2	0.0-23.8	43.1	18.9-67.4	19.6	4.2-35.0
18-69	**457**	**5.7**	**2.5-8.9**	**15.2**	**6.3-24.0**	**14.1**	**9.4-18.8**	**46.0**	**38.9-53.1**	**19**	**12.8-25.2**
Age Group	**Women**										
(years)	N	% Daily	95% CI	% 5-6 days	95% CI	% 3-4 days	95% CI	% 1-2 days	95% CI	0% days	95% CI
18-29	11	0.0	0.0-0.0	0.0	0.0-0.0	38.0	0.0-77.8	30.1	0.0-61.7	31.9	0.0-66.8

30-44	27	0.0	0.0-0.0	1.9	0.0-6.0	11.4	0.0-28.3	48.0	30.3-65.7	38.7	20.5-56.8
45-59	28	0.0	0.0-0.0	0.0	0.0-0.0	4.8	0.0-12.6	62.0	35.7-88.3	33.2	8.4-58.0
60-69	25	4.1	0.0-12.5	0.0	0.0-0.0	15.5	0.0-34.9	40.8	16.3-65.4	39.5	14.8-64.3
18-69	**91**	**0.5**	**0.0-1.5**	**0.9**	**0.0-2.7**	**15.4**	**2.5-28.4**	**46.9**	**33.2-60.6**	**36.3**	**23.3-49.2**

Age Group	**Both Sexes**										
Age group (years)	n	% Daily	95% CI	% 5-6 days	95% CI	% 3-4 days	95% CI	% 1-2 days	95% CI	0% days	95% CI
18-29	N	0.6	0.0-2.0	15.7	5.3-26.1	7.7	2.0-13.5	58.8	46.9-70.8	17.1	6.7-27.4
30-44	242	7.2	1.2-13.1	12.2	3.6-20.8	20	11.8-28.2	39.8	30.0-49.7	20.8	13.7-27.9
45-59	134	11.5	1.9-21.0	12.9	0.0-26.1	15.0	4.2-25.9	35.1	18.7-51.5	25.5	17.2-33.8
60-69	62	1.1	0.0-2.9	20.3	0.0-44.7	12.1	1.6-22.6	42.6	23.1-62.2	23.8	9.8-37.8
18-69	**548**	**5.3**	**2.4-8.2**	**14.0**	**5.9-22.1**	**14.2**	**9.6-18.8**	**46.1**	**39.6-52.5**	**20.4**	**14.5-26.4**

In figure 7 below, shows the prevalence among current drinkers of consumption on 5-6 days in the past 7 days shows 26% of males within the age group of 60-69 to be the highest. From the graph it shows that men are likely to drink more alcohol as compared to women across all age groups.

Figure 7: Prevalence among current drinkers of consumption on 5-6 days of past 7 days



3.2.2.3 Stopping drinking due to health reasons

Table 13 shows distribution of respondents among former drinkers who have stopped drinking due to health reasons. Overall, 28.5% of the respondents who had not drunk alcohol in the past 12 months had stopped drinking due to health reasons. There is no significant difference between the sexes in regards to cessation due to health reasons.

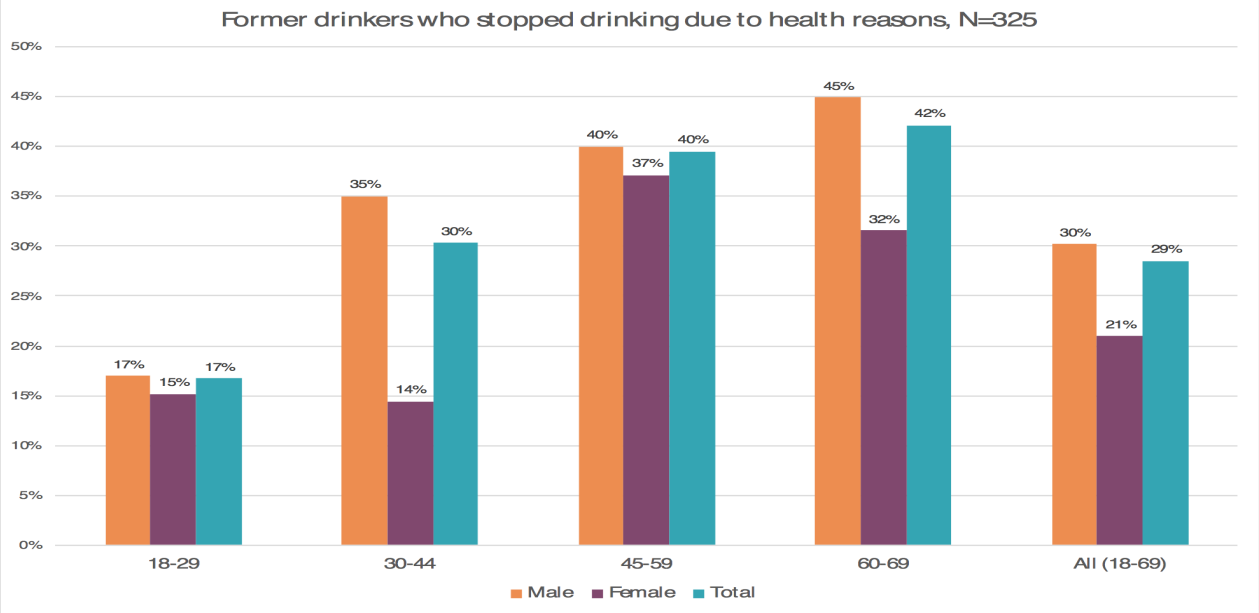
Table 13: Former drinkers who stopped drinking due to health reasons

Stopping drinking due to health reasons									
	Men			Women			Both Sexes		
Age Group (years)	N	% stopping due to health reasons	95% CI	N	% stopping due to health reasons	95% CI	N	% stopping due to health reasons	95% CI
18-29	37	17.0	0.0-37.9	31	15.2	0.0-32.2	68	16.7	0.0-34.0

30-44	73	35.0	18.2-51.8	43	14.4	2.7-26.1	116	30.3	16.9-43.7
45-59	64	40.0	23.3-56.7	24	37.1	12.1-62.1	88	39.5	24.9-54.2
60-69	33	44.9	23.1-66.7	20	31.6	5.7-57.6	53	42.1	24.2-59.9
18-69	**207**	**30.2**	**15.5-44.9**	**118**	**21.0**	**11.1-31.0**	**325**	**28.5**	**16.9-40.0**

From figure 8 below, the highest percentage (44.9%) of men who has stopped drinking due to health reasons was in the age group 60 to 69 while the highest percentage of women was in the age group 45 to 59 at 37.1 % as shown in the graph below.

Figure 8: Former drinkers who stopped drinking due to health reasons



3.2.2.4 **Consumption of unrecorded alcohol**

From the table 14, unrecorded alcohol consumed by communities represent 60%, unrecorded alcohol can be defined in local language as home brewed alcohol (masese, kachasu, bibida, ntonjani, goli-goli and ntsekedenge) or any alcohol not intended for drinking in the past twelve months. In table 14, there are more men 61% taking the unrecorded alcohol as compared to the women 45%.

Table 14: Consumption of unrecorded alcohol by gender

Age Group (years)	Men			Women			Both Sexes		
	N	% consuming unrecorded alcohol	95% CI	N	% consuming unrecorded alcohol	95% CI	N	% consuming unrecorded alcohol	95% CI
18-29	96	61.1	44.3-77.9	11	34.7	0.0-72.7	107	60	43.6-76.4
30-44	189	63.5	52.9-74.2	22	34.8	8.0-61.6	211	61.4	50.9-71.9
45-59	95	56.2	43.4-69.1	23	68.7	42.2-95.2	118	57.4	45.4-69.3
60-69	33	70.4	49.5-91.3	19	57.5	30.1-84.9	52	68.3	50.0-86.6
18-69	**413**	**61.6**	**52.0-71.1**	**75**	**45.4**	**28.0-62.7**	**488**	**60.4**	**51.5-69.4**

From table 15 below, there is a significant difference between rural and urban in terms of percentage of current drinkers who consume unrecorded alcohol with 64.4% in the rural and 17.9% in the urban.

Table 15:. Consumption of unreported alcohol by urban/rural status

Age Group (years)	Urban			Rural		
	B	% consuming unrecorded alcohol	95% CI	N	% consuming unrecorded alcohol	95% CI
18-29	31	17.1	0.0-35.3	76	65.5	49.2-81.9
30-44	39	22.6	3.8-41.5	172	64.7	53.9-75.4
45-59	17	8.8	0.0-20.6	101	60.1	48.1-72.1
60-69	6	10.8	0.0-30.1	46	71.1	52.8-89.4
18-69	**93**	**17.9**	**5.8-30.0**	**395**	**64.4**	**55.9-72.9**

Table 16: Consumption of unreported alcohol by gender and urban/rural status

Residence	Men	Women

	N	% consuming unrecorded alcohol	95% CI	N	% consuming unrecorded alcohol	95% CI
Urban	73	15.3	4.9-25.7	20	28.1	0.0-62.8
Rural	340	65.2	56.1-74.3	55	51.2	29.1-73.4
18-69	**413**	**61.6**	**52.0-71.1**	**75**	**45.4**	**28.0-62.7**

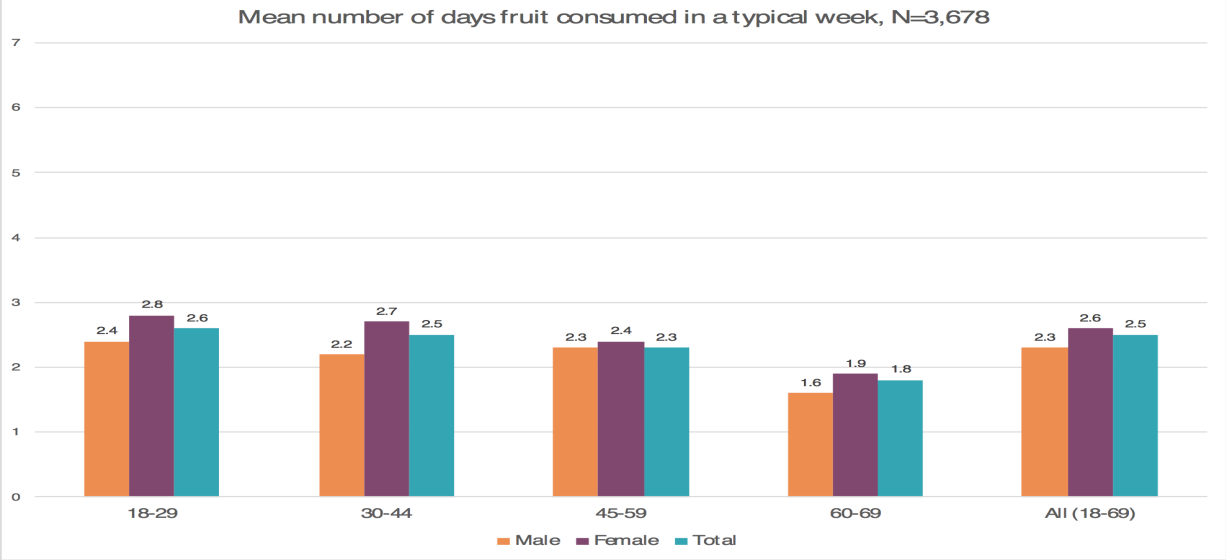
3.2.3 Unhealthy diet

Respondents' were asked about their fruit and vegetable intake in a typical week and on how many servings of fruit and vegetables they consumed on one of these days. It is recommended that at least 400g (5 portions) of fruits and vegetables should be consumed in a day (WHO, 2015). This survey asked respondents questions on the following areas of interest and are covered in this section; fruits and vegetable consumption and dietary salt intake.

3.2.3.1 Fruit consumption

Figure 9 below, shows the distribution of mean number of days of fruit consumption among the respondents by age and sex. The mean consumption of fruits among the respondents is 2.6 days per week.

Figure 9: Mean Number of days' fruit consumed in a typical week



3.2.3.2 Vegetable consumption

The table 17 below shows the distribution of mean number of days of vegetable consumption among the respondents by age and sex. The mean number of days of vegetable consumption in a typical week is 5.2 days.

Table 17: Vegetable consumption (days per week)

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	95% CI	N	Mean number of days	95% CI
18-29	437	5.2	4.8-5.7	908	5.1	4.8-5.4	1345	5.2	4.9-5.4
30-44	560	5.1	4.8-5.4	969	5.2	5.0-5.5	1529	5.2	5.0-5.4
45-59	310	5	4.7-5.4	522	5.3	5.1-5.6	832	5.2	5.0-5.4
60-69	135	5.4	5.0-5.9	263	5.3	4.9-5.7	398	5.4	5.1-5.7
18-69	**1442**	**5.2**	**4.9-5.4**	**2662**	**5.2**	**5.0-5.4**	**4104**	**5.2**	**5.0-5.4**

3.2.3.3 Fruit and/or vegetable consumption

From table 18 below, it provides data on 'Less than five servings of fruit and/or vegetables on average per day.' The results show that the age-range 18-29 years have the highest 91% of respondents that have less than five servings. Furthermore, though not statistically significant but men are more less likely to have five servings average per day as compared to female.

Table 18: Fruit and vegetable consumption per day

Less than five servings of fruit and/or vegetables on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	% < five servings per day	95% CI	n	% < five servings per day	95% CI	***3.2.3.***	% < five servings per day	95% CI

18-29	438	92.9	89.7-96.1	906	89.2	85.9-92.5	1344	91.0	88.3-93.7
30-44	557	91.8	88.4-95.2	969	87.5	84.1-91.0	1526	89.6	86.9-92.3
45-59	313	92.1	88.4-95.8	517	87.8	83.0-92.5	830	89.9	86.4-93.3
60-69	136	88.9	81.4-96.4	261	90.6	86.3-94.9	397	89.8	85.7-94.0
18-69	**1444**	**92.2**	**90.0-94.5**	**2653**	**88.5**	**85.8-91.2**	**4097**	**90.3**	**88.1-92.4**

3.2.3.4 Salt intake

Salt provides our body with the vital mineral sodium, to maintain normal blood pressure and normal function of muscles and nerves. The WHO recommendation on sodium consumption is <2g/day (5g of salt per day). This is because sodium is associated with fluid retention in the body cells, resulting to high risk onset of increased blood pressure leading to hypertension and cardiovascular diseases. Reducing salt intake has been identified as one of the most cost-effective measures a country can take to improve population health outcomes.

Percentage of respondents who add salt always or often before eating or when eating.

Table 19, below, highlights the percentage of respondents who add salt always or often before or when eating.

Overall, 17.4 percent of respondents add salt always or often before eating or when eating with men (20 percent) than women (15 percent). Men in age group 18-29 present the highest proportion (22 percent) of adding salt always or often before eating or when eating.

Table 19: Use of salt

Add salt always or often before eating or when eating									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	%	95% CI	N	%	95% CI	N	%	95% CI
18-29	449	21.6	13.9-29.3	922	14.9	10.9-18.8	1371	18.2	13.7-22.6
30-44	566	19.0	13.9-24.1	978	15.5	11.3-19.6	1544	17.2	13.7-20.7
45-59	324	19.7	12.9-26.5	529	12.4	8.1-16.7	853	15.9	11.4-20.4

60-69	143	15.8	8.0-23.5	268	17.7	10.4-25.1	411	16.8	10.7-23.0
18-69	**1482**	**20.2**	**15.4-24.9**	**2697**	**14.8**	**12.0-17.6**	**4179**	**17.4**	**14.2-20.6**

Respondents' perception and Knowledge on Salt consumption

The table 20 below shows respondents perception and knowledge on amount of salt consumed, of which 3.2% of respondents that is both sexes think they consume far too much or too much salt. Furthermore, it was noted that men 4.1% perceived to have consumed more salt than women 2.3%. In conclusion 68.9% of respondents perceive their consumption of salt to be just the right amount

Table 20: Self-reported salt consumption

Self-reported quantity of salt consumed											
	Men										
Age Group (years)	N	% Far too much	95% CI	% Too much	95% CI	% Right amount	95% CI	% Too little	95% CI	% Far too little	95% CI
18-29	418	4.7	0.7-8.6	11.8	6.9-16.6	65.9	54.0-77.7	16.3	4.0-28.7	1.4	0.0-2.8
30-44	526	3.3	1.7-5.0	11.9	7.4-16.3	71.3	65.4-77.2	10.7	6.5-14.9	2.8	0.9-4.7
45-59	299	4.6	0.0-9.4	12.6	8.1-17.1	67.5	59.2-75.8	11.2	4.9-17.5	4.2	1.3-7.0
60-69	131	2	0.0-5.3	13.2	4.2-22.3	69.7	58.0-81.5	14.3	5.3-23.3	0.8	0.0-1.9
18-69	**1374**	**4.1**	**2.2-5.9**	**12**	**8.7-15.3**	**68.1**	**62.2-74.0**	**13.5**	**7.6-19.4**	**2.3**	**1.2-3.4**
Self-reported quantity of salt consumed											
	Women										
Age Group (years)	N	% Far too much	95% CI	% Too much	95% CI	% Just the right amount	95% CI	% Too little	95% CI	% Far too little	95% CI
18-29	864	2.7	1.0-4.5	10.4	6.8-13.9	69.1	62.6-75.6	15.3	9.3-21.4	2.4	1.1-3.8

30-44	917	2.8	0.8-4.7	10.2	7.0-13.4	71.8	68.0-75.5	11.1	7.8-14.4	4.2	2.1-6.3
45-59	489	0.8	0.1-1.5	4.2	1.9-6.5	69.6	63.9-75.3	19.9	14.0-25.7	5.5	2.7-8.4
60-69	240	0.2	0.0-0.6	8.3	2.4-14.2	59.7	49.5-70.0	22.2	14.1-30.2	9.6	3.9-15.3
18-69	**2510**	**2.3**	**1.3-3.3**	**9.2**	**7.1-11.3**	**69.6**	**66.0-73.1**	**15**	**11.7-18.3**	**3.9**	**2.8-5.0**

Self-reported quantity of salt consumed

	Both Sexes										
Age Group (years)	Both Sexes	% Far too much	95% CI	% Too much	95% CI	% Just the right amount	95% CI	% Too little	95% CI	% Far too little	95% CI
18-29	1282	3.7	1.3-6.1	11.1	7.8-14.3	67.5	60.5-74.6	15.8	9.2-22.4	1.9	1.0-2.9
30-44	1443	3.0	1.8-4.3	11	7.9-14.1	71.5	67.9-75.2	10.9	8.3-13.5	3.5	2.0-5.0
45-59	788	2.6	0.2-5.0	8.2	5.7-10.6	68.6	63.9-73.4	15.8	10.9-20.6	4.9	2.7-7.1
60-69	371	1.0	0.0-2.5	10.5	4.7-16.4	64.3	56.3-72.4	18.5	12.4-24.7	5.6	2.5-8.6
18-69	**3884**	**3.2**	**2.0-4.3**	**10.6**	**8.3-12.8**	**68.9**	**65.2-72.6**	**14.3**	**10.9-17.6**	**3.1**	**2.3-4.0**

Intake of salt per day

From the table 21, below there is no significant difference between men and women in salt intake per day. Respondents consume 10.4 g/day.

Table 21: Salt consumption, by gender

Mean salt intake (g/day)

	Men			**Women**			**Both Sexes**		
Age Group (years)	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
18-29	212	11.3	10.8-11.9	310	9.3	8.9-9.7	522	10.5	10.0-10.9
30-44	285	11.1	10.7-11.6	404	9.6	9.3-9.8	689	10.4	10.1-10.7
45-59	169	11.3	10.7-11.8	233	9.1	8.8-9.5	402	10.2	9.9-10.6
60-69	74	10.7	10.1-11.3	116	8.1	7.6-8.7	190	9.5	9.0-10.0
18-69	**740**	**11.2**	**10.9-11.6**	**1063**	**9.3**	**9.1-9.5**	**1803**	**10.4**	**10.1-10.6**

Mean Salt Intake between Urban and Rural

From the table below, it depicts that there is not a significant difference in the salt intake between urban (10.7 g/day) and rural (10.3 g/day) populations.

Table 22: Salt consumption by urban/rural status

Mean salt intake (g/day)									
Residence	Men			Women			Both Sexes		
	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
Urban	116	11.8	10.8-12.7	254	9.8	9.3-10.3	370	10.7	10.0-11.3
Rural	624	11.2	10.8-11.5	809	9.2	9.0-9.4	1433	10.3	10.1-10.6
All	**740**	**11.2**	**10.9-11.6**	**1063**	**9.3**	**9.1-9.5**	**1803**	**10.4**	**10.1-10.6**

3.2.4 Insufficient physical activity

World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure – including activities undertaken while working, playing, carrying out household chores, traveling, and engaging in recreational pursuits. The term "physical activity" should not be confused with "exercise", which is a subcategory of physical activity that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness. Both, moderate and vigorous intensity physical activity brings health benefits. In order to be beneficial for cardio- respiratory health, all activity should be performed in bouts of at least 10 minutes' duration. WHO recommends that adults aged 18–64 years should do at least 150 minutes of moderate- intensity physical activity throughout the week, or do at least 75 minutes of vigorous- intensity physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity. Adults age 65 years and above should follow the recommendations of the above age group.

Prevalence of insufficient physical activity

A very small proportion (1.3%) of respondents are not meeting WHO recommendations on physical activity for health (0.9%, men, 1.8% women).

Table 23: Physical activity for Health

Not meeting WHO recommendations on physical activity for health									
Age Group (years)	Men			Women			Both Sexes		
	n	% not meeting recs	95% CI	n	% not meeting recs	95% CI	*n*	*% not meeting recs*	*95% CI*
18-29	386	0.2	0.0-0.6	727	0.5	0.1-0.9	1113	0.3	0.0-0.7
30-44	458	1.2	0.0-2.8	798	1.9	0.6-3.1	1256	1.6	0.5-2.6
45-59	261	1.5	0.0-3.1	413	3.9	1.3-6.5	674	2.7	1.0-4.4
60-69	114	3.9	0.0-8.5	212	5.9	1.3-10.4	326	5.0	1.7-8.2
18-69	**1219**	**0.9**	**0.2-1.5**	**2150**	**1.8**	**1.0-2.5**	**3369**	**1.3**	**0.8-1.9**

3.2.4.1 Level of total Physical Activity according to former WHO recommendations

The table below shows the levels of total physical activity based on a combination of physical activity done as part of work, transport and leisure time. Two percent of respondents have a low level of total physical activity; 3 percent are moderately active while 95 percent have a high level of physical activity. Respondents in the age group 60-69 are least active.

Table 24: Total physical activity

Level of total physical activity according to former recommendations							
Men							
Age Group (years)	N	% Low	95% CI	% Moder-ate	95% CI	% High	95% CI
18-29	386	0.4	0.0-1.0	3	0.9-5.1	96.6	94.4-98.8
30-44	458	1.9	0.1-3.8	2.3	1.0-3.7	95.7	93.3-98.2
45-59	261	5.8	1.6-9.9	5.2	0.7-9.8	89	83.9-94.1
60-69	114	4.5	0.0-9.5	5.4	0.0-11.0	90.1	82.5-97.7
18-69	**1219**	**1.9**	**0.9-2.8**	**3.2**	**1.8-4.6**	**94.9**	**93.1-96.7**

Women							
Age Group (years)	N	% Low	95% CI	% Moder-ate	95% CI	% High	95% CI
18-29	727	1	0.4-1.6	3	0.8-5.2	96	93.7-98.3
30-44	798	2.5	0.8-4.2	3.3	1.6-5.0	94.2	91.2-97.1
45-59	413	4.4	1.8-7.1	1.9	0.5-3.4	93.6	90.2-97.0
60-69	212	6.8	2.1-11.5	7.6	2.1-13.0	85.7	78.8-92.6
18-69	**2150**	**2.4**	**1.5-3.3**	**3.2**	**1.7-4.7**	**94.5**	**92.5-96.4**
Both Sexes							
Age Group (years)	N	% Low	95% CI	% Moder-ate	95% CI	% High	95% CI
18-29	1113	0.7	0.2-1.2	3	1.1-4.9	96.3	94.4-98.3
30-44	1256	2.2	1.0-3.5	2.9	1.7-4.0	94.9	92.9-96.9
45-59	674	5.1	2.6-7.6	3.5	0.9-6.2	91.4	88.0-94.8
60-69	326	5.7	2.3-9.2	6.6	2.7-10.5	87.7	82.6-92.8
18-69	**3369**	**2.1**	**1.4-2.8**	**3.2**	**2.0-4.4**	**94.7**	**93.1-96.3**

Physical Activity related to work, transport and Recreation

The table 25 below, shows mean minutes of physical activity based on physical activity done as part of work, transport and Recreation time by age and sex. The lowest mean minutes is on recreation related physical activity at 26 mean minutes. The mean minutes for transport related physical activity was 122 while that on work related is highest with 277 mean minutes.

Table 25: Work-, transport-, and recreation-related physical activity

Mean minutes of work-related physical activity on average per day									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
18-29	386	259.7	216.5-302.8	727	264.9	240.1-289.7	1113	262.2	235.9-288.4
30-44	458	287.1	259.0-315.3	798	310.9	285.9-335.9	1256	299.5	278.6-320.4
45-59	261	283.0	255.9-310.2	413	277.7	244.5-310.9	674	280.3	257.0-303.5
60-69	114	273.0	223.3-322.7	212	243.7	217.6-269.8	326	257.4	233.8-280.9
18-69	**1219**	**272.5**	**246.5-298.4**	**2150**	**281.7**	**265.0-298.4**	**3369**	**277.1**	**259.5-294.7**
Mean minutes of transport-related physical activity on average per day									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
18-29	386	137.4	106.8-168.1	727	117.2	96.3-138.1	1113	127.8	106.8-148.8
30-44	458	128.7	103.3-154.1	798	119.3	93.0-145.5	1256	123.8	103.9-143.7
45-59	261	114.4	82.5-146.3	413	109.9	80.3-139.6	674	112.1	85.7-138.5
60-69	114	82.6	53.0-112.2	212	98.3	62.2-134.4	326	91.0	68.7-113.2
18-69	**1219**	**128.7**	**108.3-149.2**	**2150**	**115.8**	**100.6-131.0**	**3369**	**122.3**	**107.5-137.0**
Mean minutes of recreation-related physical activity on average per day									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
18-29	386	50.2	39.1-61.4	727	20	15.1-25.0	1113	35.9	28.9-42.8
30-44	458	24.5	17.9-31.0	798	10.3	7.5-13.2	1256	17.1	13.7-20.6
45-59	261	38.3	3.5-73.1	413	8.2	0.4-16.0	674	22.8	0.8-44.7
60-69	114	9.4	1.5-17.2	212	4.7	0.1-9.3	326	6.9	2.5-11.3
18-69	**1219**	**38.4**	**30.4-46.4**	**2150**	**14.0**	**11.2-16.8**	**3369**	**26.2**	**20.7-31.7**

3.2.4.2 Minutes spent on sedentary activities on average per day

The table 26 below shows the mean minutes spent in sedentary activities on a typical day. Overall, respondents spend an average of 164 minutes per day on sedentary time. The median minutes of total sedentary activity per day is 120.

Table 26: Minutes spent in sedentary activities on average per day, by gender

Minutes spent in sedentary activities on average per day					
Men					
Age Group (years)	N	Mean minutes	95% CI	Median minutes	Interquartile range (P25-P75)
18-29	449	160.1	137.2-183.0	120	60 – 240
30-44	568	163.7	146.8-180.7	120	60 – 240
45-59	324	202	171.4-232.5	180	60 – 300
60-69	144	193.7	167.9-219.5	180	120 – 240
18-69	**1485**	**169.5**	**155.0-184.1**	**120**	**60 – 240**
Minutes spent in sedentary activities on average per day					
Women					
Age Group (years)	N	Mean minutes	95% CI	Median minutes	Interquartile range (P25-P75)
18-29	922	153.2	141.9-164.6	120	60 – 240
30-44	980	151.2	139.1-163.3	120	60 – 220
45-59	531	173.2	153.8-192.6	150	60 – 240
60-69	269	210.6	182.0-239.2	180	120 – 300
18-69	**2702**	**158.9**	**150.6-167.1**	**120**	**60 – 240**
Minutes spent in sedentary activities on average per day					
Both Sexes					
Age Group (years)	N	Mean minutes	95% CI	Median minutes	Interquartile range (P25-P75)

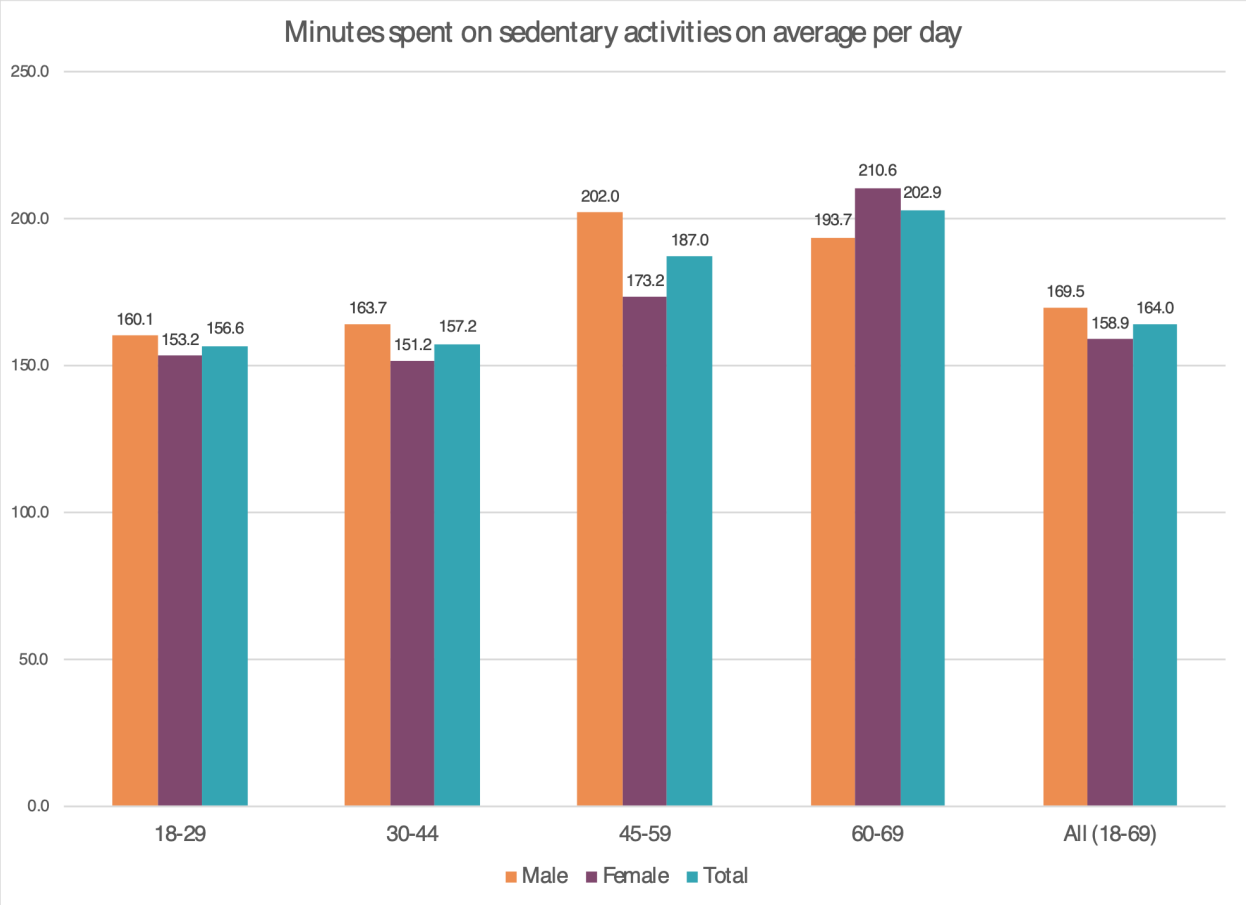
18-29	1371	156.6	144.2-169.0	120	60 – 240
30-44	1548	157.2	147.2-167.2	120	60 – 240
45-59	855	187	165.5-208.5	180	60 – 300
60-69	413	202.9	184.0-221.8	180	120 – 300
18-69	**4187**	**164**	**154.8-173.2**	**120**	**60 – 240**

From table 27 below urban mean sedentary minutes is 192 and median is 180, this is significantly higher than in rural areas, where mean sedentary minutes is 161 and the median is 120 minutes.

Table 27: Minutes spent on sedentary activities on average per day, by residence, by age

Minutes spent in sedentary activities on average per day					
Urban					
Age Group (years)	N	Mean minutes	95% CI	Median minutes	Interquartile range
18-29	289	197.9	173.7-222.1	180	120 – 240
30-44	313	176.4	154.2-198.5	180	90 – 240
45-59	165	197.9	155.1-240.8	180	120 – 300
60-69	77	217.5	184.8-250.2	180	120 – 300
18-69	**844**	**191.6**	**173.8-209.4**	**180**	**120 – 240**
Rural					
Age Group (years)	N	Mean minutes	95% CI	Median minutes	Interquartile range
18-29	1082	151.4	138.2-164.7	120	60 – 240
30-44	1235	154.8	144.0-165.7	120	60 – 240
45-59	690	185.7	162.2-209.3	180	60– 300
60-69	336	201.2	180.4-222.1	180	90 – 300
18-69	**3343**	**160.6**	**150.6-170.6**	**120**	**60 – 240**

Figure 10: Minutes spent on sedentary activities per day on sedentary activities per day



3.2.5 Overweight and obesity

Overweight and Obesity

The World Health Organization describes being overweight and obese as abnormal or excessive fat accumulation that may impair health. Body Mass Index is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of their height (kg/m²). In adults WHO defines a BMI greater than or equal to 25 as overweight and a BMI greater than or equal to 30 as obese. Being overweight and obese are major risk factors for noncommunicable diseases such as cardiovascular complications, diabetes and some forms of cancer.

The table 28 below shows the percentage of respondents who had a BMI equal to or more than 25 and were considered overweight. The results highlight that 18.5% of the respondents are

overweight with a significantly higher percentage of women (27.8%, CI, 24.6-31.0) being overweight compared to men (9.4%, CI 7.1-11.6).

Table 28: Prevalence of BMI ≥25, by age and gender

BMI≥25									
	Men			Women			Both Sexes		
Age Group (years)	N	% BMI≥25	95% CI	N	% BMI≥25	95% CI	N	% BMI≥25	95% CI
18-29	445	5.8	2.7-8.9	809	22.4	17.9-26.9	1254	13.8	10.3-17.2
30-44	564	8.5	5.7-11.4	932	34.2	28.4-39.9	1496	21.5	18.0-25.0
45-59	320	18.3	10.8-25.8	521	29.6	22.8-36.3	841	24.2	18.5-30.0
60-69	143	19.4	10.6-28.2	266	23.1	16.5-29.8	409	21.4	16.4-26.4
18-69	**1472**	**9.4**	**7.1-11.6**	**2528**	**27.8**	**24.6-31.0**	**4000**	**18.5**	**16.1-21.0**

The table 29 below shows that there's statistical difference between overweight women and men in urban and rural settings with men in urban at 26.4% and men rural at 7.7% and women in urban at 49.8% and women in rural 24.4%. The prevalence of overweight in Malawi has not changed between 2009 (21.9%) and 2017 (18.5%)

Table 29: Prevalence of BMI ≥25, by residence, gender

BMI≥25									
	Men			Women			Both Sexes		
Residence	N	% BMI≥25	95% CI	N	% BMI≥25	95% CI	N	% BMI≥25	95% CI
Urban	266	26.4	18.9-34.0	558	49.8	43.5-56.2	824	40.4	35.3-45.5
Rural	1206	7.7	5.6-9.8	1970	24.4	21.4-27.3	3176	15.8	13.7-17.9
All	**1472**	**9.4**	**7.1-11.6**	**2528**	**27.8**	**24.6-31.0**	**4000**	**18.5**	**16.1-21.0**

3.2.6 Raised blood pressure

High blood pressure is defined as a systolic blood pressure that is equal to or over 140mm Hg and a diastolic blood pressure that is equal to or over 90mm Hg. Participants were asked if they had ever had their blood pressure measured at a health facility and if diagnosed with hypertension. Of the respondents, 81.7% of men and 49.9% of women had never been measured. 8% were diagnosed within the last 12 months and beyond as shown in the table 30 below.

History of blood pressure measurement and diagnosis

Table 30: Blood pressure measurement and diagnosis, by age and gender

Blood pressure measurement and diagnosis									
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
18-29	449	88.2	83.7-92.7	11	6.6-15.3	0.6	0.0-1.3	0.2	0.0-0.6
30-44	568	80.1	75.0-85.2	15	10.4-19.6	3.2	0.7-5.7	1.7	0.4-3.1
45-59	324	71.4	62.3-80.5	23.3	13.6-33.1	1.9	0.5-3.3	3.4	0.7-6.0
60-69	144	64.3	52.2-76.4	11.9	5.8-17.9	6.3	1.5-11.1	17.6	6.9-28.2
18-69	**1485**	**81.7**	**78.0-85.4**	**14.3**	**11.0-17.5**	**2**	**1.1-2.8**	**2.1**	**1.2-3.0**
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
18-29	922	51.5	45.4-57.5	42.9	36.7-49.1	2.6	1.3-3.8	3.1	1.6-4.6
30-44	980	47.2	41.6-52.7	40.1	35.0-45.2	6.5	4.2-8.9	6.2	3.7-8.6
45-59	531	48.7	41.3-56.1	28	20.6-35.4	10.7	6.5-14.9	12.6	8.3-16.9
60-69	269	56.8	46.8-66.8	22	14.6-29.4	13.2	6.9-19.6	7.9	4.5-11.4
18-69	**2702**	**49.9**	**45.5-54.2**	**38.5**	**34.7-42.2**	**5.8**	**4.5-7.1**	**5.9**	**4.5-7.3**

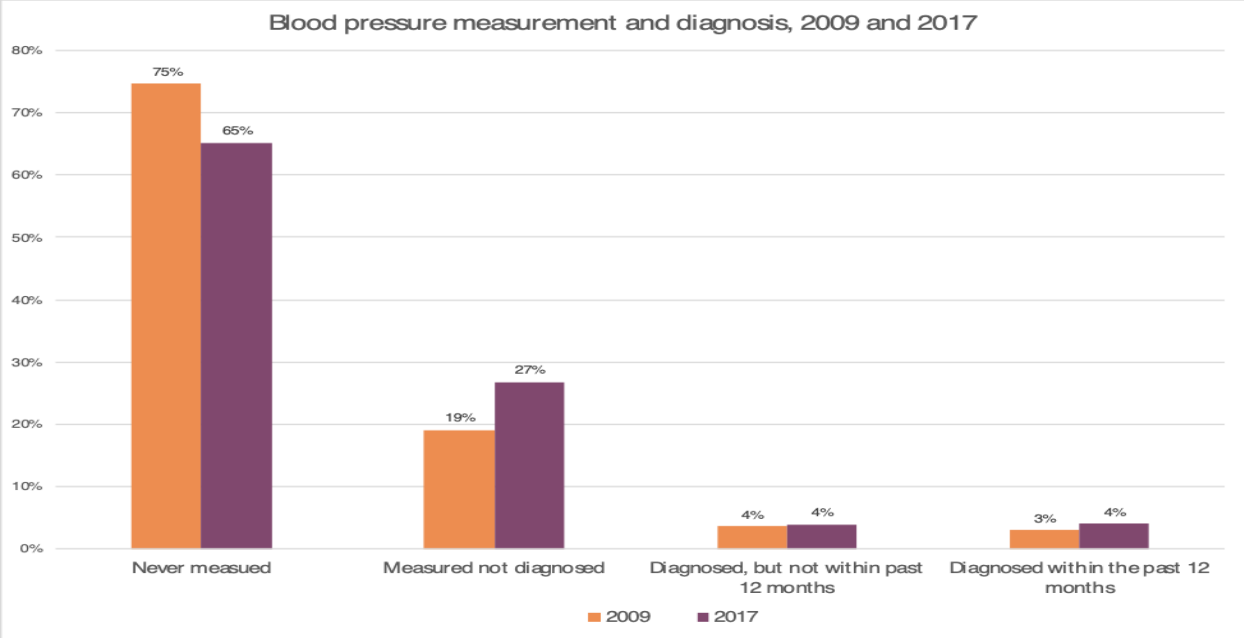
Both sexes									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not di-ag-nosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI
18-29	1371	69.4	64.6-74.2	27.3	22.8-31.9	1.6	0.9-2.4	1.7	0.8-2.5
30-44	1548	63	58.3-67.7	28	23.9-32.1	4.9	3.3-6.5	4.1	2.5-5.6
45-59	855	59.6	52.9-66.3	25.7	18.2-33.3	6.5	4.0-8.9	8.2	5.4-10.9
60-69	413	60.2	52.4-68.0	17.4	12.4-22.3	10.1	6.2-14.0	12.4	7.0-17.7
18-69	**4187**	**65.2**	**61.7-68.8**	**26.8**	**23.8-29.7**	**3.9**	**3.1-4.7**	**4.1**	**3.2-4.9**

A significant improvement has been observed between 2009 and 2017 with regards to the respondents getting their blood pressure measured (Figure 11). In 2009, 90% (CI 88.8-91.8) of men and 60% (CI 57.3-62.4) of women were never measured as opposed to 79.5% (CI74.6-84.4) of men and 46.9% (42.2-51.7) of women in 2017.

Figure 11: Blood pressure measurement and diagnosis

In relation to respondents currently taking drugs (medication) for raised blood pressure prescribed by doctor or health worker among those diagnosed, only 30% of those that have been diagnosed are taking treatment for hypertension as shown in the table below. While as 17.6% and 5.3% of men and women respectively are currently taking herbal or traditional remedy for raised blood pressure among those previously diagnosed.

Table 31: Use of medication or herbal/traditional remedy for raised blood pressure



Currently taking drugs (medication) for raised blood pressure prescribed by doctor or health worker among those diagnosed

	Men			Women			Both Sexes		
Age Group (years)	N	% taking meds	95% CI	N	% taking meds	95% CI	N	% taking meds	95% CI
18-29	4	25.8	0.0-70.9	66	18.8	5.8-31.8	70	19.7	7.5-31.8
30-44	20	13.6	0.0-29.2	127	13.4	4.9-21.9	147	13.4	5.8-21.0
45-59	23	35.2	5.6-64.8	124	54.0	39.4-68.7	147	50.8	37.0-64.6
60-69	27	46.7	17.1-76.4	65	46.1	29.4-62.8	92	46.4	29.1-63.7

18-69	**74**	**28.9**	**14.9-42.9**	**382**	**30.7**	**23.2-38.2**	**456**	**30.3**	**23.2-37.3**

Currently taking herbal or traditional remedy for raised blood pressure among those previously diagnosed

	Men			Women			Both Sexes		
Age Group (years)	n	% taking trad. meds	95% CI	n	% taking trad. meds	95% CI	n	% taking trad. meds	95% CI
18-29	4	0.0	0.0-0.0	66	1.1	0.0-2.9	70	1.0	0.0-2.5
30-44	20	26.8	0.0-59.0	127	8.3	0.0-17.5	147	13.2	2.5-23.9
45-59	23	2.8	0.0-7.1	124	4.7	1.3-8.1	147	4.4	1.4-7.3
60-69	27	20.9	2.3-39.5	65	5.2	0.0-11.7	92	12.9	2.9-22.8
18-69	**74**	**17.6**	**2.1-33.1**	**382**	**5.3**	**1.7-8.8**	**456**	**8.3**	**3.2-13.4**

Blood pressure measurement

Physical blood pressure measurements were taken, and respondents were asked about prescription of medication to treat high blood pressure. 16.7% of respondents had high blood pressure (SBP ≥140 and/or DBP ≥ 90 mmHg) or were currently on medication for treatment. There was not a significant difference in prevalence of high blood pressure between men and women.

Table 32: Prevalence of raised blood pressure does increase with age.

SBP ≥140 and/or DBP ≥ 90 mmHg or currently on medication for raised blood pressure									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	***n***	***%***	***95% CI***
18-29	449	15.0	7.4-22.7	920	8.1	5.8-10.5	1369	11.5	7.6-15.4
30-44	568	12.4	8.9-15.9	974	13.8	10.1-17.4	1542	13.1	10.5-15.8
45-59	324	27.6	18.3-37.0	530	38.6	31.3-45.8	854	33.3	26.3-40.3
60-69	144	27.9	17.0-38.8	268	41.9	33.1-50.8	412	35.5	28.1-42.9
18-69	**1485**	**16.8**	**12.2-21.3**	**2692**	**16.7**	**14.4-19.0**	**4177**	**16.7**	**14.0-19.5**

3.2.7 Raised blood glucose

Diabetes mellitus is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas or by the effectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood. A fasting glucose of 7mmol/L or higher is confirmation of existing diabetes.

Respondents were asked if they had ever had their blood glucose measurements taken and if so what whether they had been diagnosed with diabetes. The table 33 below show that overall 96% of the respondents had never been measured for raised blood glucose. Less than 1% (0.4%) of respondents were diagnosed with raised blood sugar in the past 12 months.

Table 33: Blood sugar measurement and diagnosis, by age and gender

Blood sugar measurement and diagnosis									
Men									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not diagnosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI
18-29	449	99.1	98.3-99.9	0.9	0.1-1.7	0	0.0-0.0	0	0.0-0.0
30-44	568	95.6	92.8-98.4	2.8	0.9-4.8	1	0.0-2.9	0.5	0.0-1.3
45-59	324	92.4	85.4-99.4	7.6	0.6-14.6	0	0.0-0.0	0	0.0-0.0
60-69	144	92.5	86.7-98.4	2.5	0.1-4.8	0.7	0.0-1.7	4.3	0.3-8.4
18-69	**1485**	**96.6**	**94.7-98.4**	**2.7**	**1.3-4.0**	**0.4**	**0.0-1.0**	**0.4**	**0.1-0.7**
Women									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not diagnosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI
18-29	921	97.9	96.5-99.2	2	0.8-3.1	0	0.0-0.0	0.2	0.0-0.5
30-44	980	95.6	93.7-97.5	4	2.2-5.8	0.4	0.0-0.8	0	0.0-0.1
45-59	531	90.8	86.1-95.5	7.6	3.6-11.6	0.4	0.0-1.0	1.3	0.0-3.0

60-69	269	90.3	85.3-95.3	6.6	2.8-10.4	0.9	0.0-1.9	2.3	0.0-5.4
18-69	**2701**	**95.6**	**94.2-96.9**	**3.8**	**2.6-5.0**	**0.2**	**0.0-0.4**	**0.4**	**0.0-0.8**
Both sexes									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not diagnosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI
18-29	1370	98.5	97.6-99.3	1.5	0.7-2.2	0	0.0-0.0	0.1	0.0-0.3
30-44	1548	95.6	94.0-97.2	3.4	2.1-4.8	0.7	0.0-1.6	0.3	0.0-0.7
45-59	855	91.6	87.8-95.3	7.6	4.0-11.2	0.2	0.0-0.5	0.7	0.0-1.5
60-69	413	91.3	87.3-95.3	4.7	2.4-7.0	0.8	0.0-1.7	3.2	0.7-5.6
18-69	**4186**	**96**	**94.9-97.2**	**3.3**	**2.4-4.1**	**0.3**	**0.0-0.6**	**0.4**	**0.1-0.7**

The table 34 shows the mean fasting blood glucose among the respondents. Of the respondents, 4.7 mmol/L is the mean fasting blood glucose among the population. Women have higher mean fasting blood glucose (4.8mmol/L) than men (4.6mmol/L) with highest percentage of mean fasting blood glucose among the 60-69 age group at 4.9mmol/L.

Table 34: Mean fasting blood glucose

Mean fasting blood glucose (mmol/L)									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
18-29	384	4.5	4.4-4.6	817	4.6	4.5-4.8	1201	4.6	4.5-4.7
30-44	509	4.6	4.5-4.7	891	4.8	4.7-4.9	1400	4.7	4.6-4.8
45-59	304	4.7	4.5-4.8	504	4.9	4.8-5.0	808	4.8	4.7-4.9
60-69	128	4.9	4.6-5.1	260	5	4.8-5.2	388	4.9	4.8-5.1
18-69	**1325**	**4.6**	**4.5-4.7**	**2472**	**4.8**	**4.7-4.8**	**3797**	**4.7**	**4.6-4.7**

The table 35 below shows prevalence of impaired fasting glycaemia and raised blood glucose. In comparison to 2009, there's a significant decline in both impaired fasting glycaemia and raised

blood glucose. Impaired fasting glycaemia was 4.2% in 2009 and 2.3% in 2017 whereas raised blood glucose was 5.6% in 2009 and 1.4% in 2017.

Table 35: Prevalence of impaired fasting glycaemia and raised blood glucose'

Impaired Fasting Glycaemia*									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	%	95% CI	N	%	95% CI	N	%	95% CI
18-29	384	0.5	0.0-1.0	817	1.5	0.5-2.4	1201	1	0.4-1.5
30-44	509	1.4	0.5-2.4	891	2.8	1.4-4.2	1400	2.2	1.2-3.1
45-59	304	2.7	0.6-4.8	504	5.3	2.5-8.1	808	4	2.2-5.9
60-69	128	2.9	0.0-6.1	260	4.5	1.1-7.9	388	3.8	1.4-6.1
18-69	**1325**	**1.2**	**0.7-1.8**	**2472**	**2.7**	**1.8-3.6**	**3797**	**2**	**1.4-2.6**
Raised blood glucose or currently on medication for diabetes**									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	%	95% CI	N	%	95% CI	N	%	95% CI
18-29	384	1.2	0.0-2.7	817	1.1	0.1-2.0	1201	1.1	0.3-2.0
30-44	509	0.8	0.0-1.7	891	2.1	1.0-3.1	1400	1.5	0.8-2.2
45-59	304	0.9	0.1-1.7	504	1	0.2-1.9	808	1	0.4-1.6
60-69	128	7.6	1.0-14.2	260	1.7	0.3-3.0	388	4.3	1.1-7.6
18-69	**1325**	**1.3**	**0.5-2.2**	**2472**	**1.4**	**0.8-2.0**	**3797**	**1.4**	**0.8-1.9**

3.2.8 Abnormal blood lipids

Cholesterol is a fatty substance known as a lipid and vital for the functioning of the body. It is mainly made by the liver but can also be found in some foods. Blood cholesterol test profiles is usually categorized into high-density lipoproteins (HDL), low-density lipoproteins (LDL) and triglycerides. High cholesterol itself doesn't usually cause any symptoms but increases your risk of serious health conditions.

Nearly all (99.8%) of the respondents had never been measured for cholesterol levels. Interestingly; women have a higher mean cholesterol at 144.5mg/dl (CI 141.3-147.7) with men at 129.6mg/dl (CI 126.7-132.5). This is illustrated in table 36 below.

Table 36: Cholesterol measurement and diagnosis

Total cholesterol measurement and diagnosis									
Men									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not diagnosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI
18-29	449	100	100-100	0.0	0.0-0.0	0.0	0.0-0.0	0.0	0.0-0.0
30-44	568	99.8	99.5-100	0.2	0.0-0.5	0.0	0.0-0.0	0.0	0.0-0.0
45-59	324	99.9	99.6-100	0.0	0.0-0.0	0.1	0.0-0.4	0.0	0.0-0.1
60-69	144	99.3	97.9-100	0.0	0.0-0.0	0.7	0.0-2.1	0.0	0.0-0.0
18-69	**1485**	**99.9**	**99.8-100**	**0.1**	**0.0-0.2**	**0.1**	**0.0-0.1**	**0.0**	**0.0-0.0**
Women									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not diagnosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI
18-29	921	99.8	99.4-100	0.2	0.0-0.6	0.0	0.0-0.0	0.0	0.0-0.0
30-44	980	99.4	98.7-100	0.4	0.0-0.8	0.0	0.0-0.0	0.3	0.0-0.8
45-59	531	100	100-100	0.0	0.0-0.0	0.0	0.0-0.0	0.0	0.0-0.0
60-69	269	99.6	98.8-100	0.4	0.0-1.2	0.0	0.0-0.0	0.0	0.0-0.0
18-69	**2701**	**99.7**	**99.4-99.9**	**0.3**	**0.0-0.5**	**0.0**	**0.0-0.0**	**0.1**	**0.0-0.3**
Both sexes									
Age Group (years)	N	% Never meas-ured	95% CI	% meas-ured, not diagnosed	95% CI	% diag-nosed, but not within past 12 months	95% CI	% diag-nosed within past 12 months	95% CI

18-29	1370	99.9	99.7-100	0.1	0.0-0.3	0.0	0.0-0.0	0.0	0.0-0.0
30-44	1548	99.6	99.2-100	0.3	0.0-0.5	0.0	0.0-0.0	0.1	0.0-0.4
45-59	855	99.9	99.8-100	0.0	0.0-0.0	0.1	0.0-0.2	0.0	0.0-0.0
60-69	413	99.5	98.7-100	0.2	0.0-0.7	0.3	0.0-1.0	0.0	0.0-0.0
18-69	**4186**	**99.8**	**99.6-99.9**	**0.2**	**0.0-0.3**	**0.0**	**0.0-0.1**	**0.0**	**0.0-0.1**

Table 37: Average cholesterol levels

Mean total cholesterol (mg/dl)									
	Men			**Women**			**Both Sexes**		
Age Group (years)	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
18-29	387	120	116.2-123.7	826	137.2	131.8-142.6	1213	128.7	125.2-132.3
30-44	516	132.9	128.6-137.3	903	142.9	138.9-147.0	1419	138.1	134.9-141.3
45-59	309	142.8	136.4-149.3	513	159.4	153.5-165.2	822	151.4	146.1-156.8
60-69	133	154.8	145.6-164.1	263	171	162.2-179.8	396	163.7	156.5-170.8
18-69	**1345**	**129.6**	**126.7-132.5**	**2505**	**144.5**	**141.3-147.7**	**3850**	**137.3**	**134.7-139.9**

3.2.9 Cervical cancer screening

The results in the table 38 below show that 12.2% of women who responded to the survey have been screened for cervical cancer.

Table 38: Screening for cervical cancer, by age

Age Group (years)	N	% ever tested	95% CI
18-29	902	8.9	5.2-12.7
30-44	964	17.6	13.4-21.9
45-59	520	13	8.2-17.9
60-69	255	3.7	1.4-6.0
18-69	**2641**	**12.2**	**9.1-15.4**

In the target group of 30-49, only 16.4% have been screened for cervical cancer as shown in the table below.

Table 39: Cervical cancer screening among women aged 30-49, by urban/rural status

	Urban			Rural			Total		
Age Group (years)	N	% ever tested	95% CI	N	% ever tested	95% CI	N	% ever tested	95% CI
30-49	**268**	**26.7**	**18.7-34.7**	**905**	**14.8**	**10.3-19.3**	**1173**	**16.4**	**12.3-20.4**

The distribution of women in rural and urban area was explored with more women in urban areas having more access to screening facilities than women in rural areas.

3.2.10 Cardiovascular Risk

The cardiovascular risk is shown below; between the sexes, women (11.5%) are at a higher risk than men (6.6%).

Table 40: 10-year CVD risk, by gender

Percentage of respondents with a 10-year CVD risk ≥30% or with existing CVD									
	Men			Women			Both Sexes		
Age Group (years)	N	%	95% CI	N	%	95% CI	N	%	95% CI
40-54	364	4.8	1.5-8.2	582	9.7	5.8-13.5	946	7.1	3.8-10.5
55-69	215	11	2.2-19.8	393	15.2	10.2-20.3	608	13.3	8.3-18.2
40-69	**579**	**6.6**	**2.4-10.8**	**975**	**11.5**	**8.5-14.6**	**1554**	**9.1**	**5.9-12.2**

3.2.11 Combined Risk Factors

The table below shows that there are no significant differences in combined risk factors between urban and rural especially in no risk factors and 1-2 risk factors. However, there is a significant difference in the 3-5 combined risk factors with urban at 13.5% (CI 8.9-18.0) and rural at 5.3% (3.3-7.2).

Table 41: Prevalence of 3+ combined risk factors, by urban/rural status

Summary of Combined Risk Factors							
Urban							
Age Group (years)	N	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
18-44	497	6.9	3.0-10.9	85.7	78.1-93.3	7.4	2.6-12.3
45-69	205	3.1	0.5-5.7	59.4	48.1-70.7	37.5	26.1-48.9
18-69	**702**	**6.1**	**2.7-9.6**	**80.4**	**73.4-87.4**	**13.5**	**8.9-18.0**
Rural							
Age Group (years)	N	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
18-44	1729	7.6	5.2-10.0	88.7	85.8-91.6	3.7	1.8-5.6
45-69	764	4.2	2.2-6.2	84.6	79.8-89.3	11.2	7.0-15.5
18-69	**2493**	**6.9**	**4.8-8.9**	**87.9**	**85.1-90.6**	**5.3**	**3.3-7.2**

4 Chapter Four – Discussion

4.1 Alcohol consumption

The results from the STEPS survey show that there is still alcohol usage among participants. The effects of harmful alcohol use filter through the development philosophy of our core obligation and responsibility as espoused in the Malawi Growth and Development Strategy II. In many respects, alcohol abuse is linked to increased armful use of alcohol causes an increased risk of some cancers, liver disease and stroke incidences of risky sexual behavior and road traffic accidents. It is also associated with the weakening of the immune system as well as increased violent behavior such as rape and increased indulgence in other forms of drug abuse. Alcohol and drug abuse are among determinants facilitating the spread of HIV in Malawi. Unpublished reports from Malawi Police Service show that alcohol contributes significantly to crime in the country. A report of 2011 shows that alcohol was linked to 25% of murder cases, 40% of suicides, 27% road traffic accidents, 7% of sexual violence and 38% of physical assault. As such, there is need to increase awareness of the negative effects of alcohol and curb harmful consumption of alcohol including underage drinking through The Malawi National Alcohol Policy. The policy offers a comprehensive mechanism for developing, implementing, coordinating, monitoring and evaluating health, social and economic interventions related to harmful alcohol consumption in Malawi.

The STEPS survey indicates that 60% of the current drinkers had consumed unrecorded alcohol which includes homebrewed alcohol (masese, kachasu, bibida, ntonjani, goli-goli and ntsekedenge) or any alcohol not intended for drinking in the past twelve months. This can be attributed to the alcohol distribution based on region within Malawi which shows that there is a significant difference between rural and urban in terms of consumption of unrecorded alcohol among current drinkers with 64% in the rural and 18% in the urban. This calls for targeted action among the rural communities.

On the issue pertaining to life time abstinence, there was no significant increase among those aged 25-64 years, lifetime abstinence prevalence was at 68.1% in 2009 and 68.5% in 2017. This can be attributed to the awareness of dangers of alcohol. However, pertaining to health seeking behaviour among the respondents it is evident that more men have been advised to stop drinking alcohol by a health worker. It is evident that Government through the Ministry of Health and Population is working on sensitizing dangers of alcohol abuse. In 2009 a nationwide survey in Malawi showed that among people aged 25-64, 30.1 percent of males and 4.2 percent of females consume alcohol as compared to 2017 prevalence rates (for respondents aged 25-64 years): 36.2% of men, but only 3.4% of women, are current drinkers (drank past 30 days).

The hazardous and harmful use of alcohol is risky for both the drinker and other people. The Malawi National Alcohol Policy offers a comprehensive mechanism for developing, implementing, coordinating, monitoring and evaluating health, social and economic interventions related to harmful alcohol consumption in Malawi. The policy that was developed was based to be set as a platform for comprehensive implementation mechanisms to ensure efficient and effective enforcement, prevention advocacy campaigns, treatment and monitoring mechanisms for reducing alcohol attributable harms. The policy, therefore, intends to increase awareness of the negative effects of alcohol and curb harmful consumption of alcohol including underage drinking.

4.2 Tobacco Use

The survey showed that 11.2% of Malawians are smokers. The percentage of tobacco smokers in men is 21.7% whilst 1.5% in women. With respect to areas of residence it was evident that prevalence of smoking in urban areas is at 6.1%, compared to 11.9% in rural areas. Tobacco use is a health issue, tobacco kills more than 8 million people each year. Tobacco is a hindrance to economic development; with premature deaths resulting in family income loss, and increased healthcare burden. Malawi is an agricultural area with tobacco being one of the highest earners and therefore contributors to the economy; tobacco farming accounts for 81% of Malawi's foreign exchange. Efforts to end smoking are treated with caution and often come with negative economic consequences for the country.

The Tobacco Act regulates growing and exportation but does not contain any restrictions on advertising, smoking in public places or health warning label requirements as such there are currently no smoke-free zones in the healthcare facilities, educational facilities, indoors, workplaces, restaurants and bars. However, Malawi is in the process to ratify to the Framework Convention on Tobacco Control (FCTC) this is yet to be finalized.

In comparison to 2009 results; there's a slight decline in smoking habits across the population despite the difference not being statistically significant. For example, smoking habits of the respondents showed that in 2017, 10.8% smoked daily whereas in 2009 it was 12.4%. This can be attributed to the health education initiatives through Ministry of
Health and Partners have been engaged in both communities and health service delivery points in the Country. However, there is still need to focus on gender-based mainstreaming of smoking habit messages and interventions as there is a significant difference in smoking habits between men and women with 16% (CI 12.2-20.2) of men smoke daily compared to 1% (CI 0.5-1.5) for women.

The results further show that 98% of women have never smoked in comparison to men where 69.6% (CI have never smoked. Interestingly it was noted that for both the 2009 and 2017 survey the average age of starting to smoke remains at 22 for both sexes. Furthermore, there's a statistically significance difference in the use of manufactured cigarettes between men 69.7% (CI 61.4-78.1) and women 22.3% (CI 4.8-39.8). Interestingly the use of manufactured cigarettes decreases with age whereas the hand-rolled increases with age. The exposure to second hand smoking at work place was at 24.8% (CI 17.9-31.7) as opposed to women at 10.7% (CI 8.6-12.8). Interestingly the risk of exposure decreases with age in men but increases with age in women in the workplace. Further studies may be needed to find out further on why this is the case. Exposure to second smoke in the home is relatively the same for both women (12.3) and men (16.2). Malawi has a Tobacco Act which regulates growing and exportation but does not contain any restrictions on advertising, smoking in public places or health warning label requirements as such there are currently no smoke-free zones in the healthcare facilities, educational facilities, indoors, workplaces, restaurants and bars. A such the country needs to ratify to the Framework Convention on Tobacco Control (FCTC) to fully achieve this.

4.3 Diet

There has been a significant decrease from 2009 (97.5%) to 2017 (89.8%) respectively in the percentage of respondents (25-64 years) having less than 5 serves of fruits/vegetables per day. The World Health Organization (WHO) recommends consumption of at least 5 portions of fruits and vegetables per day. The mean number of days' fruit consumed in a typical week is 2.6 days These results should be considered with caution as often a 'serving' in the Malawian context means a fruit taken for breakfast, lunch and dinner and excludes the fruit and vegetables consumed during the day outside of meals. Malawians are also likely to consider all vegetables consumed in one sitting as one serving Results have shown Under reporting of fruit and vegetable consumption which may be due to the wording of diet-related questions. There is need in the future surveys should consider careful use of some questions on diet.

4.4 Salt Intake

Reducing salt intake has been identified as one of the most cost-effective measures a country can take to improve population health outcomes. The survey found that the average Malawian has a daily intake of 10.4 grams of salt per day; this is double the WHO recommendation of 5 g/day. 17.4% of respondents add salt always or often before eating or when eating, prevalence was higher among men (20.0%) than women (15%). Men in age group 18-29 present the highest proportion (22 percent) of adding salt always or often before eating or when eating. Twenty-five percent of the rural respondents compared to 20 percent of the urban respondents add salt always or often before eating or when eating although it depicts no significant difference in the

salt intake between urban and rural populations. It was alarming to note that 38.2% of the respondents always or often eat processed foods with high salt. Consumption is highest among the urban population, over half (53.8%) always or often consume processed food high in salt. This calls for targeted action among urban populations. There is need for health education in all ages and sex against eating processed foods, the harm of eating too much salt as well as adding salt before eating or when eating.

4.5 Physical Activity

Results show physical inactivity prevalence to be extremely low, at 1.3%. We can compare physical inactivity levels today to those in 2009, and we see a great decrease. According to former WHO recommendations, today, 2.6% of respondents (25-64 years) have a low level, 3.0% moderate level and 94.3% high level of total physical activity; in 2009 the population was split: 9.5%, unknown%, 83.7%, respectively.

The lowest mean minutes is on recreation related physical activity at 26 mean minutes. The mean minutes for transport related physical activity was 122 while that on work related is highest with 277 mean minutes. The lowest physical activity is on recreation and even worse for Women are almost 3 times less recreationally active than men. Women spend 14.0 minutes on average per day doing recreation-related physical activity, compared to men who spend 38.4 minutes. Furthermore 67.4% of women do not indulge in recreation-related physical activity, compared to 42.8% of men. It shows that most women are not involved in the recreation activities.

The mean minutes spent in sedentary activities on a typical day. Overall, respondents spend an average of 164 minutes per day on sedentary time. The median minutes of total sedentary activity per day is 120. There is a need to introduce programs to strategically target women for their involvement into recreation related physical activities such as sporting activities. This call to action is strengthened by the finding that 50% of women in urban populations are overweight. It is important to ensure that all respondents in the age group 60-69 are targeted for recreation activities as it shows the least age to be engaged in physical recreation activities.

One of the best recommendations to engage all age groups in physical activities is through government initiative such as health walks, which see all civil service employees have physical recreation activities on Fridays of each week. With such an approach it can work out to have this as a national event that requires participation of all.

4.6 Overweight and Obesity

The 2017 steps survey indicated that the prevalence of obesity and overweight in the Malawian population has not significantly changed since 2009. In 2009, 21.9% of the population aged 25-64 years were overweight in comparison to 2017 where the prevalence is 21.5%. Significant differences have been observed among the rural and urban population in 2017. 40.4% (CI 35.3-45.5) of urban population compared to 15.8% (CI 13.7-17.9) of the rural population are overweight. In men 26.4% (CI 18.9-34.0) in urban areas and 7.7% (CI 5.6-9.8) in rural areas are overweight. The situation is similar to women where 49.8% (CI 43.5-56.2) and 24.4% (CI 21.4-27.3) are overweight in urban and rural areas respectively.

Based on the results, the age range 30-44 show a high number of those overweight and obese, recreation activities are a must, with diet control emphasizing the need to cut down on carbohydrate intake and increasing fruits and vegetables. This further needs to comprehensively support the National Alcohol Policy to control alcohol use among all age groups including those who smoke.

4.7 Raised Blood Pressure

Overall there has been a significant improvement in people accessing services to measure their blood pressure. Among those aged 25-64 years, in 2009, 74.7% (CI 73.0-76.4) for both sexes had never been measured whereas in 2017, 62.4% (58.3-66.6) had never been measured. This increase may be attributed by health education messages and awareness campaigns that have encouraged people to go to the nearest health facility to get their BP checked. Among the sexes, women are more likely to access the services than men; 49.9% (45.5-54.2) of women have never been measured compared to 81.7% (CI 78.0-85.4) of men. This is of no surprise as studies have shown that women are more likely to go to the hospital than men because they are bread winners as such they find less time to go to the hospital. However, it should be encouraged that men need to attend health services and also find ways to make people not stay long at the hospital.

Among those accessing diagnostic services, in 2017, 8.0% were diagnosed with high blood pressure. However only 30.3% are currently on treatment prescribed by a medical doctor or health worker for raised blood pressure. This may be due to luck of drugs in the hospital as such people have to buy drugs which is difficult for them due to poverty. However, HSSP11 has indicated that some NCD drugs be put on the essential health package to prevent people from buying essential drugs. In addition, people travel long distances to get medication at a health facility. There is need for districts to have decentralized clinics so that they reach the people who leave far from health facilities to increase access to health services. Among those diagnosed with raised blood pressure, 8.3% reported to be taking herbal or traditional medicines. Taking Herbal

medicine among patients with chronic illness in Malawi is common, this has also contributed to patients not taking prescribed drugs. However, no studies to date have shown the efficacy of these medicines. Therefore, the government has to put measures so that these medications are tested and that they are safe to be used.

Currently in Malawi there is an influx in the herbal medicines and access to these herbal remedies is not a challenge. Marketing of the herbal medicines are not controlled in Malawi, and a lot of Malawians currently prefer herbal medications as compared to complementary medications issued in hospitals.

There is need to strike a balance between demand creation activities such as community screening programmes and public awareness on blood pressure, with the availability of the services and access to the services. It has been an issue were though public awareness activities are done, there are not enough services to meet the demand of the public. This requires stakeholder involvement to mobilize resources in joint collaboration with the Government of Malawi.

4.8 Raised Blood Glucose

The survey results highlight that the prevalence of diabetes has significantly declined since the 2009 STEPS survey. In 2009, the prevalence in the Malawian population was 5.6% in comparison to 2017 where the prevalence was at 1.4%. The results indicate that there has been an improvement in the prevalence of raised blood sugar. The improvements can be in two fold, the introduction of the NCD Unit at the Ministry of Health and Population in 2010, all NCD interventions tailor made to align to most of the health policies and strategic plans for the nation including external donor funded vertical programmes. With the release of the 2009 STEPS report, it provided the much needed baseline as to the country stud on NCDS. As much as the drop in the percentile in the prevalence of raised blood glucose, it is imperative to note that with the development of NCD Action Plan, which had a collaborative effort, which saw partners adopting and implementing most of the interventions addressed to combat NCDs in Malawi. It should not be ruled out though Malawi has been involved in the two surveys 2009 and 2017, they had different approaches. The 2009 STEPS results being the first to be done in Malawi cannot rule out arithmetical errors. This can be attributed to sample size, target population pertaining to age range groups to mention a few. There is still need to further analysis and understand the data capturing techniques used in the 2009 which had a different approach for the 2017 data collection and analysis.

Despite the improvement in prevalence of diabetes, 96.0% still reported to have never been measured for raised blood glucose. There is need to develop screening criteria tools for Diabetes

to be used by health care providers so that every person who attends a health facility be screened for diabetes regardless of the condition they have. This will increase diabetes screening at health facilities. In addition, screening campaigns and awareness have to be intensified to cover the people in the communities. It is imperative as NCD clinics are developed in Malawi there is need of integration, this will minimize the missed opportunities of patients seeking health care with comorbidity conditions. It provides an opportunity to have a one stop NCD clinic center were all services are available. There is need to have a link between the community health workers, Health Surveillance Assistants and the immediate health facilities. For those diagnosed with diabetes, access to treatment was reported at 1.3% for those taking insulin and 47.9% for those taking medication prescribed by a doctor or health worker. This shows that there is need to improve access to treatment for those diagnosed by reaching out to people in farthest areas through decentralized clinics.

4.9 Cervical Cancer Screening

Malawi has the highest rate of cervical cancer in worldwide estimated at 75.9 per 100,000 population which can be reduced by 80% if coverage, quality and follow-up of screening are high. Despite this fact, the uptake of cervical screening among Malawians aged 18-69 is 12.2%. Among the recommended age group of 30-49, only 16.4% have previously been screened. The distribution of women in rural and urban area was explored with more women in urban areas (26.7%) having more access to screening facilities than women in rural areas (14.8%).

4.10 Combined Risk Factors

The STEPS survey found that 6.2% (CI 4.4-8.1) of Malawians aged 18-69 years, and 8.0% (5.3-10.6) of those aged 25-64 years have combined 3-5 risk factors. Whereas in 2009 prevalence among those aged 25-64 years was 16.5% (CI 14.7-18.4). This reduction can be attributed to NCD interventions that have been put in place since 2012. Although there have been improvements made; significant differences in the 3-5 combined risk factors have been observed between the urban and rural population with urban at 13.5% (CI 8.9-18.0) and rural at 5.3% (3.3-7.2). as such, health education and awareness campaigns on NCD risk factors have to be intensified.

5 Secondary Analysis of 2017 STEPS Survey

5.1 Introduction to Malawi STEPS Secondary Analysis

The global *Lancet* Commission on Reframing NCDs and Injuries for the Poorest Billion ("The *Lancet* NCDI Poverty Commission") was launched in 2015, aiming to broaden the NCD agenda with a clear focus on equity [1]. Officially launched in 2016 and supported by the global Commission, the Malawi NCDI Poverty Commission, works to highlight an important and complementary agenda in Malawi for NCDs & Injuries [2]. The Commission Report, released in August 2018, found that over 60% of the Disability Adjusted Life Years (DALYs) in Malawians are caused by conditions *outside* of the standard framing of NCDs, which focuses on four major disorders: cardiovascular disease, diabetes, respiratory disease, and cancer. This expanded agenda highlights a large number of additional conditions as well as some important trends: a significant proportion of the NCD burden is occurring in those under 40 years old, and the majority of this burden is estimated to be attributable to risk factors outside of the common cardio metabolic and modifiable risk factors [2]. Ultimately, these findings highlighted the need for a complementary and expanded agenda, particularly to investigate the burden of NCDIs in the rural poor.

As part of this initiative, the Malawi STEPS Committee, with support from the Malawi NCDI Poverty Commission, expanded the 2017 STEPS Survey in order to meet three additional objectives in a secondary analysis:

1) To disaggregate the main findings of the STEPS Survey by socioeconomic status in order to determine the burden of risk factors and disease across different levels of relative wealth and poverty in Malawi;
2) To determine the burden of severe mental illness;
3) To determine the burden of potential cases of epilepsy.

The main STEPS findings, disaggregated by socioeconomic status are included below, with additional sections on epilepsy and mental health in the following sections.

5.2 Methods

5.2.1 Malawi Equity Tool

The Equity Tool is a set of questions developed by Metrics for Management that allows researchers and programs to measure and categorize household wealth [3]. The tool utilizes a set of questions pulled from the World Bank's Demographic and Health Surveys (DHS), and assigns values to responses to each question to create a score for each household, representing their relative wealth within the population. These scores make it possible to divide households into nationally representative wealth quintiles (i.e. the respondent's *national* wealth quintile, not the quintile they fall into within the individual survey's sample).

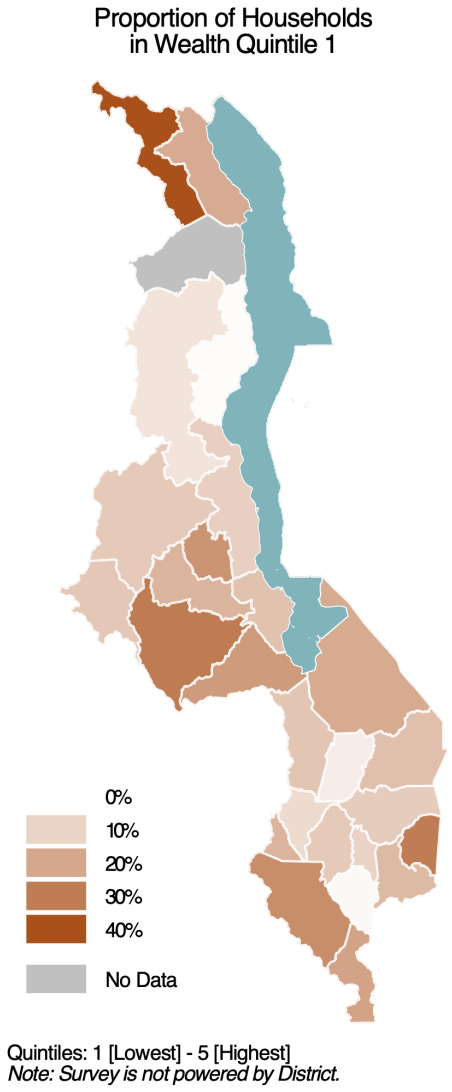
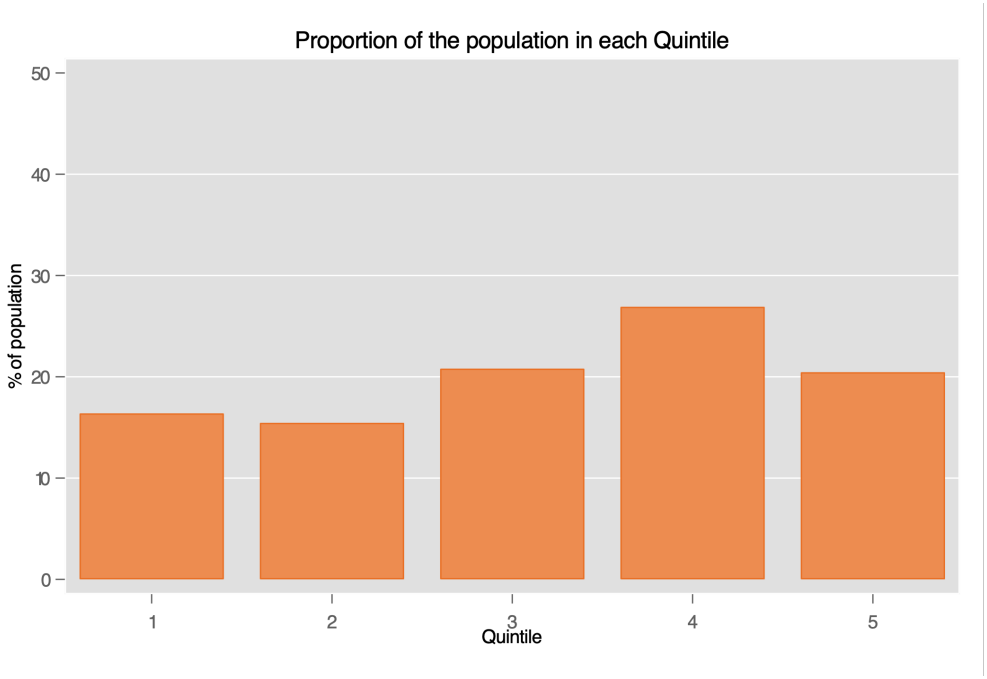


Figure 12: Poverty rates by District

The number of questions in the Equity Tool varies by country. For Malawi, 17 questions were used for the 2017 STEPS Survey [3] These include simple yes/no questions asking whether the household has key items such as a radio, television, or phone, as well as categorical questions such as the type of water source used, or the type of material used to construct their roof. Possession of items or materials that are associated with higher levels of wealth contribute positively to the National Score, while lack of such items, or utilization of materials associated with lower wealth, contribute negatively. A full description of the questions used, the possible responses, and the weights utilized in calculating the National Score and Quintile can be found in **Appendix A: Equity Tool methodology.** A map of Malawi shows the proportion of households in the STEPS Survey in each district which were in the poorest quintile, with the darker colors illustrating larger proportions of households in the poorest quintile. (Figure 12)

Because the Equity tool was developed based off data from the 2011 World Bank Demographic and Health Survey (DHS), and because the STEPS survey was not designed for stratification by wealth, the STEPS data is unbalanced across quintiles. However, because it was not stratified for wealth, the distribution is good, thought there are slightly more Malawians surveyed from the 3rd, 4th, and 5th (wealthier) quintiles, with the greatest level of oversampling coming from the 4th quintile. This reflects the fact that overall well-being has increased since 2011: A person on the margin between the 1st and 2nd quintiles in 2011 would likely be firmly in the 2nd quintile by 2017. Figure 13, below, provides a breakdown of the proportion of the population in the STEPS survey in each quintile, for reference.

***Figure 13*: population by worthy quintile**



5.2.2 Mental Illness and Epilepsy

The questions included in the 2017 Malawi STEPS Survey for severe mental illness were taken directly from the WHO STEPS module on Mental Health and Suicide and include questions about suicidal ideation, attempts, and any suicide deaths in the family. Additionally, one question was included on epilepsy: “Does anyone in the household sometimes have fits, become rigid, or lose consciousness?”. This screening question was found in the literature as an initial stage for diagnosis of epilepsy, with high performance including a sensitivity of 100% and a specificity of 93% for moderate or severe lifetime and active convulsive epilepsy [4], [5]

5.2.3 Summary Statistics

The original STEPS survey provides data for 4,187 households, representing 7,831,767 adults aged 18-69 in Malawi. As some of the equity tool questions are missing for 212 observations, we are limited to 3,975 observations (representing 7,394,222 adults) when we disaggregate our statistics by wealth quintile.

The STEPS survey provides inverse probability proportional to size weights for each of the three "steps". That is, each individual is weighted by the inverse of the probability that they are selected to be sampled. Households from areas that are under-sampled count for more in the data when we calculate averages and prevalence rates, and households from areas that are over-sampled count for less. We also use these weights, along with the sampling strata to calculate the confidence intervals and run statistical tests.

Tables 42-47 below provide weighted prevalence rates for the main variables of interest. Columns Q1-Q5 provide average rates for each of the 5 wealth quintiles. The Total column provides the average for all respondents who have a National Wealth Score; these totals may differ slightly from the totals in the main STEPS report (since we are limited to 3,975 observations instead of the whole 4,187, as described above).

It is possible that some misclassification may occur across adjacent wealth quintiles: For example, a household at the 20th in terms of National Score (and therefore in the poorest quintile) may realistically not be significantly different than someone at the 21st percentile, while this second person would be in the next quintile (Q2). However, there is a high degree of separation between those falling among the wealthiest quintile Q5, and those among the poorest, Q1. Thus, the column OR_{Q5} provides an estimate of the odds ratio for respondents in Quintile 5 (wealthiest) relative to those in Quintile 1 (poorest), controlling for age, education, and district averages.

These odds ratios come from logistic regressions in **Appendix B: Regression Results.** These regressions estimate the following equation:

$$ln(\frac{p(Y_i = 1)}{1 - p(Y_i = 1)}) = \beta_1 Q_{1i} + \beta_2 Q_{2i} + \beta_3 Q_{3i} + \beta_4 Q_{4i} + \beta_5 Q_{5i} + \gamma' X_i + \delta' D_i + \epsilon_i$$

Where Y_i is the outcome for person *i*, Q_{ji} is an indicator for person *i* belonging to wealth quintile *j*, X_i is a vector of control variables for person *i*, and D_i.is a vector of district-level fixed effects. These controls include age, age squared, and education. The term ϵ_i represents the error term for person *i*. The P-Val column contains the P-Values from Wald test that $\beta_1 = \beta_5$ (i.e. there is no

difference between Quintile 1 and Quintile 5) from those same regressions[3]. The odds ratio reported in OR_{Q5} is e^{β_5} (i.e. the odds multiplier for those in Quintile 5 relative to those in Quintile 1). Column N provides the number of respondents with non-missing data for that variable, and Population provides the estimated population represented.

So, for example, Row 1 of 37 shows that 53.1% of households in Quintile 5 have had their blood pressure measured at some point (Q5 column), while 34.9% of households in Quintile 1 have. (Q1 column) The odds of having your blood pressure measured are 60% higher if you are Quintile 5 than if you were in Quintile 1 (OR_{Q5}=1.6), and this result is significant at the 5% level (P-Val=0.011).

5.3 Main STEPS Results by Socioeconomic Status

Quintile	Mean	95% CI	N
1	34.0	32.7-35.4	1,229,473
2	32.9	31.3-34.5	1,222,188
3	32.9	31.3-34.5	1,617,274
4	35.4	33.9-36.8	1,940,768
5	36.4	34.9-37.9	1,445,098

5.3.1 Hypertension and diabetes by socioeconomic status

Table 42 below shows the results for screening for hypertension and diabetes, by wealth quintile, where Q1 is the poorest and Q5 the wealthiest. Those in the poorest quintile were less likely to have ever had their blood pressure measured (p=0.011), and they were less likely to have had their blood sugar measured (p=0.029). Respondents in the poorest quintile were also less likely to have been diagnosed with high blood pressure

[3] In practice, β_1 is omitted as the constant term in the logistic regressions, and the Wald test becomes a test that the coefficient $\beta_5 = 0$. These are equivalent.

Table 42: Screening for hypertension and diabetes

	Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Population
Percent who have ever had their blood pressure measured	34.9	27.0	25.9	33.5	53.1	35.1	1.6	0.011	3,975	7,394,222
Percent who have had their blood pressure measured and been diagnosed with high blood pressure	4.0	3.4	4.4	9.4	17.7	8.2	4.7	0.000	3,975	7,394,222
Percent who have never had their blood pressure measured or diagnosed	65.1	73.0	74.1	66.5	46.9	64.9	0.6	0.011	3,975	7,394,222
Percent who have ever had their blood sugar measured	0.9	1.7	3.2	4.7	8.5	4.1	3.2	0.029	3,975	7,394,222
Percent who have had their blood sugar measured and been diagnosed with high blood sugar	0.0	0.0	0.1	1.1	2.0	0.7	1.0	.	3,975	7,394,222
Percent who have never had their blood sugar measured or diagnosed	99.1	98.3	96.8	95.3	91.5	95.9	0.3	0.029	3,975	7,394,222

Table 43 below shows that there is no difference between the poorest and wealthiest quintiles in terms of the odds of living with elevated blood pressure, or on medication for raised blood pressure) or raised blood sugar (or on medication for raised blood sugar) in the general population. However, women in Quintile 5 had their odds of living with high blood sugar approximately 52 time higher than women in Quintile 1 (p=0.007).

Table 43: Blood pressure and blood sugar measurements

	Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Population
Percent with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised BP)	14.0	13.5	17.5	15.0	20.7	16.3	1.3	0.447	3,966	7,379,942
Males Only	14.1	13.4	19.6	13.0	22.1	16.4	1.1	0.808	1,426	3,568,533

Females Only	13.9	13.6	15.1	17.2	19.6	16.2	1.5	0.267	2,540	3,811,408
Percent with raised fasting blood glucose as defined below or currently on medication for raised blood glucose (plasma venous value ≥ 7.0 mmol/L)	1.3	0.7	0.8	1.3	3.2	1.4	1.5	0.604	3,614	7,292,441
Males Only	3.3	0.0	0.6	1.6	2.2	1.4	0.2	0.123	1,280	3,542,775
Females Only	0.1	1.4	1.0	1.0	3.9	1.5	52	0.004	2,334	3,749,667

Figure 14 shows blood pressure screening and prevalence for men and women in each quintile, illustrating that across levels of wealth, women are getting screened for high blood pressure more often than men (orange bars). Figure 13 also shows that all respondents were found to have similar rates of high blood pressure across the quintiles when measured during the survey, or who reported being on medication for high blood pressure (purple bars).

***Figure 14*: Prevalence of Blood pressure for men and women in each quintile**

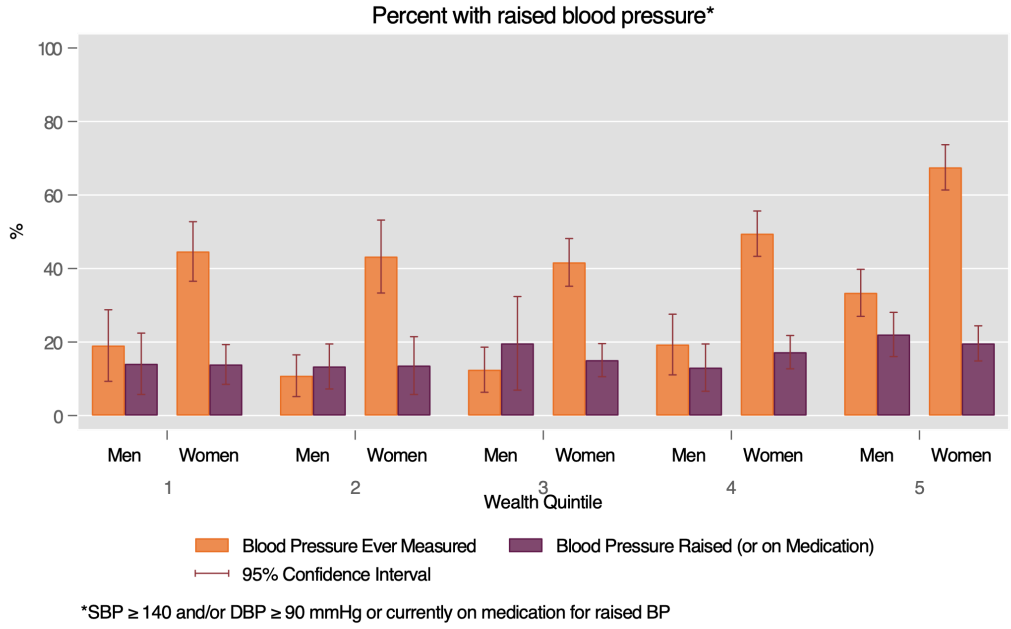


Figure 15 shows the same graph, but with each bar broken down into two subgroups: Those above and below the age of 40. While those over 40 make up approximately half of all people living with high blood pressure, those under 40 make up a higher share of those who have been screened, especially in the bottom 3 quintiles.

***Figure 15*: Prevalence of Blood pressure for men and women by age group**

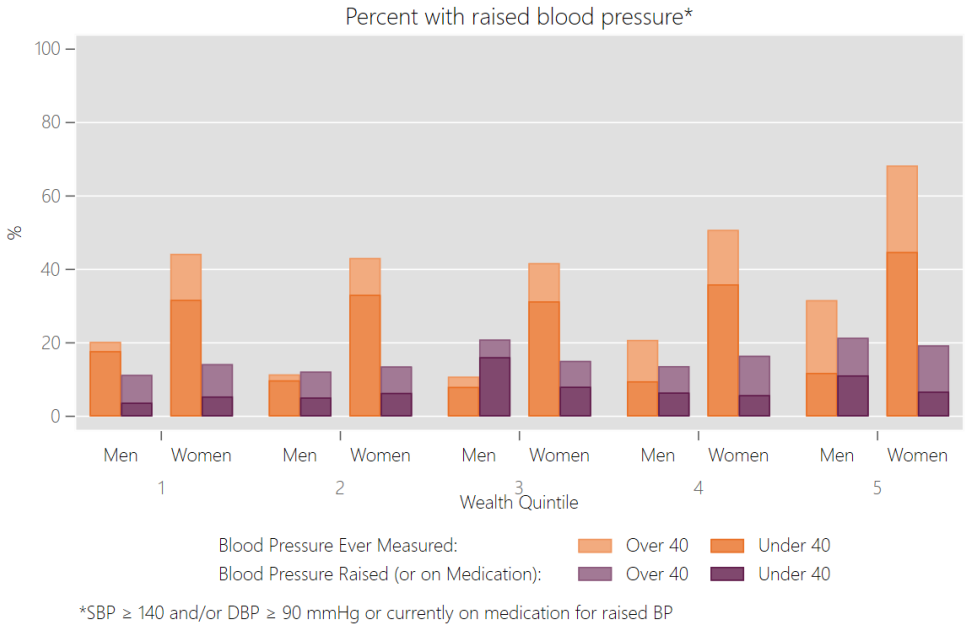


Figure 15 above provides a breakdown of screening prevalence among those who were found to have high blood pressure (or who reported being on medication for high blood pressure). The turquoise bar represents those with high blood pressure who have been screened in the past but not diagnosed; the purple bar represents those diagnosed (and who are on medication); and the orange bar represents those who have never been screened. Overall, many people with high blood pressure had never had their blood pressure checked; this was worse among men, particularly in the poorer quintiles.

Figures 16-18 show similar visualizations for raised blood sugar. Figure 16 illustrates those who have had blood sugar measured and who have raised blood sugar across all quintiles, and Figure 17 shows the same numbers, broken down by sex and age group.

Figure 16*: Blood Sugar by quintile*

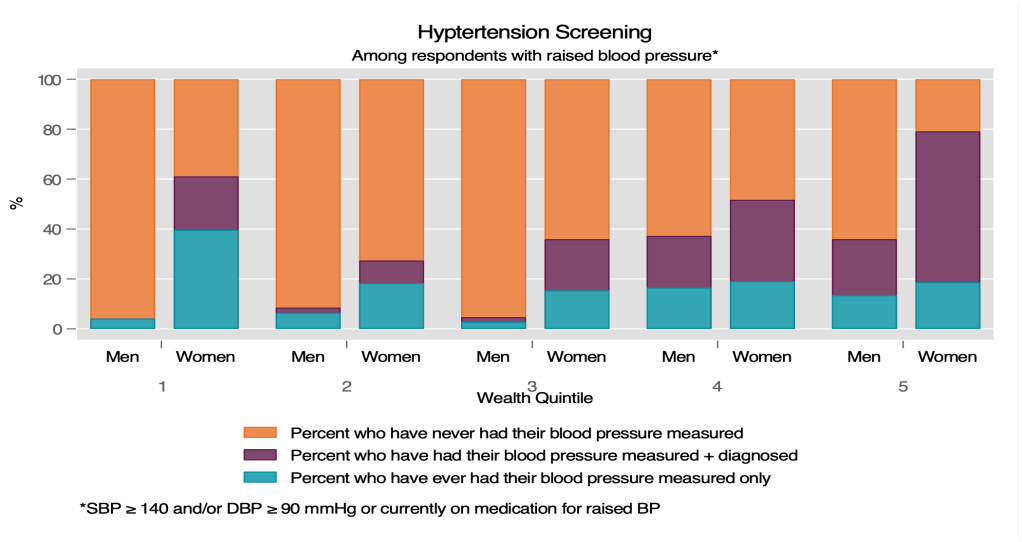


***Figure 17:* Blood Sugar by sex and age group**

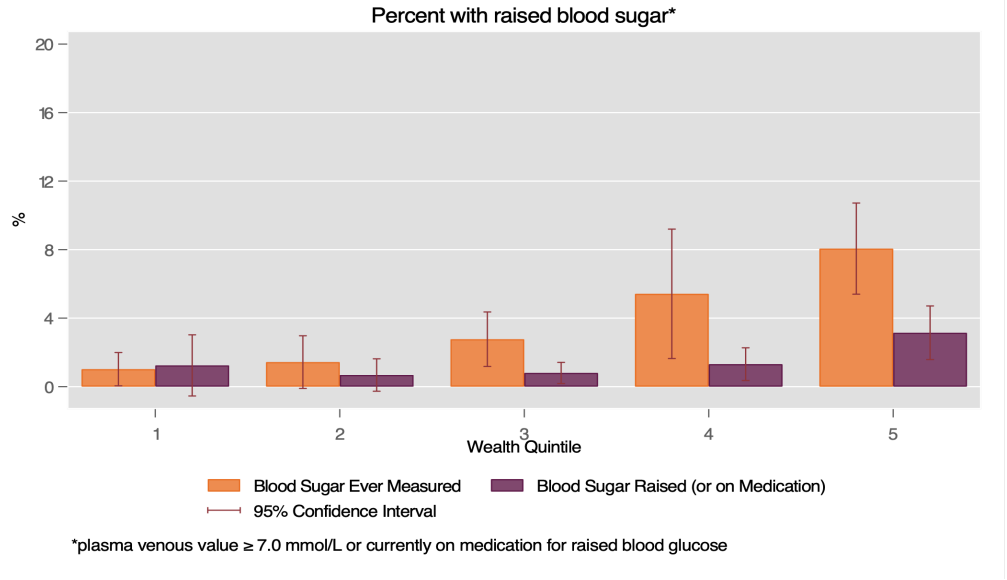


Figure 18: **Blood sugar by quintile**

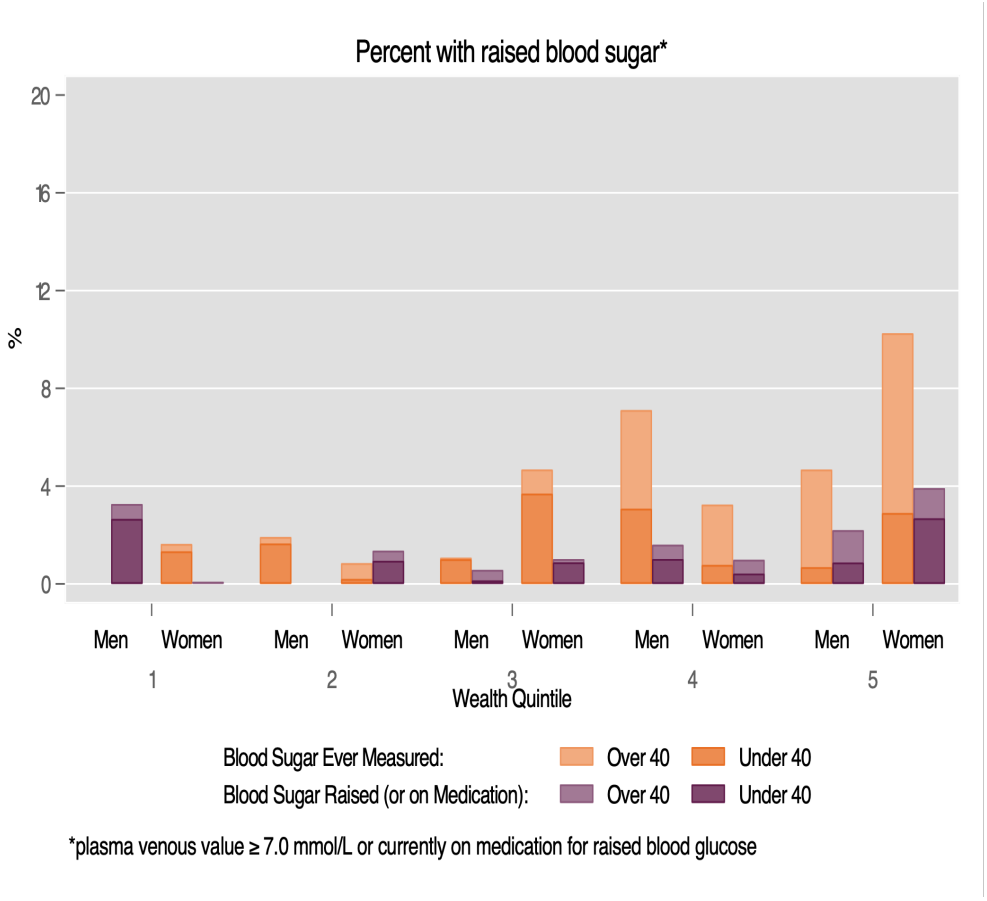
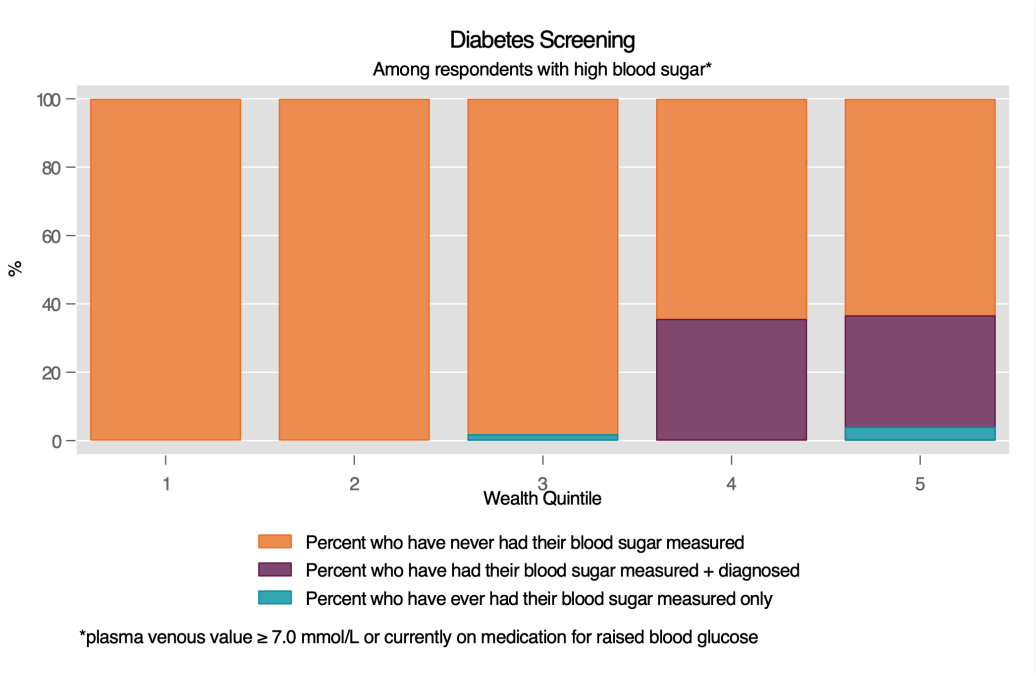


Figure 19 shows those that have high blood sugar or diabetes who had been previously tested or diagnosed. Notably, none of the respondents with elevated blood sugar in the poorest quintile had ever previously been screened for diabetes.

Figure 19: Diabetes Screening by wealth quintile



5.3.2 Risk factors by socioeconomic status

Table 44 shows risk factors across wealth quintiles as the proportion of people who currently smoke tobacco, engage in heavy episodic drinking, and always or often eat processed foods high in salt. More tobacco smoking is noted amongst the poorest Malawians, compared to the wealthiest. There are no significant differences between Quintile 1 and Quintile 5 for heavy episodic drinking or consumption of processed foods high in salt. Figure 19 shows these results.

Table 44*: Tobacco, alcohol, and salt intake*

		Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Population
Percent who currently smoke tobacco		14.9	14.6	16.0	7.8	5.2	11.2	0.3	0.000	3,975	7,394,222
	Men	36.1	27	29	13.2	10.3	21.5	0.2	0.000	1,426	3,568,533
	Women	1.8	2.1	0.9	1.7	1.4	1.5	0.7	0.641	2,549	3,825,689

	Ages 18-44	13.2	12.4	15	5.7	4.6	9.9	0.2	0.000	2,762	5,814,697
	Ages 45-69	22.1	24.6	20.7	14.1	7	16.1	0.3	0.024	1,213	1,579,525
Percent who engage in heavy episodic drinking (6 or more drinks on any occasion in the past 30 days)		6.4	8.0	8.8	7.4	8.1	7.8	1.5	0.412	3,975	7,394,222
	Men	16.1	14.8	16.2	13.7	17.5	15.5	1.4	0.457	1,426	3,568,533
	Women	0.4	1.1	0.1	0.3	1.1	0.6	1.3	0.758	2,549	3,825,689
	Ages 18-44	6.2	7.6	6.7	7.4	8.2	7.2	1.3	0.567	2,762	5,814,697
	Ages 45-69	7.2	9.8	18.4	7.6	7.9	9.8	1.4	0.721	1,213	1,579,525
Percent who always or often eat processed foods high in salt		38.4	34.3	32.4	40.6	43.5	38.2	1.5	0.085	3,956	7,338,869

Figure 20: Risk factors by socioeconomic factors

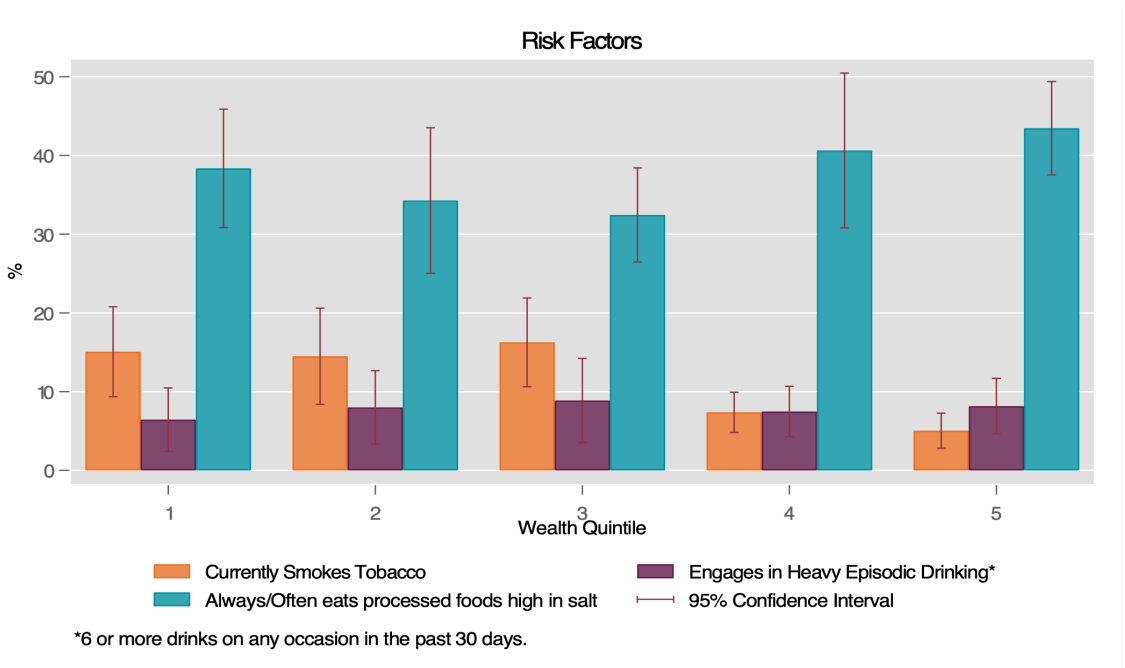


Table 45 shows combined risk factors, similar to the main STEPS analysis, by quintile. This shows those with no risk factors or 3 or more risk factors by age. Among respondents age 18 to 69 years, those in the wealthiest quintile were more likely to have 3 or more of the risk factors than respondents in the poorest quintile. (Figure 21)

Table 45*: Combined Risk Factors*

	Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Population
Percent with none of the designated risk factors	5.8	8.4	8.1	7.1	5.0	6.9	0.5	0.010	3,052	5,801,633
Percent with three or more of the designated risk factors, aged 18 to 44 years	1.7	1.0	4.3	3.1	8.0	3.8	6.3	0.000	2,119	4,585,920
Percent with three or more of the designated risk factors, aged 45 to 69 years	9.6	19.7	8.0	11.1	23.2	14.3	2.3	0.316	933	1,215,713
Percent with three or more of the designated risk factors, aged 18 to 69 years	3.3	4.0	4.9	5.1	11.7	6.0	3.5	0.003	3,052	5,801,633

Designated risk factors include: Current daily smoker, consumes less than five servings of fruit and/or vegetables per day, not meeting WHO recommendations on physical activity (<150 minutes of moderate activity per week, or equivalent), overweight or obese (BMI ≥ kg/m^2), or has raised blood pressure (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised BP).

Figure 21: Combined risk factors by wealth quintile

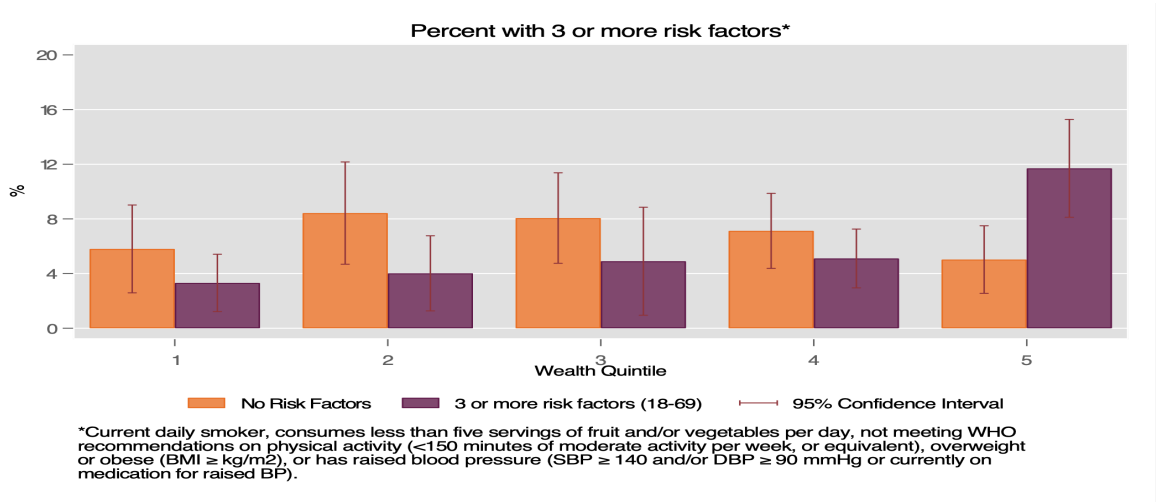


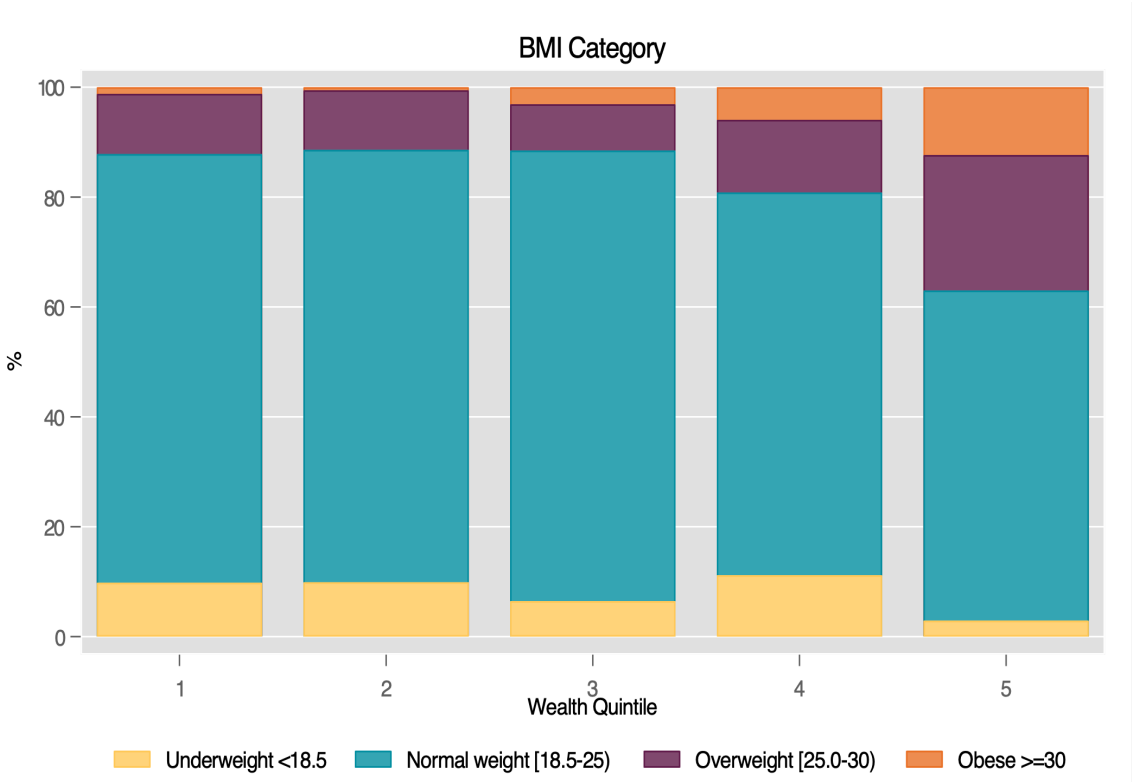
Table 46 shows BMI by quintile, both for underweight as well as overweight and obese. Here there are differences between the wealthiest and poorest quintile for all categories: more poor people are underweight and more wealthy people are overweight or obese. (Figure 22)

Table 46: Body Mass Index

		Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Popula-tion
Mean body mass index - BMI (kg/m^2)		21.8	21.9	22.2	22.6	24.7	22.7	2.4	0.000	3,799	7,012,123
	Men	20.7	21.3	21.4	21.6	22.9	21.7	2	0	1,413	3,506,786
	Women	22.6	22.5	23	23.8	26.1	23.8	2.9	0	2,386	3,505,337
Percent who are under-weight (BMI below 18.5 kg/m^2)		9.8	9.9	6.5	11.2	2.9	8.0	0.2	0.002	3,799	7,012,123
	Men	14.8	10.6	8.5	16.4	3.3	11	0.1	0.004	1,413	3,506,786
	Women	6.4	9.1	4	5	2.6	5.1	0.4	0.089	2,386	3,505,337

Percent who are overweight (BMI ≥ 25 kg/m^2)		12.2	11.4	11.5	19.2	37.0	18.9	4.2	0.000	3,799	7,012,123
	Men	1.4	4.4	5.2	10.9	24.1	9.7	16.1	0	1,413	3,506,786
	Women	19.5	19.2	19.4	29	47.2	28.2	3.9	0	2,386	3,505,337
Percent who are obese (BMI ≥ 30 kg/m^2)		1.2	0.6	3.1	5.9	12.4	5.1	14.5	0.000	3,799	7,012,123
	Men	0.4	0.2	0.5	1.3	3.2	1.2	5.6	0.119	1,413	3,506,786
	Women	1.8	1	6.4	11.5	19.5	9	16.2	0	2,386	3,505,337

***Figure 22*: BMI by quintile**



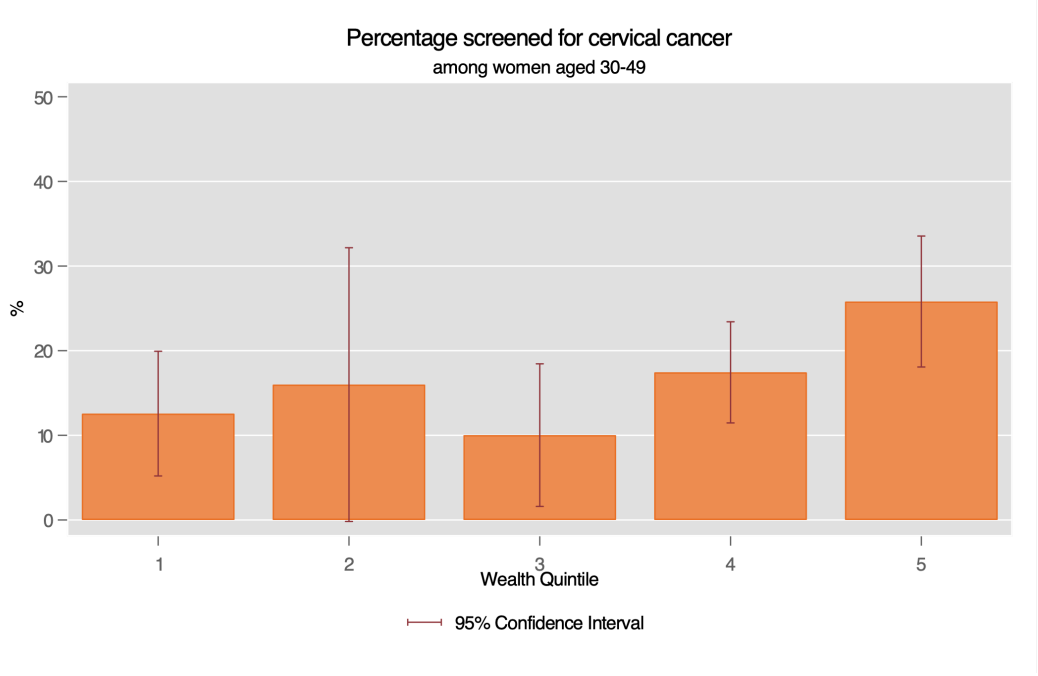
5.3.3 Cervical cancer by socioeconomic status

Table 47: Cervical Cancer Screening

	Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Population
Percent of women aged 30-49 years who have ever had a screening test for cervical cancer	12.6	16.0	10.0	17.4	25.8	16.9	4.9	0.014	1,117	1,506,894

Table 47 above demonstrates cervical cancer screening results by wealth quintile: 26% of women aged 30-49 years in the wealthiest quintile had previously been screened for cervical cancer vs 13% in the poorest quintile. The odds of having had cervical cancer screening were 5x higher for these women, which was found to be statistically significant (p=0.014). (Figure 23)

Figure 23: Cancer screening by Wealth quintile



5.3.4 Main results by socioeconomic status key findings

Overall the results by socioeconomic status tell a significant story of reduced access to care amongst the poorest Malawians. Many Malawians living with hypertension or diabetes have

never been screened for these conditions, and this is worse among the poorest quintile, and the results show no difference in rates of hypertension and diabetes across measures of wealth, with the exception of the wealthiest women having higher odds of raised blood sugar than the poorest women. Overall, women at all wealth quintiles are more likely to get screened for hypertension than men, a finding that we hypothesized may be related with antenatal care. For cervical cancer, a higher proportion of the wealthiest Malawians had been screened, supporting a trend throughout the results of better access to care in wealthier Malawians.

Despite the increased screening in the wealthier quintiles, and other research showing increased wealth and urbanization associated with high blood pressure and high blood sugar, a large proportion of the current cohort of Malawians expected to have high blood pressure are within the poorest quintile. The data suggests over 160,000 Malawians in Quintile 1 are living with high blood pressure, or 13% of the expected hypertension patients. In fact, over a quarter of expected Malawians with hypertension are in the poorest two quintiles – estimated at over 300,000 people. Similarly, for elevated blood sugar, 15% of the cohort is in Quintile 1 (almost 16,00 people), and 23% of the cohort is in the poorest two quintiles (almost 24,000 people). This is partly an age effect as older people are likely to be living in poorer households and have a much higher risk of these conditions. This highlights the need for ensuring service delivery models are designed with reaching all Malawians in mind, including the rural poor.

Risk factors occur in all levels of wealth in Malawi, with poor Malawians more likely to smoke, a trend that is driven by males, though overall the wealthiest Malawians were more likely to have 3 or more risk factors than the poorest. The wealthiest Malawians also tended to have a higher BMI or be overweight or obese, whereas the poorest Malawians were more likely to be underweight.

5.4 Mental Health & Epilepsy Results

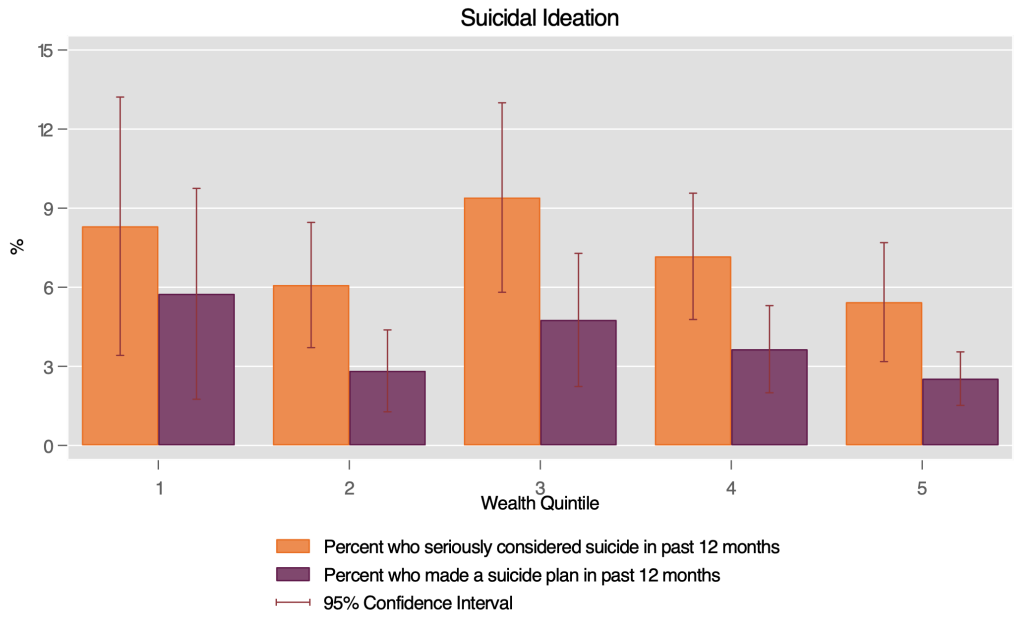
5.4.1 Mental health and epilepsy results by socioeconomic status

Table 47 show the results for severe mental illness and epilepsy. Overall, 7.4% of Malawians seriously considered suicide in the past year, 8.7% in the poorest quintile and 5.4% in the wealthiest (p=0.023). (Figure 23) Those who had made a plan to commit suicide in the past year included 3.8% of Malawians (5.7% in Q1 and 2.5% in Q5, p=0.004).

Table 48: Mental Health and Epilepsy

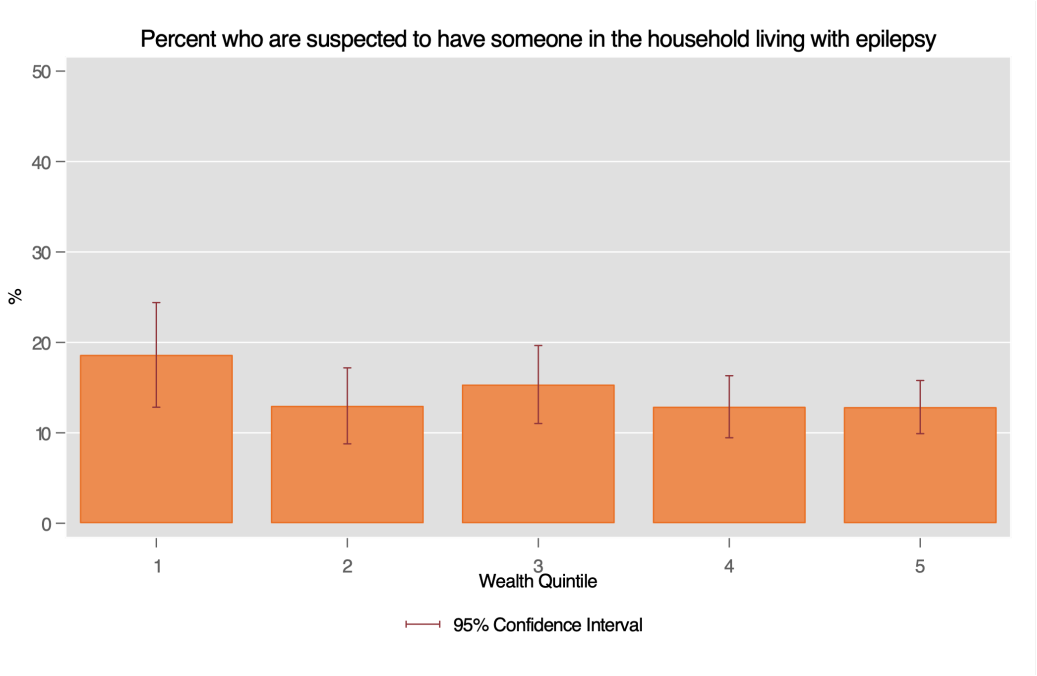
	Q1	Q2	Q3	Q4	Q5	Total	OR_{Q5}	P-Val	N	Population
Percent who seriously considered suicide in past 12 months	8.7	6.1	9.4	7.2	5.4	7.4	0.4	0.023	3,945	7,294,602
Percent who made a suicide plan in past 12 months	5.7	2.8	4.7	3.6	2.5	3.8	0.2	0.004	3,956	7,374,063
Percent who have ever at-tempted suicide	0.2	0.3	0.9	0.8	1.4	0.8	3.0	0.236	3,944	7,354,857
Percent who attempted suicide in the past 12 months	0.2	0.3	0.8	0.4	0.2	0.4	0.5	0.562	3,959	7,377,930
Percent who have ever had a family member attempt suicide	3.2	5.4	9.5	3.7	5.1	5.4	0.6	0.38	3,937	7,342,900

***Figure 24*: Suicidal by wealth quintile**



Over 14% of households in Malawi have someone in the household suspected to have epilepsy, representing 18.6% of poorest households and 12.8% of wealthiest households. However, there is no indication that the odds of having epilepsy are different between these quintiles (p=0.28). Figure 25 below.

***Figure 25*: Epilepsy by wealth quintile**



5.4.2 Mental health and epilepsy key findings

The rate of severe mental illness in Malawi is worryingly high, with over 7% of Malawians between the ages of 18 and 69 seriously contemplating suicide within the past year, and almost 4% making a plan. This is worse among the poorest Malawians compared to the wealthiest. This data projects that, concurringly, over 100,000 of the poorest Malawians living in Quintile 1 have seriously considered suicide in the last year, with almost 70,000 making a plan, representing 20% and 24% of those patient cohorts, respectively. A third of these individuals fall within the poorest two quintiles.

This is the first population survey of possible epilepsy cases in Malawi that we are aware of. A striking 14% of households have someone in the household possibly suffering from epilepsy, using a one-question screen that performed in Kenya with high sensitivity and specificity. Using the DHS average household size of 4.5, this amounts to approximately a 3.2% population prevalence

of suspected epilepsy. [6] Extrapolating these numbers, we could anticipate over half a million Malawians living with suspected epilepsy, with more than 200,000 epilepsy patients in the poorest two quintiles.

5.5 Future Trends

Appendix A provides tables of results from a series of logistic regressions run on the variables listed in the above analysis. From this, we can construct an image of what a population in Malawi will look like as the population ages and moves up in relative wealth. n ageing and increasingly wealthy population will look like in Malawi.

Table 1 provides results from our key indicators for hypertension. This reveals that for each year of age, people increase their odds of being screened by 2%. This compounds over time: A person who is 40 would have odds 10% higher of having been screened than someone who is 35 (1.02^5=1.104). Similarly, we would expect more people to be diagnosed as they get older (both due to more chances of being screened and greater possibility that they develop hypertension). Regarding wealth, the odds of having hypertension (see column (3)) do not change appreciably from quintile 1 to quintiles 2 and 3. It is only as people move into the top 40% of wealth that they start being diagnosed with hypertension at higher rates. However, from Table 3, there is no indication that the odds of having hypertension are likely to change as Malawians become wealthier: All coefficients on quintiles are not statistically significant.

Table 2 shows a slightly different story: The odds of being diagnosed with diabetes are only significantly different for those in the 3rd Quintile (with a 95.4% drop in the odds relative to Quintile 1). However, from Table 4, there is no difference in the odds of having raised blood sugar between Quintiles (column (1)). The risk does increase with age, however.

For risk factors, Table 5 shows that smoking decreases with wealth faster even as it increases with age. Someone moving from Quintile 1 to Quintile 2 would decrease their odds of smoking by 38.6%, while it would take 12.4 years to offset that risk by the equivalent amount (increasing the risk by 1/0.614 = 1.63, or 63%) through the age mechanism.

References

[1] World Health Organization, "Noncommunicable diseases country profiles 2018," 2018. [Online]. Available: https://www.who.int/nmh/publications/ncd-profiles-2018/en/.

[2] World Health Organization, "Global action plan for the prevention and control of NCDs 2013-2020," 2013. [Online]. Available: https://www.who.int/nmh/events/ncd_action_plan/en/.

[3] World Health Organization African Region, "Report on the status of major health risk factors for non-communicable diseases.," 2015.

[4] Ministry of Health Malawi, "Malawi National STEPS Survey for Chronic Non-Communicable Diseases and their Risk Factors: Final Report.," 2010.

[5] Malawi Ministry of Health, "Health Sector Strategic Plan II (2017-2022)," 2017.

[6] G. Bukhman, A. O. Mocumbi, and R. Horton, "Reframing NCDs and injuries for the poorest billion: A Lancet Commission," *Lancet*, vol. 386, no. 10000, pp. 1221–1222, 2015.

[7] Malawi Ministry of Health. Malawi NCDI Poverty Commission., "Malawi National NCDI Poverty Commission Report," 2018.

[8] "Equity Tool," *http://www.equitytool.org*, 2019. .

[9] V. Mung'ala-Odera *et al.*, "Validity and reliability of the 'Ten Questions' questionnaire for detecting moderate to severe neurological impairment in children aged 6-9 years in rural Kenya.," *Neuroepidemiology*, vol. 23, no. 1–2, pp. 67–72.

[10] V. Mung'ala-Odera *et al.*, "Prevalence, incidence and risk factors of epilepsy in older children in rural Kenya.," *Seizure*, vol. 17, no. 5, pp. 396–404, Jul. 2008.

[11] National Statistical Office (NSO)[Malawi] and ICF, "2015-2016 Malawi Demographic and Health Survey Key Findings. Zomba, Malawi, and Rockville, Maryland, USA. NSO and ICF," pp. 1–20, 2017.

APPENDIX A: LOGISTIC REGRESSION RESULTS

Table 1: Screening for hypertension

	(1)	(2)	(3)	(4)	(5)	(6)
	sc1a	sc1a	sc2	sc2	sc3	sc3
Quintile 2	.741		.955		1.35	
	(.16)		(.393)		(.291)	
Quintile 3	.747		1.28		1.34	
	(.158)		(.39)		(.284)	
Quintile 4	.982		2.54***		1.02	
	(.207)		(.747)		(.215)	
Quintile 5	1.64**		4.69***		.61**	
	(.317)		(1.54)		(.118)	
Wealth Score		1.53***		1.87***		.655***
		(.105)		(.196)		(.0452)
Female	4.99***	5.04***	3.44***	3.32***	.2***	.198***
	(.686)	(.709)	(.667)	(.64)	(.0275)	(.0279)
Age	1.02***	1.02***	1.06***	1.06***	.979***	.979***
	(.00581)	(.00619)	(.00704)	(.00666)	(.00556)	(.00593)
Years of Education	1.06***	1.04**	1.01	.992	.945***	.957**
	(.0204)	(.0225)	(.0215)	(.0231)	(.0182)	(.0206)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3906	3906	3875	3875	3906	3906

Exponentiated coefficients

Logistic regressions with modified Huber-White SEs.

sc1a: Proportion who have ever had their blood pressure measured

sc2: Proportion who have had their blood pressure measured and been diagnosed with high blood pressure

sc3: Proportion who have never had their blood pressure measured or diagnosed

* p<0.10, ** p<0.05, *** p<0.01

Table 2: Screening for diabetes

	(1)	(2)	(3)	(4)	(5)	(6)
	sc4a	sc4a	sc5	sc5	sc6	sc6
Quintile 2	1.67		1		.598	
	(1.21)		(.)		(.433)	
Quintile 3	2.74*		.0457**		.365*	
	(1.45)		(.0539)		(.194)	
Quintile 4	3.2**		.804		.312**	
	(1.81)		(.411)		(.176)	
Quintile 5	3.24**		1		.309**	
	(1.74)		(.)		(.166)	
Wealth Score		1.6***		1.62		.623***
		(.274)		(.512)		(.106)
Female	1.38	1.26	.448	.508	.726	.793
	(.459)	(.435)	(.223)	(.231)	(.242)	(.273)
Age	1.06***	1.05***	1.05**	1.06***	.947***	.949***
	(.00691)	(.00675)	(.0238)	(.019)	(.0062)	(.00608)
Years of Education	1.08**	1.05	.931	.942	.929**	.955
	(.0364)	(.0382)	(.0669)	(.0716)	(.0314)	(.0349)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3875	3875	1427	1797	3875	3875

Exponentiated coefficients

Logistic regressions with modified Huber-White SEs.

sc4a: Proportion who have ever had their blood sugar measured

sc5: Proportion who have had their blood sugar measured and been diagnosed with high blood sugar

sc6: Proportion who have never had their blood sugar measured or diagnosed

* p<0.10, ** p<0.05, *** p<0.01

Table 3: Blood pressure measurements

	(1)	(2)	(3)	(4)	(5)	(6)
	pm7	pm7	pm7_m	pm7_m	pm7_f	pm7_f
Quintile 2	.932		.77		1.1	
	(.29)		(.337)		(.501)	
Quintile 3	1.28		1.25		1.24	
	(.455)		(.693)		(.382)	
Quintile 4	.904		.662		1.16	
	(.23)		(.274)		(.338)	
Quintile 5	1.27		1.12		1.46	
	(.399)		(.552)		(.502)	
Wealth Score		1.15		1.01		1.35**
		(.147)		(.18)		(.167)
Female	.933	.927	1	1	1	1
	(.144)	(.144)	(.)	(.)	(.)	(.)
Age	1.04***	1.04***	1.03***	1.03***	1.06***	1.06***
	(.00641)	(.00655)	(.00879)	(.0087)	(.00754)	(.0076)
Years of Education	.98	.973	1	.998	.958	.944*
	(.0224)	(.0222)	(.0303)	(.0312)	(.0318)	(.0315)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3897	3897	1413	1413	2484	2484

Exponentiated coefficients

Logistic regressions with modified Huber-White SEs.

pm7: Proportion with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised BP)

pm7_m: Males Only

pm7_f: Females Only

* p<0.10, ** p<0.05, *** p<0.01

Table 4: Blood sugar measurements

	(1)	(2)	(3)	(4)	(5)	(6)
	bm3	bm3	bm3_m	bm3_m	bm3_f	bm3_f
Quintile 2	.491		1		16.1*	
	(.566)		(.)		(23.4)	
Quintile 3	.533		.116**		12.7*	
	(.46)		(.123)		(16.6)	
Quintile 4	.722		.251		8.73	
	(.627)		(.244)		(11.9)	
Quintile 5	1.5		.176		52***	
	(1.22)		(.187)		(71.1)	
Wealth Score		1.79***		1.07		2.67***
		(.36)		(.341)		(.725)
Female	1.04	1.04	1	1	1	1
	(.473)	(.435)	(.)	(.)	(.)	(.)
Age	1.03*	1.03	1.04	1.04	1.02*	1.02
	(.0169)	(.0177)	(.0299)	(.0302)	(.0137)	(.0153)
Years of Education	1.11***	1.08*	1.19**	1.12**	1.08	1.04
	(.0402)	(.0449)	(.0947)	(.0625)	(.0625)	(.0761)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2886	2886	616	722	1630	1630

Exponentiated coefficients

Logistic regressions with modified Huber-White SEs.

bm3: Proportion with raised fasting blood glucose as defined below or currently on medication for raised blood glucose (plasma venous value ≥ 7.0 mmol/L)

bm3_m: Males Only

bm3_f: Females Only

* p<0.10, ** p<0.05, *** p<0.01

Table 5: Tobacco, alcohol, and salt intake

	(1)	(2)	(3)	(4)	(5)	(6)
	tb1	tb1	al4	al4	dt7	dt7
Quintile 2	.614*		.924		1.16	
	(.181)		(.567)		(.28)	
Quintile 3	.594		.914		1.08	
	(.211)		(.502)		(.252)	
Quintile 4	.25***		.745		1.4*	
	(.0855)		(.348)		(.251)	
Quintile 5	.233***		1.37		1.38	
	(.0859)		(.625)		(.345)	
Wealth Score		.391***		1.17		1.14
		(.132)		(.238)		(.128)
Female	.039***	.0409***	.0295***	.0302***	.871	.863
	(.00997)	(.0103)	(.0115)	(.0114)	(.139)	(.135)
Age	1.04***	1.04***	1.03***	1.03***	.992**	.992**
	(.00829)	(.00824)	(.00719)	(.00717)	(.00393)	(.00393)
Years of Education	.886***	.88***	.996	.992	.99	.991
	(.035)	(.0376)	(.0326)	(.0368)	(.0218)	(.0221)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3624	3624	3624	3624	3607	3607

Exponentiated coefficients

Logistic regressions with modified Huber-White SEs.

tb1: Proportion who currently smoke tobacco

al4: Proportion who engage in heavy episodic drinking (6 or more drinks on any occasion in the past 30 days)

dt7: Proportion who always or often eat processed foods high in salt

* p<0.10, ** p<0.05, *** p<0.01

Table 6: Combined risk factors I

	(1)	(2)
	rf1	rf1
Quintile 2	1.05	
	(.423)	
Quintile 3	1.09	
	(.414)	
Quintile 4	1.14	
	(.407)	
Quintile 5	.592	
	(.282)	
Wealth Score		.766
		(.162)
Female	1.35	1.36
	(.325)	(.327)
Age	.974***	.975***
	(.00897)	(.00941)
Years of Education	1.02	1.02
	(.0349)	(.0365)
District FE	Yes	Yes
Observations	2266	2266

Exponentiated coefficients
Logistic regressions with modified Huber-White SEs.
rf1: Proportion with none of the above risk factors
* p<0.10, ** p<0.05, *** p<0.01

Table 7: Combined risk factors II

	(1)	(2)	(3)	(4)	(5)	(6)
	rf2	rf2	rf3	rf3	rf4	rf4
Quintile 2	.458		2.31		1.23	
	(.271)		(1.32)		(.484)	
Quintile 3	2.19		1.04		1.72	
	(1.25)		(1.06)		(.68)	
Quintile 4	1.71		1.47		1.36	
	(1.03)		(1.12)		(.479)	
Quintile 5	5.14***		2.33		3.06***	
	(2.82)		(1.96)		(1.25)	
Wealth Score		1.74***		1.47		1.6***
		(.346)		(.367)		(.252)
Female	.672	.704	1.17	1.13	.914	.885
	(.315)	(.311)	(.489)	(.472)	(.324)	(.321)
Age	1.05***	1.05***	1.02	1.02	1.05***	1.05***
	(.0206)	(.0175)	(.0163)	(.0161)	(.011)	(.0115)
Years of Education	.88*	.887	.953	.936	.921	.91
	(.0649)	(.0694)	(.0536)	(.0546)	(.0531)	(.0529)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1730	1730	866	866	2788	2788

Exponentiated coefficients
Logistic regressions with modified Huber-White SEs.
rf2: Proportion with three or more of the above risk factors, aged 18 to 44 years
rf3: Proportion with three or more of the above risk factors, aged 45 to 69 years
rf4: Proportion with three or more of the above risk factors, aged 18 to 69 years
* p<0.10, ** p<0.05, *** p<0.01

Table 8: Body Mass Index I

	(1)	(2)
	pm1	pm1
Quintile 2	1.32	
	(.421)	
Quintile 3	1.86**	
	(.463)	
Quintile 4	3.63***	
	(1.28)	
Quintile 5	11.1***	
	(4.51)	
Wealth Score		3.78***
		(.58)
Female	6.05***	5.74***
	(1.11)	(1.01)
Age	1.01	1.01
	(.00786)	(.00769)
Years of Education	.989	.969
	(.0315)	(.0311)
District FE	Yes	Yes
Observations	3470	3470

Exponentiated coefficients
Logistic regressions with modified Huber-White SEs.
pm1: Mean body mass index - BMI (kg/m2)
* p<0.10, ** p<0.05, *** p<0.01

Table 9: Body Mass Index II

	(1)	(2)	(3)	(4)	(5)	(6)
	pm1c1	pm1c1	pm2	pm2	pm3	pm3
Quintile 2	1.03		1.15		.54	
	(.532)		(.359)		(.339)	
Quintile 3	.596		1.25		3.73*	
	(.195)		(.295)		(2.53)	
Quintile 4	.407**		2.29***		7.28***	
	(.16)		(.685)		(4.59)	
Quintile 5	.26***		4.27***		13.3***	
	(.115)		(1.34)		(8.1)	
Wealth Score		.457***		1.87***		2.53***
		(.109)		(.214)		(.352)
Female	.609**	.621**	3.49***	3.4***	9.34***	8.45***
	(.131)	(.134)	(.535)	(.523)	(2.26)	(1.99)
Age	1.03***	1.03***	1.02***	1.02***	1.03***	1.03***
	(.00835)	(.00817)	(.00617)	(.00615)	(.0077)	(.00759)
Years of Education	1.04	1.04	.993	.988	.986	.95
	(.0284)	(.0291)	(.0263)	(.0283)	(.0406)	(.046)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3470	3470	3470	3470	3347	3347

Exponentiated coefficients
Logistic regressions with modified Huber-White SEs.
pm1c1: Proportion who are underweight (BMI below 18.5 kg/m2)
pm2: Proportion who are overweight (BMI â‰¥ 25 kg/m2)
pm3: Proportion who are obese (BMI â‰¥ 30 kg/m2)
* p<0.10, ** p<0.05, *** p<0.01

Table 10: Suicide I

	(1)	(2)	(3)	(4)	(5)	(6)
	su1	su1	su2	su2	su3	su3
Quintile 2	.813		.727		.885	
	(.341)		(.333)		(.822)	
Quintile 3	1.06		1.14		2.24	
	(.483)		(.529)		(1.96)	
Quintile 4	.925		.809		1.1	
	(.329)		(.343)		(1.15)	
Quintile 5	.543		.263**		3.56	
	(.215)		(.147)		(3.05)	
Wealth Score		.685***		.438***		1.42
		(.0884)		(.0911)		(.475)
Female	2.34***	2.32***	1.99**	1.98**	.946	1.04
	(.432)	(.413)	(.631)	(.586)	(.616)	(.581)
Age	1.02***	1.02***	1.02***	1.02***	1.05***	1.05***
	(.00544)	(.00557)	(.00776)	(.00782)	(.0185)	(.0149)
Years of Education	1	1.01	1.04	1.06*	1.07	1.07
	(.0293)	(.0341)	(.0335)	(.0324)	(.0721)	(.0657)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3595	3595	3470	3470	2067	2067

Exponentiated coefficients
Logistic regressions with modified Huber-White SEs.
su1: Proportion considered suicide in past 12 months
su2: Proportion who made a suicide plan in past 12 months
su3: Proportion who have ever attempted suicide
* p<0.10, ** p<0.05, *** p<0.01

Table 11: Suicide II

	(1)	(2)	(3)	(4)	(5)	(6)
	su4	su4	su5	su5	su6	su6
Quintile 2	1.27		1.12		.605	
	(1.43)		(.654)		(.435)	
Quintile 3	3.41		1.57		1.04	
	(3.36)		(.885)		(.669)	
Quintile 4	1.21		.534		.275*	
	(1.6)		(.309)		(.211)	
Quintile 5	.539		.506		.329	
	(.664)		(.354)		(.271)	
Wealth Score		.658		.467***		.536
		(.435)		(.116)		(.26)
Female	1.35	1.14	.945	.95	.93	.94
	(.928)	(.798)	(.221)	(.231)	(.333)	(.357)
Age	1.04	1.03	1.01	1.01	1.02	1.01
	(.0259)	(.0243)	(.00889)	(.00825)	(.0153)	(.014)
Years of Education	1.13	1.12	1.12**	1.14***	1.11	1.11
	(.0909)	(.0787)	(.0511)	(.0528)	(.0933)	(.0925)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1420	1420	3436	3436	3123	3123

Exponentiated coefficients
Logistic regressions with modified Huber-White SEs.
su4: Proportion who attempted suicide in the past 12 months
su5: Proportion who have ever had a family member attempt suicide
su6: Proportion who have ever had a family member die from suicide
* p<0.10, ** p<0.05, *** p<0.01

Table 12: Epilepsy and Cervical Cancer Screening

	(1)	(2)	(3)	(4)
	ep1	ep1	cc1	cc1
Quintile 2	.735		2.24	
	(.193)		(1.68)	
Quintile 3	.854		1.72	
	(.185)		(1.67)	
Quintile 4	.724		2.47	
	(.176)		(1.69)	
Quintile 5	.71		5.55**	
	(.194)		(4.35)	
Wealth Score		.877		2.18***
		(.091)		(.386)
Female	1.2	1.22	1	1
	(.185)	(.186)	(.)	(.)
Age	1.01	1.01	1.01	1.01
	(.00598)	(.00612)	(.0286)	(.0307)
Years of Education	.96*	.959*	1.01	.987
	(.023)	(.0222)	(.0389)	(.041)
District FE	Yes	Yes	Yes	Yes
Observations	3595	3595	1027	1027

Exponentiated coefficients

Logistic regressions with modified Huber-White SEs.

ep1: Proportion who have someone in the household with Epilepsy

cc1: Proportion of women aged 30-49 years who have ever had a screening test for cervical cancer

* p<0.10, ** p<0.05, *** p<0.01

Appendices

Appendix A	Country-specific STEPS Instrument
Appendix B	Show cards used
Appendix C	Survey Implementation Plan
Appendix D	Fact Sheet
Appendix E	Data Book
Appendix F	Secondary Analysis Logistic Regression Results