Kingdom of Tonga NCD Risk Factors

STEPS REPORT (2014)

World Health Organization
Western Pacific Region

Kingdom of Tonga
NCD Risk Factors
STEPS REPORT
(2014)

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The Kingdom of Tonga NCD Risk Factors STEPS REPORT (2014) (referred as "the Report") is a record of a combined effort and contribution of several organizations and many individuals.

The Report was compiled by: Dr Cathy Latu Tekiteki (MOH, Tonga), Dr Philayrath Phongsavan (Univ. of Sydney), Dr Li Dan (WHO, Nuku'alofa), Ms Leanne Riley, Ms Melanie Cowan (WHO, Geneva), Ms Fusi Kaho, Dr Siale 'Akau'ola (MOH), Mr Shalvindra Raj (Australia) and Ms Latu Fusimalohi (MOH).

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
BP	Blood Pressure
CHD	Coronary Heart Disease
CI	Confidence Interval
CVD	Cardiovascular Diseases
DBP	Diastolic Blood Pressure
DFAT	Department of Foreign Affairs and Trade
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
HTN	Hypertension
MET	Metabolic equivalent
mg/dL	Milligrams per decilitre (unit of blood chemistry values)
mmHg	Millimetres of mercury (unit of blood pressure measurement)
mmol/L	Millimoles per litre (unit for blood chemistry values)
NCDs	Noncommunicable diseases
PICs	Pacific island countries and areas
SBP	Systolic Blood Pressure
WHO	World Health Organization

FOREWORD

In most of the countries in the world, Noncommunicable diseases (NCDs), including cardiovascular diseases, diabetes and cancer have become a high disease burden. In order to address this growing problem, accurate information about the risk factors that contribute to the development of NCDs is needed. A “risk factor” is any characteristic or exposure that increases a person’s likelihood of developing a NCD. Risk factors of NCDs include tobacco use, alcohol use, physical inactivity, unhealthy diet, overweight and obesity, high blood pressure, a raised level of blood glucose or cholesterol.

To increase our capacity to undertake population risk surveillance, the Ministry of Health and WHO undertook jointly the 2nd-round national NCD Risk Factors STEPS Survey. The STEPS survey has been specifically designed by WHO to assess the prevalence of the common NCDs and risk factors in a population. The information from the survey provides important information to develop and implement NCD plans and programs to address the growing epidemic of NCDs. Furthermore, the survey provides a firm foundation for an ongoing surveillance for NCDs and their various risk factors.

This report is the result of the 2nd-round STEPS survey carried out in Tonga by 2012. It shows still high prevalence of NCDs and their risk factors among our population and suggests actions to: control and prevention NCDs; provide a supportive physical environment and infrastructure, and improved health service delivery, etc.

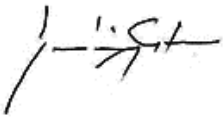
This is the first nationwide 2nd-round NCD STEPS survey report to be published across the PICs. It represents a historical milestone in our efforts to address the NCD epidemic affecting our people and marks an increased commitment by the Ministry of Health and other governmental and nongovernment agencies to tackle the NCD challenge. The survey results and recommendations will enable us to develop more effective health policies and programs in primary and secondary NCD prevention and in monitoring and evaluating our ongoing efforts in NCD prevention and control.

The Tonga STEPS survey involved intensive work, persistence and dedication from the Tonga STEPS field survey team. We owe each of them our sincere appreciation. We also wish to thank all the support staff in the Ministry of Health.

We wish to thank the WHO CLO/Tonga Office and other WHO Offices for their strong technical guidance, excellent coordination and financial support. The financial assistance from the Department of Foreign Affairs and Trade, Australia is also appreciated.

This report is dedicated to the hard work and commitment of all those involved from the inception to the completion of the NCD Risk Factors STEPS survey in Tonga.

The findings and recommendations in this report will guide our actions for preventing and controlling NCDs and improving health for all in our country.



Lord/Mr Tu'i'afitu
Minister for Health
Ministry of Health
Kingdom of Tonga

Dr Siale 'Akau'ola
Chief Executive Officer
Ministry of Health
Kingdom of Tonga

We are pleased to see the 2nd-round Tonga NCD STEPS report has been completed.

The extremely high prevalence of NCDs in Pacific island countries and areas (PICs) accounts for 75% of all deaths and contributes to significant long term illness and disability. Ministers at the 9th Health Ministers' Meeting held in June, 2011 declared a NCD crisis in the Pacific requiring urgent attention and action.

The WHO STEPwise Approach to Surveillance of NCD Risk Factors (STEPS) is the WHO recommended surveillance tool for chronic disease risk factors and chronic disease-specific morbidity and mortality at national level. To date, majority of countries and areas throughout the world have utilized WHO STEPS to conduct national surveys on risk factors and prevalence of NCDs.

Some of the key results of the STEPS survey in 2012, reported in 2014 in the Kingdom of Tonga include the following:

- 26.7% of the population smoked tobacco daily.
- 9.3% of the population was current alcohol drinkers.
- 73.1% of the population consumed less than five combined servings of fruit and vegetables per day.
- 23.7% of the population was with low level of physical activity.
- The prevalence of overweight in the population was 90.7%, the prevalence of obesity was 67.6%.
- The prevalence of hypertension was 27.6%.
- The prevalence of raised blood glucose in the population was 34.4%.
- The prevalence of raised blood cholesterol in the population was 48.8%.
- 98.7% of the population was at high risk or moderate risk of NCDs.

These results clearly document that NCDs are the No. 1 disease in Tonga.

Among the 22 PICs, Tonga is the first PIC having published the 2nd-round national NCD STEPS Report, which marks a milestone as they have provided the scientific, national, updated NCD data. With a specific importance, they have provided comparable data over time, which have shown the improvements and outcome of the NCD intervention in Tonga.

The comparison between 2004 and 2012 STEPS surveys has shown that the improvements in many NCD indicators in Tonga, including prevalence of current tobacco use, current alcohol consumption, fruit and vegetable consumption, low physical activity, overweight, obesity, combined NCD risk factors; among the above improved indicators, the prevalence of low physical activities has been reduced from 43.9% in 2004 to 23.7% in 2012 significantly, the percentage consumed less than five servings of fruit and vegetables per day has been decreased from 92.2% in 2004 to 73.1% in 2012 significantly. Thank for the efforts and contribution from all the stakeholders.

The application of this "Kingdom of Tonga NCD Risk Factors STEPS REPORT (2014)" include updating the national NCD strategy, identifying evidence-based prioritized intervention for NCD prevention and control, providing national data of NCDs for comparison over time and between countries, contributing the scaling up of the implementation of the Millennium Development Goals, and conducting evaluation against the global NCD targets and indicators among others.

Future priorities need to be given to both primary and secondary prevention activities to prevent and control NCDs, including cardiovascular diseases, diabetes, cancer, and their risk factors including tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity.

WHO is honoured to be a critical part of the collaborative efforts among the Tonga Ministry of Health, Australia Department of Foreign Affairs and Trade to complete the Tonga 2nd-round STEPS survey and report.

WHO is proud to collaborate with the Ministry of Health in publishing this new "Kingdom of Tonga NCD Risk Factors STEPS REPORT (2014)", and will continue to work with health authorities, health workers, other key stakeholders and the public to address the issues raised in this report and achieve further improvements.

Dr Liu Yunguo
Director, Pacific Technical Support
Representative, South Pacific
World Health Organization

Dr Li Dan
Country Liaison Officer
for the Kingdom of Tonga
World Health Organization

EXECUTIVE SUMMARY

The WHO STEPS survey for NCD risk factors is a valuable national data resource for Tonga. As a monitoring and surveillance system, the surveys provide an evidence-based and a standardised methodological framework which the government and non-government agencies can use to systematically identify and prioritise non-communicable disease (NCDs) issues for policy and public health interventions.

In 2012, the Government of Tonga conducted its 2nd-round national STEPS survey; this survey repeated the 2004 national STEPS survey (N=849; 15-64 years) but involved a relatively larger sample population (N=2,457; 25-64 years). The key objectives of the 2012 STEPS survey were to:

- document the prevalence and magnitude of major modifiable risk factors for NCDs, including tobacco use, alcohol consumption, fruit and vegetable consumption, physical activity, overweight and obesity, blood pressure, blood glucose and cholesterol levels
- document the prevalence of key NCDs among adults in Tonga
- monitor trends in major NCD risk factors and key NCDs across age groups and gender.

A total of 2,599 aged 25-64 years consented and participated in the survey, the response rate was 88.8%. About 62.1% of women and 37.9% of men took part in the survey. The sampled data has been conducted population weighting, taking reference to the national population structure.

Step 1: Behavioural risk factors

For **tobacco use**, the survey found that among those aged 25-64 years:
- 29.3% had currently smoked any tobacco product (such as cigarettes, cigars or rolled tobacco): 46.4% of men and 13.4% of women
- 26.7% were daily smokers: 42.1% men, 12.4% women
- Smoking uptake among daily smokers started at a mean age 18.6 years: men 17.5 years, women 22.2 years
- Daily smokers had smoked on average 22 years: men 23.9 years, women 15.9 years
- 85.2% of daily smokers smoked manufactured cigarettes.

For **alcohol consumption**, the survey found that among those aged 25-64 years:
- 9.3% drank in the past 30 days (current drinkers): 16.4% of men, 2.8% of women
- More respondents in 25-44 years age group than those in 45-65 age groups drank in the past 30 days: 11.6% and 4.6%, respectively
- 46.9% adults drank 6+ standard drinks on a drinking day: 51% men, 24.2% women.

For **fruit and vegetable intake**, the survey found that among those aged 25-64 years:
- 73.1% consumed less than five combined servings of fruit and/or vegetables per day: 72.4% men, 73.7% women
- Respondents consumed an average of 3.9 servings of fruit and/or vegetables on a typical day: an average of 1.8 serves of fruit, and 2.1 serves of vegetables.

For **physical activity**, the survey found that among those aged 25-64 years:
- 23.7% had low level of total physical activity (<600 METminutes per week): 15.1% of men, 31.7% of women

- Respondents spent an average of 168.8 METminutes per day on total physical activity: 229.6 METminutes for men, 111.8 METminutes for women
- Respondents in 25-44 years age group had higher mean METminutes than those in 45-65 years age group: 180.1 METminutes and 145.1 METminutes, respectively
- Work-related physical activities contributed the largest portion of all total physical activity (mean 106.6 METminutes per day), followed by transport (42.8 METminutes per day) and recreation (19.4 METminutes per day).

Step 2: Physical risk factors

For **body weight and waist circumference**, the survey found that among those aged 25-64 years:

- 90.7% were overweight (BMI ≥25kg/m^2): 87.3% of men, 94% of women
- 67.6% were obese (BMI ≥30kg/m^2): 57.2% men, 77.6% women
- By 25-44 years, 89.9% were overweight (BMI ≥25kg/m^2): 86.5% men, 93.4% women
- Average waist circumferences were: 103.3cm for men, 106.7cm for women; both values exceed the cut-off values where the risk of cardiovascular disease increases (men: 102cm; women: 88cm)
- By 25-44 years, men had a mean waist circumference of 102.2cm, women 105.1cm.

For **hypertension**, the survey found that among those aged 25-64 years:

- 27.6% had hypertension (defined as having SBP≥140 mmHg and/or DBP≥90 mmHg or on medication for raised blood pressure): 28.2% of men, 27.1% of women
- By 25-44 years, 22.1% of men and 14.3% of women had elevated blood pressure
- By 45-64 years, 41.3% of men and 52.9% of women had elevated blood pressure.

Step 3: Biochemical risk factors

For **total blood cholesterol**, the survey found that among those aged 25-64 years:

- 48.8% had raised blood cholesterol (defined as having >5.0 mmol/L or ≥190 mg/dl or currently on medication for raised cholesterol): 49.3% of men, 48.2% of women
- By 25-44 years, 44.1% of men and 38.2% of women had raised blood cholesterol
- By 45-64 years, 60.3% of men and 67.5% of women had raised blood cholesterol.

For **fasting blood glucose**, the survey found that among those aged 25-64 years:

- 34.4% had diabetes (defined as having capillary whole blood value ≥6.1 mmol/L or ≥110mg/dl or currently on medication for diabetes): 29.7% of men, 38.6% of women
- By 25-44 years, 24.5% of men and 29.4% of women had diabetes
- By 45-64 years, 40.7% of men and 56.9% of women had diabetes
- 23.8% had impaired fasting glycaemia (defined as having capillary whole blood value ≥5.6 mmol/L (100 mg/dl) and <6.1 mmol/L (110 mg/dl): 23.9% of men, 23.8% of women
- By 25-44 years, 22.1% of men and 24.7% of women had impaired fasting glycaemia
- By 45-64 years, 27.5% of men and 22.2% of women impaired fasting glycaemia.

Combined NCD risk factors

For **combined risk factors** (current daily smokers, overweight/obese, consumed less than five serves of fruit/vegetables, low total physical activity, raised blood pressure), the survey found that among those aged 25-64 years:

- 57.1% had 3-5 risk factors and were considered as having High Risk of NCDs: 56% men, 60.2% women
- By 25-44 years, 52.8% were at High Risk: 51.7% men, 55.4% women
- By 45-64 years, 66.9% were at High Risk: 64.7% men, 75% women.

Cardiovascular disease risk

- 16.6% of men and 7% of women in the age group 55-69 years had a 10 year cardiovascular risk of more than 30%.

Comparison with Tonga 2004 STEPS Survey

In 2004, Tonga conducted its first STEPS survey also covering three island groups of Tongatapu, Ha'apai and Vava'u. This section presents a snapshot of 2004-2012 trends of major NCD risk factors: tobacco use, alcohol consumption, fruit and vegetable consumption, physical activity, overweight, obesity and combined high risk factors among the same age group 25-64 in the two national STEPS surveys in Tonga.

Trend analysis at a glance

NCD Indicators for 25-64 years	Tonga STEPS Survey in 2004	Tonga STEPS Survey in 2012	2004-2012 Trend
Low physical activity (<600 METminutes per week)	43.9% ±5.9	23.7% ±2.2	Significantly Improved
Fruit and vegetable consumption (Less than 5 serves of fruit/vegetables per day)	92.2% ±2.1	73.1% ±3.0	Significantly Improved
Alcohol consumption (in past 12 months)	8.9% ±5.2	5.7% ±1.3	Improved
Smoke any tobacco product (such as cigarettes, cigars or rolled tobacco)	29.8% ±3.7	29.3% ±2.6	Marginally Improved
Overweight	92.1% ±2.1	90.7 ±1.8	Improved
Obesity	68.7% ±4.2	67.6%±2.9	Marginally Improved
Combined high NCD risk factors (with 3-5 risk factors)	60.7% ±4.4	57.1% ±4.6	Improved

* Both survey data has been weighted

Conclusions

Noncommunicable diseases and associated modifiable risk factors continue to present a major public health issue in Tonga. Encouragingly, the number of Tongans who reported engaging in NCD health risk behaviours decreased between 2004 and 2012. For these promising trends to continue existing public health efforts need to be sustained and expanded, before Tonga can expect to see any further slowing down in the incidence of NCDs. Underlying reasons for NCD health risk behaviours are linked to "unhealthy environments" these require modification through regulations, policies, legislations and changing of social norms. Management of people with NCD risk factors in health services is also a critical component to change the NCD risk profile in Tonga.

Recommendations

These recommendations underscore the importance for the Tonga health systems and partners to promote and strengthen primary and secondary prevention of NCD risk factors and NCD-related diseases through whole of-government and whole-of-society approaches:

- Continue comprehensive tobacco control and anti-smoking programmes, like Tobacco-free workplaces and Tobacco-free Hospital, to reduce smoking rates, in particular ensure comprehensive bans on smoking in all public places and provide cessation support in all health facilities.

- Continue to increase tobacco taxes which have been showing to reduce tobacco prevalence.

- Tobacco control in children, like Tobacco-free Schools, need to be further strengthened since the majority of adult tobacco users begin their tobacco use as teenagers, and the increased price and tax of tobacco products should decrease the prevalence of tobacco use among children effectively.

- Continue comprehensive public health programmes and regulations to reduce harmful alcohol consumption with an emphasis on preventing youth consumption, regulation of retail and marketing and developing public awareness programmes on the linkages between alcohol use and health outcomes. Alcohol consumption is also responsible for violence and road traffic injuries.

- Continue comprehensive healthy eating programmes to increase fruit and vegetable intake, and undertake policies and regulations to reduce excessive consumption of high-fat, high-salt and high-sugar foods – including the ban of sale of sugar sweetened beverages and unhealthy foods inside schools.

- Continue comprehensive and culturally-appropriate programmes to modify environments in order to promote daily physical activity such as walking and cycling.

- Develop a system of community-based, outreached lifestyle support for the management of individuals at risk of NCDs or with diagnosed NCDs focused on families and changing eating and dietary patterns in homes.

- Promote the use of total cardiovascular risk estimation and provide management as per national agreed protocols.

- Equip health workers and health facilities with appropriate technology and drugs and medicines to manage and treat hypertension and diabetes and provide rehabilitation services that are linked to community resources for survivors of heart attacks or strokes and for amputations.

- Develop facility-based targets for reduction of numbers of patients who smoke, consume too much salt, are hypertensive or diabetic. Introduce innovative medical records systems that track individuals with multiple risks for NCDs, through patient-cards or family booklets that are monitored over by the health facility, like hospitals and health centres, over time.

- Conduct intensive analyses and extensive application of the comparable Tonga STEPS data to better understand the associations between behavioural, physical and biochemical risk factors and chronic disease status over time.

- Consider repeat STEPS surveys to further monitor trends at 6-8 year intervals, adding expanded quantitative questions (e.g., salt, sugar, fat intake). These surveillance data would provide evidence of net gains in NCD prevention and control efforts across Tonga and over time.

1. INTRODUCTION

1.1 The burden of NCDs in Tonga is substantial

The four major non-communicable diseases (NCDs), as defined by the World Health Organization (WHO), are diabetes, cardiovascular disease, cancer, respiratory diseases, and diabetes [1]. Once considered as 'diseases of affluence' affecting high-income societies, NCDs have now affected many low- and middle-income countries [2-3]. It is now widely acknowledged that the rising NCDs and their associated morbidity and premature mortality are posing a significant threat to countries achieving sustainable development, and internationally agreed development goals [2,4].

In Tonga, data compiled over the past two decades have indicated the continuing rise of NCDs; for example, in 2002 the prevalence of diabetes among Tongan men and women was reported at 15.1% (Colagiuri et al, 2002), and a 2004 study put the prevalence rate among those aged 25-64 years at 16.4% (WHO, 2012a). In 2010, NCDs accounted for four out of five leading causes of mortality in Tonga, 10% of hospitalisation and 20% of government health spending [5].

The increase in behavioural-related risk factors such as poor diet, harmful alcohol intake, physical inactivity, and smoking are acknowledged as the major contributing factors to the rise in NCDs in Tonga [6]. These are all strongly linked to "unhealthy environments"-- that are best addressed through policies, regulations and legislation.

One of the key behavioural-related risk factors for NCDs, the increase in overweight and obesity rates in pose a significant NCD contributor in Tonga. Among Tongan adults, a 2000 study reported a mean body mass index (BMI) of 32.3kgm^2 among Tongans aged 15+ (Colagiuri et al, 2002). In 2004, overweight/obesity rates for those aged 25-64 years were documented at 33.3kgm^2 (WHO, 2012).

The high prevalence of overweight and obesity is also evident among Tongan adolescents, with 36.0% of boys and 53.8% of girls aged 11-16 years were overweight or obese using the international cut-off points for children and adolescents [7,8].

1.2 Preventing and controlling NCDs in Tonga is a priority

The Government of Tonga led the way as the first Pacific island country to launch a National Strategy to Prevent NCDs (2004-2009); this set the foundation for a range of systems and strategic developments in Tonga some of these are listed below. In 2009, Tonga reaffirmed its commitments to addressing NCDs, by placing NCDs as one of the seven priority areas for the government [6].

In recent years, Tonga has been implementing a range of systems and policy initiatives to comprehensively tackle its NCD challenges, some of these initiatives include:

- Starting from 1 June, 2012, WHO CLO/Tonga Office and Ministry of Health, Tonga initiated to jointly co-organize five (5) high-level multi-sectoral national workshops/meetings on NCD prevention and control in Tonga, covering physical activity and healthy eating, tobacco taxation, Launch of STEPS Report (2012), training and review on the Package of Essential NCD (PEN) intervention, etc. Therefore, the high-level multi-sectoral platform on NCD prevention and control in Tonga has been set up (see the Appendix 4 of the Report).

- In the past 2 years, Tonga has received 2 WHO Awards on NCD prevention and control: (1) On 31 May, 2014, Mr Siosifa Tuitupou Tu'utafaiva, Hon. Minister of Revenue and Customs, Tonga and Lord/Mr Tu'i'afitu, Hon. Minister of Health, Tonga won the 2014 World No Tobacco Day Award Medals and Certificates signed by Dr Margaret Chan, Director General, WHO. Under the leadership and influence of the above two Ministers and their officials and staff, the tobacco tax has been successfully increased by 19% in both imported and local manufactured tobacco in Tonga with effect from 13 Aug., 2013. (2) In 2013, "Healthy Islands Recognition-Best Practice 2013" issued by Dr Shin Young-soo, Regional Director, WHO to the Physical Activity and Sports Project collaborated by Ministry of Internal Affairs, Tonga and Ministry of Health, Tonga.

- MOH, Tonga and WHO conducted the first WHO STEPwise Approach to Surveillance of Risk Factors for NCDs to collect and document the magnitude and patterns of the four major NCD risk factors in 2004 (WHO, 2012).

- Tonga National Strategy to Prevent and Control Non Communicable Diseases (2010-2015) or 'Hala Fononga ki ha Tonga Mo'uilelei', Tonga's PATH (Physical activity, Alcohol harm reduction, Tobacco control and Healthy eating) to Health. The Strategy set a range of measurable NCD risk factor targets to be achieved by 2015.

- The "Healthy Eating and Physical Activities for the School Children in Tonga" Project was collaborated between WHO, MOH and Ministry of Education and Training, Tonga in 2012. The "Community Based Nutrition and Cooking Education for Local Women in the Three Communities in Tongatapu" was collaborated by Ministry of Agriculture and Food, Forests and Fisheries, Tonga, WHO CLO/Tonga Office and MOH, Tonga in 2012.

- In 2009, Tonga Health Promotion Foundation was established; initiated through the Health Promotion Foundation Act 2007 to support community- and policy-based initiatives tackling NCDs. Tonga Health Promotion Foundation has been strengthened since 2014.

- The Tonga Health Systems Support Program (2009-2015), a bilateral program between DFAT, Australia and MOH, Tonga, is dedicated to halting the rising prevalence of NCDs risk factors. It focuses on primary and secondary prevention and takes a comprehensive approach in strengthening community health services, implementing health promotion and behaviour change campaigns and legislative reform.

- Establishment of Advanced Nursing Diploma in the Prevention, Detection and Management of Non-Communicable Diseases. Commenced in 2013, the program graduated its first 20 locally-trained nurses in February 2014 with specialised skills in NCD prevention, detection and management.

1.3 The national context

1.3.1 Geography and population

The Kingdom of Tonga is an island sovereign nation located in the South Pacific Ocean. As a Polynesian archipelago, Tonga's 170 islands (with approximately 718km^2 of land) are scattered over approximately 800,000km (500miles), of which only 36 are inhabited. The

country consists of five main island groups: Tongatapu, Ha'apai, Vava'u, 'Eua and Niuas. Tongan is the official language of the island, but English is also widely spoken.

Based on the 2011 Census, two thirds of the 104,000 inhabitants live on the main island, Tongatapu, particularly around the capital city of Nuku'alofa. Tonga has a young population with approximately 38% of the population being under 15 years of age, and 8% aged 60 years and older. While the official data have Tongans experiencing a relatively high life expectancy at 72.5 years of age, a recent study found that life expectancy in Tonga has plateaued or decline; with rising NCDs and premature mortality being considered as the key driver of this change.

1.3.2 Government, education and the economy

Tonga is a constitutional monarchy, with governance power vested in the Cabinet of Ministers, headed by the Prime Minister. Legislative Assembly Members are elected by popular vote. Local villages or group of villages are governed by town or district officials, respectively.

The education is structured into primary, secondary and post-secondary. Tonga government funds the majority of primary schools and approximately one third of secondary schools; the rest are funded by various [religious] denominations. Tongans have an average of 10 years of schooling, and enjoy a 99% adult literacy rate [10].

The United Nations classifies Tonga in the medium human development category, with Tonga's Human Development Index (HDI; the United Nations composite measure of health, education and income) at 0.710, giving it a ranking of 95 out of 186 countries with comparable data [10]. The HDI of East Asia and the Pacific as a region is 0.683, placing Tonga above the regional average. However, this development gain is potentially under threat unless Tonga reverses the rising incidence of diabetes and cardiovascular diseases.

As a small island nation Tonga has limited human and financial resources. In 2012, Tonga's Gross National Income (GNI) per capita stood at US$4,153 [10]. The country's economy is agricultural-based including fishing and root crops, with very limited export base. Tonga relies substantially on import products, and remittances from Tongans living overseas. Tonga's economic growth and ability to attract foreign investment is limited by high transportation costs and fragile ecosystem and weather.

2. OBJECTIVES

The key objectives of the 2012 Tonga STEPS survey include:

- documenting the prevalence and magnitude of major modifiable risk factors for NCDs, including tobacco use, alcohol consumption, fruit and vegetable consumption, physical activity, overweight and obesity, blood pressure, blood glucose and cholesterol levels;
- documenting the prevalence of key NCDs among adults in Tonga, and;
- monitoring trends in major NCD risk factors and key NCDs across age groups and gender.

This STEPS survey will provide within-country trend data for national policy and health promotion initiative development.

STEPS survey structure

A cross-sectional population-wide survey, Tonga STEPS survey followed the standardised sequential three-step process (Figure 1) recommended by WHO [9, 12]. This is to ensure comparable data within- and between country. Core STEPS data are collected across all three steps, specifically:

- Step 1: A questionnaire-based (interview) survey on tobacco use, alcohol drinking, fruit and vegetable consumption, physical activity, medication use, history of elevated blood pressure or hypertension and diabetes.

- Step 2: Physiological and physical measures of blood pressure, height, weight, and waist circumference.

- Step 3: Biochemical measures of fasting blood glucose and total cholesterol.

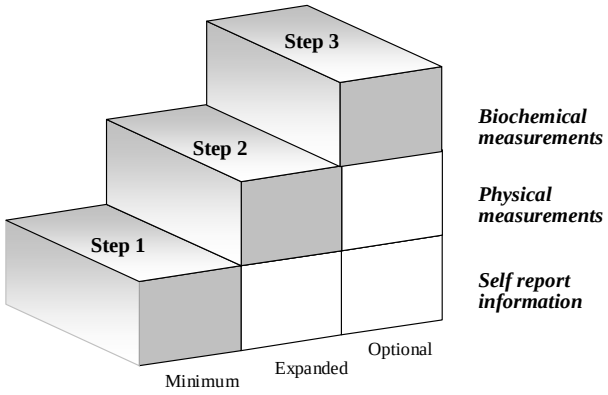


Figure 1 The WHO STEPwise approach to surveillance of NCD Risk Factors

3. METHODOLOGY

3.1 Sampling frame and sample size

While the original sampling protocol covered those aged 15-70 years, due to limited financial support, a decision was made to confine the sampling to those aged 25-64 years only, thus the data for the age group 15-24 was missing.

The survey covered the residents in Tongatapu, Vava'u, Ha'apai, Eua and Niuas. The sampling frame was household lists from the Population Census, supplemented by the additional households information. A total of 337 Census blocks were actually surveyed.

A total of 3,446 were randomly drawn from the sampling frame; 518 were excluded because they either had severe mental health problems, working or living abroad, resulting in the final sample size of 2,928 eligible Tongans invited to take part in the survey.

3.2 Data collection procedures

Tongan field survey staff received 1-week training in the STEPS survey methodology and data collection protocol facilitated by WHO staff experienced in STEPS surveys. At the completion of training, field staff participated in a brief pilot to familiarise with the survey implementation procedures, practice interview techniques and conduct physical measures.

The Tonga 2012 STEPS survey employed a hand-held (Personal Digital Assistants) PDA-based electronic system to collect, verify and manage data collection. Steps 1-2 data collection took place at participating households, and Step 3 data collection took place in dedicated STEPS survey centres. Trained field staff conducted all data, including household interviews, physical and biochemical measurements. Household interviews were conducted in English and/or Tongan, supported by locally-adapted show cards to facilitate questionnaire comprehension.

Signed informed consents to participate in Steps 1, 2 and/or 3 measurements were obtained from all participants; the STEPS survey was conducted from September 2011 to August 2012.

3.2.1 Step 1 - Behavioural risk factors interviews

All consenting participants completed the face-to-face interview in which questions were asked about years of formal education, tobacco use, alcohol consumption, fruit and vegetable consumption, physical activity, medication use, and history of elevated blood pressure or hypertension and diabetes.

3.2.2 Step 2 - Physical measurements

For blood pressure, the OMRON Digital Automatic Blood Pressure Monitor was used to measure resting blood pressure three times; the first reading followed by two measurements taken with 2-3 minute intervals, with the third reading recorded and used in the analysis.

The Seca Leicester Height Measure was used to measure height and measurement recorded to the exact centimetre, and the Siltec PS500L used to measure weight to the exact kilogram. Participants were measured wearing only light clothing and without shoes. Constant tension tape was used to measure waist circumference and recorded to the nearest 0.1cm. Height, weight and waist circumference were measured once. Pregnant female pregnant participants did not have their waist circumference, height and weight measured. Step 2 measurements followed Step 1 interviews at the respondents' residence.

3.2.3 Step 3 - Biochemical measurements

This Step assessed respondents' fasting blood glucose and fasting total cholesterol level by drawing capillary whole blood using finger prick method. Participants who fasted at least 12 hours before their clinic appointment in the morning had their capillary blood samples drawn. Respondents with diagnosed diabetes were asked to take their tablets and/or insulin after the measurements were completed. Step 3 measurements took place at dedicated STEPS survey clinics.

3.3 Data management and statistical analysis

The data of this STEPS survey were entered and stored on the PDA by the country staff in Tonga. WHO Office in Geneva conducted data cleaning and weighting and produced the data book. Data were weighted to account for the probability of selection and these weights were then adjusted to correct for over- or under- representation of each of the age-sex groups included in the results. All analyses were performed using Epi Info.

Analyses for this report were descriptive, comprising of frequencies, means and cross tabulations. Frequencies were calculated for categorical variables, and means were computed for continuous variables. For both frequency and mean estimates, 95% confidence intervals were reported by two 20-year age groups (25-44 years and 45-64 years) and by gender.

To examine trends over time, tobacco use, alcohol consumption, fruit and vegetable intake, and physical activity outcomes from the Tonga STEPS 2004 were re-analysed by two 20-year age groups to facilitate comparison with the Tonga STEPS 2012 survey. These comparative data are presented in Section 5 of this report.

4. RESULTS

4.1 Demographic characteristics of survey population

The demographic characteristics of those who took part in the STEPS survey are presented in this section. A total of 2,599 individuals participated (response rate of 88.8%), of these 2,490 individuals took part in Steps 1, 2 and 3; 49 took part in Step 1 only, and 60 took part in Steps 2 and 3 only.

Table 1 shows that across a higher proportion of women than men participated in the survey (62.1% and 37.9%, respectively). This pattern was similar across the two age groups.

The study population comprised a slightly higher proportion of participants aged 25-44 years (57.1%), compared to 42.9% who were in the 45-64 age group.

Table 1 Demographic description of study population

Age group and sex of respondents						
Age Group (years)	**Men**		**Women**		**Both Sexes**	
	N	%	n	%	n	%
25-44	520	37.0	884	63.0	1404	57.1
45-64	410	38.9	643	61.1	1053	42.9
25-64	**930**	**37.9**	**1527**	**62.1**	**2457**	**100.0**

Both men and women and age groups reported similar mean years of education (men: 11.2 years; women: 11.0 years). Overall, the older age group (45-64 years) reported relatively lower mean years of education (10.4 years) than the younger age group (25-44 years, 11.5 years).

Table 2 Mean number of years of education by gender and age group

Mean number of years of education						
Age Group (years)	Men		Women		Both Sexes	
	n	Mean	n	Mean	n	Mean
25-44	519	11.6	881	11.5	1400	11.5
45-64	409	10.7	641	10.3	1050	10.4
25-64	**928**	**11.2**	**1522**	**11.0**	**2450**	**11.0**

4.2 Tobacco use

Survey participants were asked a number of questions relating to tobacco use, and based on their responses were classified into the following smoking status:

- Current smokers – those who currently smoke any tobacco product (such as cigarettes, cigars or rolled tobacco).
- Daily smokers – those who smoke any tobacco product every day.
- Non-daily smokers – those current smokers who do not smoke on a daily basis.

Approximately 29.3% (±2.6) of those surveyed were classified as current smokers, with significantly more men (46.4% ±4.0) than women (13.4% ±2.4) being current smokers at the time of the survey (Table 3). Although the proportion of male current smokers in the older age group (45-64 years) was slightly higher (47.8% ±5.5) than the younger age group (25-44 years, 45.8% ±5.1), this difference was not statistically significant.

Among women, 15.6% ±2.9 of women in the 25-44 years were current smokers, compared to 9.0% ±3.1 in the 45-64 years age group.

Table 3 Percentage of current smokers in the study population

Percentage of current smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% Current smoker	95% CI	N	% Current smoker	95% CI	n	% Current smoker	95% CI
25-44	518	45.8	±5.1	881	15.6	±2.9	1399	30.3	±3.1
45-64	409	47.8	±5.5	640	9.0	±3.1	1049	27.3	±3.8
25-64	**927**	**46.4**	**±4.0**	**1521**	**13.4**	**±2.4**	**2448**	**29.3**	**±2.6**

42.1% (±3.9) of all men were smoking on a daily basis (Table 4). Men aged 45-64 years reported slightly higher proportion of daily smoking (44.6% ±5.3) than men aged 25-44 years (40.9% ±4.8).

Of the Tongan men, 39.0% (±4.0) never smoked, while 14.6% (±3.4) were former smokers (Table 4).

Table 4 Current smoking status among men in the study population by age group

Smoking status									
	Men								
Age Group (years)	n	Current smoker				Non-smokers			
		% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
25-44	518	40.9	±4.8	4.9	±2.3	14.6	±4.7	39.7	±5.1
45-64	409	44.6	±5.3	3.2	±1.9	14.6	±3.8	37.6	±4.9
25-64	927	42.1	±3.9	4.3	±1.6	14.6	±3.4	39.0	±4.0

12.4% (±2.2) of women smoked on a daily basis, with 14.5% (±2.8) in the younger age group smoking daily compared to a significantly lower daily smoking rate of 8.0% (±3.0) in the older age group 45-64 years.

78.5% (±2.9) of women reported that they never smoked, while 8.0% (±1.8) were defined as former smokers.

Table 5 Current smoking status among women in the study population by age group

Smoking status									
	Women								
Age Group (years)	n	Current smoker				Non-smokers			
		% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
25-44	881	14.5	±2.8	1.1	±0.7	9.1	±2.4	75.3	±3.5
45-64	640	8.0	±3.0	1.0	±0.8	5.9	±2.6	85.1	±3.7
25-64	**1521**	**12.4**	**±2.2**	**1.0**	**±0.6**	**8.0**	**±1.8**	**78.5**	**±2.9**

Table 6 presents the distributions of current smokers and non-smokers for men and women combined. 26.7% (±2.5) were smoking daily, with the daily smoking rates not markedly different between younger and older age groups. 59.5% (±2.7) reported that they never smoked, with the older age group 45-64 years reporting the highest proportion of never smokers (62.7% ±3.7) compared to the younger age group 25-44 years (58.0% ±3.3).

Table 6 Current smoking status among both sexes in the study population by age group

Smoking status									
	Both Sexes								
Age Group (years)	n	Current smoker				Non-smokers			
		% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
25-44	1399	27.4	±3.0	2.9	±1.2	11.7	±2.6	58.0	±3.3
45-64	1049	25.3	±3.6	2.0	±1.0	10.0	±2.3	62.7	±3.7
25-64	**2448**	**26.7**	**±2.5**	**2.6**	**±0.9**	**11.2**	**±1.9**	**59.5**	**±2.7**

Table 7 shows that among daily smokers in the survey population, the mean age Tongans started smoking was 18.6 (±0.5) years old, with those in the younger age group reporting smoking uptake at a slightly younger age (18.4 years ±0.7) than their older counterparts (45-64 age group: 19.0 years ±0.9). Tongan men were significantly younger than women when they first started smoking (men: 17.5 years ±0.6; women: 22.2% ±1.2). For women, younger age group reported a lower mean age of smoking uptake than the older age group (25-44 years: 21.1 years ±1.3; 45-64 years: 26.1 years ±2.1). For men, the mean starting age was similar across both age groups.

Table 7 Mean age started smoking among current daily smokers

Mean age started smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean age	95% CI	n	Mean age	95% CI	n	Mean age	95% CI
25-44	212	17.5	±0.8	123	21.1	±1.3	335	18.4	±0.7
45-64	176	17.6	±0.9	46	26.1	±2.1	222	19.0	±0.9
25-64	**388**	**17.5**	**±0.6**	**169**	**22.2**	**±1.2**	**557**	**18.6**	**±0.5**

Table 8 shows that current daily smokers had been smoking an average of 22.0 ±1.1 years. Men reported a significantly higher mean duration of smoking than women (men: 23.9 ±1.3 years; women: 15.9 ±1.7 years). As expected, both older men and women reported longer smoking duration than their younger counterparts.

Table 8 Mean number of years of smoking among current daily smokers

Mean duration of smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean age	95% CI	n	Mean age	95% CI	n	Mean age	95% CI
25-44	212	18.2	±1.2	123	12.8	±1.2	335	16.8	±0.9
45-64	176	35.2	±1.3	46	27.2	±3.7	222	33.8	±1.3
25-64	**388**	**23.9**	**±1.3**	**169**	**15.9**	**±1.7**	**557**	**22.0**	**±1.1**

Table 9 shows that manufactured cigarettes were smoked by the majority of Tongan daily smokers: 85.2% ±3.3. A higher proportion among women (95.9% ±3.1) smoked manufactured cigarettes than men (81.8% ±4.2). Among men, a relatively higher proportion of younger men reported smoking manufactured cigarettes than older men (25-44 years: 86.3% ±4.8; 45-64 years: 72.7% ±7.9).

Table 9 Percentage of current daily smokers who smoke manufactured cigarettes

Manufactured cigarette smokers among daily smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI
25-44	209	86.3	±4.8	124	95.9	±3.5	333	88.9	±3.6
45-64	171	72.7	±7.9	46	95.7	±5.3	217	76.7	±6.8
25-64	**380**	**81.8**	**±4.2**	**170**	**95.9**	**±3.1**	**550**	**85.2**	**±3.3**

Tonga's 2012 STEPS survey data and the 2010 Global Youth Tobacco Survey (GYTS) survey data have been compared. This comparison provides important evidence for measuring progress towards the tobacco control in Tonga and the global target -- a 30% reduction of tobacco use prevalence by 2025.

The Tonga 2010 GYTS survey shows that the current cigarette smoking prevalence for students aged 13-15 as 37.5% for boys, and 18.9% for girls (Table 10).

Table 10 Percentage of tobacco use among youth ages 13-15
Tonga Global Youth Tobacco Survey 2010 (n = sample size)

Percentage of current cigarette smokers									
Age Group (years)	Boys			Girls			Both Sexes		
	Sample size	% Current cigarette smoker	95% CI	Sample size	% Current cigarette smoker	95% CI	Sample size	% Current cigarette smoker	95% CI
13	172	34.0 (n=50)	10.8-47.2	227	25.6 (n=41)	12.8-38.4	404	29.1 (n=93)	19.6-37.6
14	240	43.2 (n=84)	24.3-62.1	303	14.5 (n=42)	6.4-22.7	554	28.6 (n=130)	17.1-40.1
15	210	33.1 (n=75)	24.8-41.4	295	17.8 (n=53)	12.9-22.7	507	23.2 (n=129)	18.2-28.3
13-15	622	**37.5** (n=209)	27.4-47.7	825	**18.9** (n=136)	17.0-20.8	1465	**27.1** (n=352)	21.0-33.2

Table 11 shows a comparison between current tobacco use among youth with current any tobacco smoking among adults in Tonga. This comparison indicates the prevalence of any tobacco use among Tongan boys that is nearly as high as any tobacco smoking among men; for girls the prevalence of any tobacco use is more than twice the prevalence of any tobacco smoking among women.

Table 11 Current tobacco use comparison between the 2010 GYTS and 2012 STEP surveys in Tonga

Comparison of Current Tobacco Use (%) between 2010 Children GYTS Survey and 2012 Adult STEPS Survey in Tonga					
Boys in GYTS	Men in STEPS	Girls in GYTS	Women in STEPS	Both Sex in GYTS	Both Sex in STEPS
44.9	46.4	28.0	13.4	35.7	29.3

A focus on addressing the high smoking rates among Tongan youth will be important in reducing future smoking prevalence among Tonga adults. To date, three Tobacco Free Schools have been launched by WHO and MOH in Tonga. Tobacco Free School Initiative needs to be further developed in Tonga.

The tobacco tax in Tonga has been successfully increased by 19% since 13 Aug., 2013. Increased price of tobacco products should be one of the most effective strategies for preventing initiation of tobacco use among youth.

4.3 Alcohol consumption

To examine distributions of alcohol consumption, survey respondents were asked if they ever consumed alcohol, and the frequency and quantity of alcohol consumed. Based on their responses, alcohol consumption status was classified into: current drinkers or those who have consumed an alcoholic drink in the last 30 days; those who had drank alcohol in the past 12 months, but not defined current drinkers; those who had abstained from drinking in the past 12 months, and; those who were lifetime abstainers.

Overall, 9.3% (±1.7) of survey respondents reported having consumed alcohol in the past 30 days (Table 14). There was a significant gender difference, with 16.4% (±3.2) of men reported having consumed alcohol in the past 30 days compared with just 2.8% (±1.1) of women (Tables 12 and 13).

For both men and women, the highest proportions of current drinkers occurred in the younger age group 25-44 years (men 19.7% ±4.3; women: 3.9% ±1.6) compared to the older age group 45-65 years (men: 9.3% ±3.3; women: 0.5% ±0.6).

Conversely, 72.8% ±2.7 of survey respondents were classified as lifetime abstainers, with the majority of Tongan women (86.5% ±2.5) and just over half of Tongan men (58.1% ±4.6) not having ever consumed alcohol.

Table 12 Percentage of alcohol consumption among men during the past 12 months by age group

Alcohol consumption status									
	Men								
Age Group (years)	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-44	519	19.7	±4.3	10.1	±3.1	15.0	±4.3	55.3	±5.9
45-64	410	9.3	±3.3	5.7	±2.6	21.0	±4.4	64.1	±5.5
25-64	**929**	**16.4**	**±3.2**	**8.7**	**±2.3**	**16.9**	**±3.3**	**58.1**	**±4.6**

Table 13 Percentage of alcohol consumption among women during the past 12 months by age group

Alcohol consumption status									
	Women								
Age Group (years)	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-44	881	3.9	±1.6	3.5	±1.7	8.6	±2.2	84.0	±3.3
45-64	641	0.5	±0.6	1.5	±1.4	6.5	±2.7	91.5	±3.1
25-64	**1522**	**2.8**	**±1.1**	**2.8**	**±1.3**	**7.9**	**±1.8**	**86.5**	**±2.5**

Table 14 Percentage of alcohol consumption among both sexes during the past 12 months by age group

Alcohol consumption status									
	Both Sexes								
Age Group (years)	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-44	1400	11.6	±2.3	6.7	±1.7	11.7	±2.3	70.0	±3.5
45-64	1051	4.6	±1.6	3.5	±1.4	13.3	±2.7	78.6	±3.5
25-64	**2451**	**9.3**	**±1.7**	**5.7**	**±1.3**	**12.2**	**±1.8**	**72.8**	**±2.7**

Tables 15-16 present results on the frequency and quantity of standard drinks consumed in the last 7 days among current drinkers. Among male current drinkers (last 30 days), nearly 1 in 5 Tongan men reported drinking 20+ drinks in the 7 days preceding the survey (19.1% ±8.8). Among women, 17.5% ±17.9 reported drinking 15+ drinks. These findings need to be interpreted with caution due to the small sample sizes.

Table 15 Frequency and quantity of drinks for men consumed in the last 7 days by current (last 30 days) drinker, grouped into three categories

Frequency and quantity of drinks consumed in the past 7 days							
	Men						
Age Group (years)	N	% Drank on 4+ days	95% CI	% 5+ drinks on any day	95% CI	% 20+ drinks in 7 days	95% CI
25-44	87	4.4	±5.8	66.3	±12.8	21.6	±10.4
45-64	37	25.6	±18.4	41.5	±20.2	8.9	±9.6
25-64	**124**	**8.5**	**±6.2**	**61.5**	**±11.1**	**19.1**	**±8.8**

Table 16 Frequency and quantity of drinks for women consumed in the last 7 days by current (last 30 days) drinker, grouped into three categories

Frequency and quantity of drinks consumed in the past 7 days							
	Women						
Age Group (years)	n	% Drank on 4+ days	95% CI	% 4+ drinks on any day	95% CI	% 15+ drinks in 7 days	95% CI
25-44	31	4.6	±5.9	38.9	±20.4	17.2	±18.9
45-64	3	0.0	----	21.7	±43.4	21.7	±43.4
25-64	**34**	**4.3**	**±5.5**	**37.8**	**±19.5**	**17.5**	**±17.9**

Overall, the mean number of standard drinks consumed on a drinking day by current drinkers in Tonga was 7.7 ±1.7 drinks (Table 19); men consumed an average of 8.5 ±2.0 (Table 17), and women an average of 3.6 ±0.9 drinks (Table 18).

Table 17 indicates that among male current drinkers, about half (51.0% ±11.0) reported drinking 6 or more drinks on a drinking day, compared to 12.9% ±6.8 drinking 4-5 standard drinks, 21% ±7.6 drinking 2-3 standard drinks, and 15.1% ±8.6 drinking just 1 drink on a drinking day. While no women aged 45-65 reported drinking 6 or more standard drinks, one quarter (25.7% ±18.6) of women aged 25-44 years reported drinking this amount. However, a meaningful examination of these findings is difficult due to the very small numbers of survey respondents responding to these measures.

Table 17 Number of drinks per day among men who are current drinkers by age group

Number of standard drinks consumed on a drinking day											
	Men										
Age Group (years)	n	% 1 drink	95% CI	% 2-3 drinks	95% CI	% 4-5 drinks	95% CI	% 6+ drinks	95% CI	Mean # of standard drinks	95% CI
25-44	94	16.8	±10.3	19.0	±8.7	13.4	±7.6	50.9	±12.8	8.8	±2.4
45-64	38	7.8	±7.8	29.7	±16.8	10.9	±15.1	51.6	±19.1	7.2	±2.0
25-64	**132**	**15.1**	**±8.6**	**21.0**	**±7.6**	**12.9**	**±6.8**	**51.0**	**±11.0**	**8.5**	**±2.0**

Table 18 Number of drinks per day among women who are current drinkers by age group

Number of standard drinks consumed on a drinking day											
	Women										
Age Group (years)	n	% 1 drink	95% CI	% 2-3 drinks	95% CI	% 4-5 drinks	95% CI	% 6+ drinks	95% CI	Mean # of standard drinks	95% CI
25-44	32	25.7	±15.5	42.8	±20.8	5.8	±8.3	25.7	±18.6	3.6	±1.0
45-64	3	0.0	----	78.3	±43.3	21.7	±43.3	0.0	----	3.4	±0.9
25-64	**35**	**24.1**	**±14.6**	**44.9**	**±19.9**	**6.7**	**±8.2**	**24.2**	**±17.6**	**3.6**	**±0.9**

Table 19 Number of drinks per day among both sexes who are current drinkers by age group

Number of standard drinks consumed on a drinking day											
	Both Sexes										
Age Group (years)	n	% 1 drink	95% CI	% 2-3 drinks	95% CI	% 4-5 drinks	95% CI	% 6+ drinks	95% CI	Mean # of standard drinks	95% CI
25-44	126	18.4	±9.4	23.1	±8.9	12.1	±6.5	46.5	±11.8	7.9	±2.1
45-64	41	7.3	±7.4	32.4	±16.5	11.5	±14.4	48.7	±18.3	7.0	±1.9
25-64	**167**	**16.5**	**±8.0**	**24.7**	**±7.6**	**12.0**	**±5.8**	**46.9**	**±10.4**	**7.7**	**±1.7**

4.4 Fruit and vegetable intake

On the whole reported mean number of days fruit consumed was similar across age groups (Table 20).

Table 20 Mean number of days in a week that fruit are consumed by gender and age group

Mean number of days fruit consumed in a typical week									
	Men			Women			Both Sexes		
Age Group (years)	n	Mean number of days	95% CI	n	Mean number of days	95% CI	n	Mean number of days	95% CI
25-44	515	3.3	±0.3	877	3.4	±0.2	1392	3.3	±0.2
45-64	408	3.3	±0.3	635	3.4	±0.2	1043	3.4	±0.2
25-64	**923**	**3.3**	**±0.2**	**1512**	**3.4**	**±0.2**	**2435**	**3.4**	**±0.2**

For vegetable consumption, women reported marginally higher mean number of days consuming vegetables in a typical week than men (women: 4.4 days ±0.2; men: 3.9 days ±0.2) (Table 21). Table 21 shows that both genders reported a mean 4.2 ±0.1 days of vegetables consumed in a typical week. Each of the age groups reported the same mean days of vegetable consumption in a typical week (4.2 days ±0.2).

Table 21 Mean number of days in a week that vegetables are consumed by gender and age group

Mean number of days vegetables consumed in a typical week									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of days	95% CI	n	Mean number of days	95% CI	n	Mean number of days	95% CI
25-44	515	3.9	±0.3	876	4.4	±0.2	1391	4.2	±0.2
45-64	406	3.9	±0.2	633	4.4	±0.2	1039	4.2	±0.2
25-64	**921**	**3.9**	**±0.2**	**1509**	**4.4**	**±0.2**	**2430**	**4.2**	**±0.1**

On the day when fruits were consumed, survey respondents reported consuming an average of 1.8 (±0.2) serves of fruits, with men reporting slightly higher mean servings than women (men: 2.0 ±0.3; women: 1.7 ±0.1) although this difference was not statistically significant. Reported servings of fruits remained constant from younger to older age group (Table 22).

Table 22 Mean number of servings of fruits consumed on a day when fruits were eaten

Mean number of servings of fruit on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	515	2.0	±0.3	876	1.7	±0.2	1391	1.8	±0.2
45-64	408	2.0	±0.3	633	1.7	±0.2	1041	1.8	±0.2
25-64	**923**	**2.0**	**±0.3**	**1509**	**1.7**	**±0.1**	**2432**	**1.8**	**±0.2**

On a day when vegetables were consumed, respondents reported consuming an average of 2.1 (±0.1) serves of vegetables (Table 23). Women reported consuming marginally more serves of vegetables but this difference did not reach statistical significance (women: 2.2 ±0.2; men: 2.0 ±0.2). Both younger and older age groups reported the same mean number of servings of vegetables per day.

Table 23 Mean number of servings of vegetables consumed on a day when vegetables were eaten

Mean number of servings of vegetables on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	515	2.0	±0.3	876	2.1	±0.2	1391	2.1	±0.2
45-64	406	2.0	±0.3	632	2.2	±0.3	1038	2.1	±0.2
25-64	**921**	**2.0**	**±0.2**	**1508**	**2.2**	**±0.2**	**2429**	**2.1**	**±0.1**

Table 24 presents results for the mean intake of fruit and vegetables servings combined per day on a typical week. Overall, survey respondents reported an average of 3.9 ±0.2 combined servings of fruit and vegetables, with no difference observed between men and women. The mean number of servings reported was also similar across both age groups.

Table 24 Mean number of combined servings of fruit and vegetables consumed per day of the week

Mean number of servings of fruit and/or vegetables on average per day									
Age Group (years)	Men			Women			Both Sexes		
	N	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	516	4.0	±0.5	879	3.9	±0.4	1395	3.9	±0.3
45-64	408	4.0	±0.5	635	3.9	±0.5	1043	4.0	±0.3
25-64	**924**	**4.0**	**±0.4**	**1514**	**3.9**	**±0.3**	**2438**	**3.9**	**±0.2**

Proportions of those who reported consuming less than the recommended five servings of fruit and/or vegetables per day of the week are summarised in Table 25. Overall, 73.1% (±3.0) of Tongans consumed less than the recommended fruit and/or vegetables servings per day in a typical week; there was no difference between men and women (72.4% ±4.5, 73.7% ±3.1, respectively).

Table 25 Percentage who consumed less than five combined servings of fruit and/or vegetables per day of the week

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	n	% < five servings per day	95% CI
25-44	516	73.1	±5.5	879	72.9	±3.9	1395	73.0	±3.5
45-64	408	71.1	±5.8	635	75.3	±4.6	1043	73.3	±3.7
25-64	**924**	**72.4**	**±4.5**	**1514**	**73.7**	**±3.1**	**2438**	**73.1**	**±3.0**

4.5 Physical activity

4.5.1 Measurements

Physical activity was asked using the Global Physical Activity Questionnaire (GPAQ) [11]. Respondents were asked how often (days or sessions) and how long (minutes or hours) they participated in physical activity in a typical week defined as part of: work, (active) transport and leisure, commonly referred to as the three physical activity domains. For work and leisure, respondents were asked how many days per week and how many hours/minutes per day they participate in moderate and vigorous intensity activities. For

transport, respondents were asked how often and how long they either walk and/or cycle to and from places.

4.5.2 Analysis

The three physical activity domains were first examined together and then separately and respectively, reported as either total physical activity (combining work, recreation and transport) or in three separate domains. For each domain, three activity levels were defined: low, moderate, and high (see below definition). In each domain, the total time participants spent in an activity per 5 day week was computed by multiplying the number of days by the duration of the activity.

To account for the different levels of energy expenditure required for the activities (i.e. low, moderate or high), the daily duration of activity was converted into METminutes per day. The term MET (metabolic equivalent) is used as an indication of the intensity of physical activity. A MET is the ratio of the associated metabolic rate for a specific activity divided by the resting metabolic rate. The energy cost of sitting is equivalent to a resting metabolic rate of 1 MET.

In this report and for consistency across all STEPS reports, the following MET values were allocated to the three physical activity domains (Armstrong & Bull, 2006; WHO, 2005b):

- Moderate physical activity (work and leisure domain) = 4.0 METS
- High physical activity (work and leisure domain) = 8.0 METS
- Travel-related walking/cycling = 4.0 METS

The following levels of activity in terms of METminutes were:

- Low activity: <600 METminutes per week
- Moderate activity: 600-1500 METminutes per week
- High activity: >1500 METminutes per week

4.5.3 Levels of physical activity

To examine total activity levels, physical activity done as part of work, transport and leisure was combined and categorised into low (<600 METminutes per week), moderate (600-1500 METminutes per week) and high activity levels (>1500 METminutes per week) for Tongan men are summarised in Table 26. Approximately, 15.1% ±2.8 of men reported a low level of total physical activity. Moderate physical activity was reported by 15.2% ±2.8. High level of physical was reported by 69.7% ±3.8, with the highest proportion reported by those aged 25-44 years (74.0% ±4.6) but declined to 60.1% ±6.5 in the older age group 45-64 years.

Table 26 Categories of overall physical activity among men by age group

Level of total physical activity							
Age Group (years)	Men						
	n	% Low	95% CI	% Moderate	95% CI	% High	95% CI
25-44	515	15.0	±3.5	11.0	±3.4	74.0	±4.6
45-64	404	15.3	±4.3	24.7	±5.2	60.1	±6.5
25-64	**919**	**15.1**	**±2.8**	**15.2**	**±2.8**	**69.7**	**±3.8**

In contrast to men, Tongan women demonstrated different levels and patterns of total physical activity Table 27). There were similar proportions of women reporting engaging in low (31.7% ±3.8), moderate (32.1% ±3.1) and high (36.3% ±3.5) total physical activity. Within each category of total physical activity, there were no marked differences in the proportions observed between age groups. For example, high total physical activity was reported by 37.4% ±4.0 of those in 25-44 years age group compared to 34.0% ±5.6 of those in 45-65 years age group.

Table 27 Categories of overall physical activity among women by age group

Level of total physical activity							
Age Group (years)	Women						
	n	% Low	95% CI	% Moderate	95% CI	% High	95% CI
25-44	867	30.8	±3.8	31.9	±3.8	37.4	±4.0
45-64	636	33.5	±6.1	32.5	±5.5	34.0	±5.6
25-64	**1503**	**31.7**	**±3.8**	**32.1**	**±3.1**	**36.3**	**±3.5**

For the entire survey sample, 23.7% ±2.2 were classified as having low level of total physical activity, with minimal difference between the two age groups (Table 28). Moderate physical activity was reported by 23.9% ±2.3 and high level of physical activity reported by 52.4% ±2.7 of the sample. Overall, younger Tongans aged 25-44 years were more likely to engage in high level of total physical activity (55.4% ±3.4), but this proportion generally declined to 46.2% ±4.5 by age 45-64 years.

Table 28 Categories of overall physical activity among both sexes by age group

Level of total physical activity							
Age Group (years)	Both Sexes						
	n	% Low	95% CI	% Moderate	95% CI	% High	95% CI
25-44	1382	23.0	±2.4	21.6	±2.7	55.4	±3.4
45-64	1040	25.0	±4.0	28.8	±3.9	46.2	±4.5
25-64	**2422**	**23.7**	**±2.2**	**23.9**	**±2.3**	**52.4**	**±2.7**

The mean minutes (defined as METminutes) of engaging in total physical activity per average day across all three domains by gender separately and combined are presented in Table 29. Overall, survey respondents reported spending an average of 168.8 ±11.2 METminutes per day in total physical activity. Tongan men reported a significant higher mean minutes than women (men: 229.6 ±17.2 METminutes per day; women 111.8 ±9.4 METminutes per day). For both men and women, the average time spent in total physical activity was highest in the 25-44 years age group and declined thereafter in the 45-65 years age group.

Table 29 Level of Total physical activity (mean MET minutes per day) by gender and age group

Mean minutes of total physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	n	Mean minutes	95% CI
25-44	515	245.8	±23.1	867	116.8	±11.2	1382	180.1	±14.1
45-64	404	194.1	±22.7	636	101.8	±13.8	1040	145.1	±13.9
25-64	**919**	**229.6**	**±17.2**	**1503**	**111.8**	**±9.4**	**2422**	**168.8**	**±11.2**

Tables 30-32 report on mean METminutes per day respondents engaged in work, transport and recreation-related physical activity, respectively. Across both genders, engaging in work-related physical activity accounted for the largest portion (106.6 ±8.7 METminutes/day) of all physical activity followed by transport (42.8 ±3.5) and recreation (19.4 ±2.9).

Table 30 clearly indicates that men spent significantly more time on work-related physical activities than women (144.1 ±13.6 METminutes/day and 71.5 ±8.5 METminutes/day, respectively). Across all age groups men also reported engaging in more METminutes of work-related physical activity than women.

Table 30 Level of Work-related physical activity (mean MET minutes per day) by gender and age group

Mean minutes of work-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	n	Mean minutes	95% CI
25-44	515	154.3	±18.5	867	74.8	±10.2	1382	113.8	±11.3
45-64	404	121.7	±17.0	636	64.9	±13.0	1040	91.5	±11.1
25-64	**919**	**144.1**	**±13.6**	**1503**	**71.5**	**±8.5**	**2422**	**106.6**	**±8.7**

For transport-related physical activities, men spent an average of 54.2 ±5.6 METminutes/day compared to women who reported 32.1 ±3.2 METminutes/day, a statistically significant gender difference. Mean minutes spent in transported-related physical activities did not differ significantly between younger and older age groups.

Table 31 Level of Transport-related physical activity (mean MET minutes per day) by gender and age group

Mean minutes of transport-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	n	Mean minutes	95% CI
25-44	515	55.6	±7.3	867	32.4	±3.8	1382	43.7	±4.5
45-64	404	51.1	±7.7	636	31.7	±5.3	1040	40.8	±4.8
25-64	**919**	**54.2**	**±5.6**	**1503**	**32.1**	**±3.2**	**2422**	**42.8**	**±3.5**

Table 32 shows that on average men spent significantly higher amount of time on recreation-related physical activities than women, about 31.4 ±5.3 METminutes/day for men compared to 8.2 ±1.7 METminutes/day for women. While men generally engaged in more METminutes/day of recreation-related physical activity than women in both age groups, men nonetheless experienced a decline as they aged: from 36.0 ±7.0 METminutes/day in 25-44 age group to 21.3 ±7.2 METminutes/day in 45-64 age group.

Table 32 Level of Recreation-related physical activity (mean MET minutes per day) by gender and age group

Mean minutes of recreation-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	N	Mean minutes	95% CI	**n**	**Mean minutes**	**95% CI**
25-44	515	36.0	±7.0	867	9.7	±2.4	1382	22.6	±3.9
45-64	404	21.3	±7.2	636	5.1	±1.8	1040	12.7	±3.9
25-64	**919**	**31.4**	**±5.3**	**1503**	**8.2**	**±1.7**	**2422**	**19.4**	**±2.9**

4.6 Overweight and obesity

4.6.1 Height and weight

The height and weight of each participant was measured following the standardised STEPS protocol as described in Section 3. The body mass index (BMI) of each participant was then computed by dividing the weight (kilograms) by the square of the height (metres^2), and the BMI risk categories defined as follows:

Underweight	BMI < 18.5
Normal weight	18.5 ≤ BMI ≤ 24.9
Overweight	BMI ≥ 25.0
Obese	BMI ≥ 30.0

Tables 33 and 34 show that Tongan men were significantly taller (177.9 cm ±0.7) than women (167.0cm ±0.7) and men were slightly heavier (99.4kg ±1.8) than women (97.7kg±1.2).

Table 33 Mean height by gender and age group

Mean height (cm)						
Age Group (years)	Men			Women		
	n	Mean	95% CI	n	Mean	95% CI
25-44	491	178.6	±0.9	848	167.6	±0.9
45-64	389	176.5	±0.7	618	165.8	±0.7
25-64	**880**	**177.9**	**±0.7**	**1466**	**167.0**	**±0.7**

Table 34 Mean weight by gender and age group

Mean weight (kg)						
Age Group (years)	Men			Women		
	n	Mean	95% CI	n	Mean	95% CI
25-44	491	100.0	±2.2	791	97.3	±1.5
45-64	388	98.1	±2.4	616	98.5	±2.3
25-64	**879**	**99.4**	**±1.8**	**1407**	**97.7**	**±1.2**

4.6.2 Body Mass Index categories

Table 35 presents the mean BMI for men and women, and combined. The overall mean BMI was 33.1kg/m^2 ±0.4; women had a higher mean BMI (34.8kg/m^2 ±0.4) than men (31.3kg/m^2 ±0.5) and this pattern was observed across younger and older age groups.

Table 35 Mean body mass index (kg/m^2) by gender and age group

Mean BMI (kg/m^2)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	489	31.2	±0.6	786	34.5	±0.5	1275	32.8	±0.4
45-64	388	31.5	±0.7	610	35.5	±0.8	998	33.6	±0.6
25-64	**877**	**31.3**	**±0.5**	**1396**	**34.8**	**±0.4**	**2273**	**33.1**	**±0.4**

Tables 36-38 summarise the distributions of three BMI classifications: underweight, normal and overweight/obese for men, women and both genders, respectively. Among men, 87.3% ±3.0 were classified as overweight; among women, 94.0% ±1.7 were classified as overweight.

Table 36 BMI classifications among men by age group

BMI classifications							
Age Group (years)	Men						
	n	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% Over-weight ≥25.0	95% CI
25-44	489	0.2	±0.5	13.3	±3.9	86.5	±3.9
45-64	388	0.2	±0.3	10.8	±3.9	89.0	±3.9
25-64	**877**	**0.2**	**±0.3**	**12.5**	**±3.0**	**87.3**	**±3.0**

Table 37 BMI classifications among women by age group

BMI classifications							
Age Group (years)	Women						
	N	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% Over-weight ≥25.0	95% CI
25-44	786	0.0	----	6.6	±2.0	93.4	±2.0
45-64	610	0.0	----	4.9	±2.3	95.1	±2.3
25-64	**1396**	**0.0**	**----**	**6.0**	**±1.7**	**94.0**	**±1.7**

Table 38 shows that overall 90.7% ±1.8 of the survey population were overweight, while 9.2% ±1.8 had a normal BMI.

Table 38 BMI classifications among both sexes by age group

BMI classifications							
Age Group (years)	Both Sexes						
	N	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% Over-weight ≥25.0	95% CI
25-44	1275	0.1	±0.2	9.9	±2.4	89.9	±2.4
45-64	998	0.1	±0.2	7.7	±2.2	92.3	±2.2
25-64	**2273**	**0.1**	**±0.2**	**9.2**	**±1.8**	**90.7**	**±1.8**

Table 39 presents obesity rates (BMI ≥30 kg/m^2) separately for men and women, and combined. The overall prevalence of obesity in Tonga was 67.6% ±2.9. The obesity rate was significantly higher among women (77.6% ±2.9) than among men (57.2% ±4.4).

Table 39 Percentage of obesity (BMI≥30 kg/m^2) by gender and age group

Percentage of respondents who are obese (BMI ≥ 30 kg/m^2)									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	N	%	95% CI	n	%	95% CI
25-44	489	57.6	±5.4	786	77.3	±3.8	1275	67.5	±3.6
45-64	388	56.2	±6.1	610	78.2	±4.4	998	67.9	±3.8
25-64	**877**	**57.2**	**±4.4**	**1396**	**77.6**	**±2.9**	**2273**	**67.6**	**±2.9**

4.6.3 Waist circumference

Central obesity was assessed by measuring waist circumference of participants following the STEPS standardised protocol as outlined in Section 3. Women had a significantly larger mean waist circumference (106.7cm ±1.0) than men (103.3cm ±1.3). Women in the older

age group 45-64 years had significantly higher mean waist circumference (109.7cm ±1.5) than younger women aged 25-44 years (105.1cm ±1.2). For men, the mean waist circumference in the younger age group 25-44 years increased from 102.2cm ±1.6 to 105.7 ±1.7 in the older age group 45-64 years.

Table 40 Mean waist circumference (cm) by gender and age group

Waist circumference (cm)							
Age Group (years)	Men				Women		
	n	Mean	95% CI		n	Mean	95% CI
25-44	488	102.2	±1.6		792	105.1	±1.2
45-64	385	105.7	±1.7		613	109.7	±1.5
25-64	**873**	**103.3**	**±1.3**		**1405**	**106.7**	**±1.0**

4.7 Blood pressure and hypertension

All survey respondents had their blood pressure measured, were asked if they ever had their blood pressure measured in the last 12 months or whether they had ever been told in the last 12 months by a health worker that they had high blood pressure, and if they were currently receiving any medical treatment for high blood pressure. Based on self-report and measured blood pressure data, the following STEPS classifications were set out:

- a mean systolic pressure of SBP≥140 mmHg, whether or not they had previously been told by a health worker that they had high blood pressure, OR

- a mean diastolic pressure of DBP≥90 mmHg, whether or not they had previously been told by a health worker that they had high blood pressure, OR

- normal mean systolic and diastolic pressures (i.e. normotensive) AND who were currently receiving anti-hypertensive medication, whether or not they had previously been told by a health worker that they had high blood pressure.

Those participants who reported having been previously told by a health worker that they had high blood pressure, but who were normotensive and NOT on anti-hypertensive medication, were NOT included among those considered to have hypertension.

Tables 41 and 42 present mean resting systolic blood pressure and mean resting diastolic blood pressure, respectively, for men and women separately, and combined. Tongan men indicate a statistically higher mean systolic blood pressure than women (131.2mmHg ±1.2 and 127.3mmHg ±1.2, respectively). For both genders, systolic blood pressure increased with age.

For resting diastolic blood pressure, both men and women indicate similar mean levels (78.2mmHg ±0.9 and 78.3mmHg ±0.6, respectively), and increasing with age across both genders.

Table 41 Mean resting systolic blood pressure (mmHg) by gender and age group

Mean systolic blood pressure (mmHg)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	486	128.8	±1.3	847	121.4	±1.1	1333	124.9	±0.9
45-64	385	136.4	±2.3	614	139.3	±2.0	999	138.0	±1.6
25-64	**871**	**131.2**	**±1.2**	**1461**	**127.3**	**±1.2**	**2332**	**129.2**	**±0.9**

Table 42 Mean resting diastolic blood pressure (mmHg) by gender and age group

Mean diastolic blood pressure (mmHg)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	486	77.0	±1.2	847	76.4	±0.8	1333	76.7	±0.8
45-64	385	80.5	±1.4	614	82.2	±0.9	999	81.4	±0.8
25-64	**871**	**78.2**	**±0.9**	**1461**	**78.3**	**±0.6**	**2332**	**78.2**	**±0.6**

Table 43 summarises the prevalence rates of hypertension for both genders and combined. Hypertension was indicated for 27.6% ±2.4 of the survey sample. A lightly higher proportion of Tongan men had hypertension compared to women, although this difference was not statistically significant (28.2% ±3.6 and 27.1% ±2.9, respectively). Among women, hypertension rate increased significantly from 14.3% ±2.7 (25-44 years) to 52.9% ±5.3 (45-64 years). Among men, the rise was less dramatic but still substantial: from 22.1% ±4.3 (25-44 years) to 41.3% ±5.9 (45-64 years).

Table 43 Percentage with hypertension (SBP ≥140 and/or DBP ≥ 90 or currently on medication for raised blood pressure)

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
25-44	486	22.1	±4.3	847	14.3	±2.7	1333	18.0	±2.5
45-64	385	41.3	±5.9	614	52.9	±5.3	999	47.5	±4.2
25-64	**871**	**28.2**	**±3.6**	**1461**	**27.1**	**±2.9**	**2332**	**27.6**	**±2.4**

4.8 Total cholesterol

In this sample, the overall mean total blood cholesterol was 5.1mmol/L ±0.0, with both men and women recording similar mean cholesterol levels (5.2mmol/L ±0.1 and 5.1mmol/L ±0.1, respectively) (Table 44). Increased cholesterol levels with age in men, the mean levels for women increased highly with age (25-44 years: 4.9 mmol/L ±0.1; 45-64 years: 5.5 mmol/L ±0.1).

Table 44 Mean levels of total blood cholesterol (mmol/L) by gender and age group

Mean total cholesterol (mmol/L)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	444	5.1	±0.1	727	4.9	±0.1	1171	5.0	±0.1
45-64	354	5.4	±0.1	540	5.5	±0.1	894	5.4	±0.1
25-64	**798**	**5.2**	**±0.1**	**1267**	**5.1**	**±0.1**	**2065**	**5.1**	**±0.0**

Raised blood cholesterol, defined as having ≥5.0 mmol/L or ≥190 mg/dl or reported currently on medication , was indicated by 48.8% ±2.9 of the survey sample (Table 45). Both men and women recorded similar proportions of having raised blood cholesterol (49.3% ±4.1 and 48.2% ±3.5, respectively). High proportions of raised blood cholesterol were already evident in the younger age group 25-44 years for both men (44.1% ±5.1) and women (38.2% ±4.5), with these rates increasing significantly in the older age group 45-64 years (men: 60.3% ±5.9; women: 67.5% ±4.9).

Table 45 Percentage with raised blood cholesterol (≥ 5.0 mmol/L or ≥ 190 mg/dl) or currently on medication by gender and age group

Total cholesterol ≥ 5.0 mmol/L or ≥ 190 mg/dl or currently on medication for raised cholesterol									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	444	44.1	±5.1	727	38.2	±4.5	1171	41.1	±3.4
45-64	354	60.3	±5.9	540	67.5	±4.9	894	64.1	±3.9
25-64	**798**	**49.3**	**±4.1**	**1267**	**48.2**	**±3.5**	**2065**	**48.8**	**±2.9**

4.9 Fasting blood glucose and diabetes

Respondents were asked if they had been told by a health worker that they had diabetes in the previous 12 months, and whether they were currently receiving medical treatment for diabetes. Estimates of diabetes prevalence were computed based on the WHO guidelines for defining and classifying diabetes mellitus:

- elevated fasting capillary whole blood value of glucose ≥6.1 mmol/L (≥110 mg/dl) AND whether or not they had previously been told by a health worker that they had diabetes, OR

- normal capillary whole blood value of glucose <6.1 mmol/L (<110 mg/dl) AND who were currently receiving anti-diabetes medication prescribed by a health worker.

Those participants who had been advised by a health worker that they had diabetes but who had normal fasting blood glucose, and who were NOT on anti-diabetes medication or on a special diet prescribed by a health worker, were NOT included among those considered as having diabetes.

The overall mean fasting blood glucose among the survey respondents was 6.5mmol/L ±0.1 (Table 46). Women reported a marginally higher mean fasting blood glucose level (6.7mmol/L ±0.2) than men (6.2mmo/L ±0.2). For women, mean fasting blood glucose levels increased with age, from 6.3mmo/L ±0.2 (25-44 years) to 7.5mmo/L ±0.3 (45-64 years). A similar pattern was also recorded for men.

Table 46 Mean fasting blood glucose in mmol/L by gender and age group

Mean fasting blood glucose (mmol/L)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	475	5.9	±0.2	828	6.3	±0.2	1303	6.1	±0.2
45-64	382	6.8	±0.3	602	7.5	±0.3	984	7.2	±0.2
25-64	**857**	**6.2**	**±0.2**	**1430**	**6.7**	**±0.2**	**2287**	**6.5**	**±0.1**

Table 47 Prevalence of Impaired Fasting Glycaemia by gender and age group

Impaired Fasting Glycaemia*									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	475	22.1	±4.7	828	24.7	±3.8	1303	23.5	±2.9
45-64	382	27.5	±5.6	602	22.2	±3.9	984	24.6	±3.5
25-64	**857**	**23.9**	**±3.6**	**1430**	**23.8**	**±2.6**	**2287**	**23.8**	**±2.2**

* Capillary whole blood value ≥5.6 mmol/L (100 mg/dl) and <6.1 mmol/L (110 mg/dl)

The overall diabetes prevalence of those aged 25-64 years, measured as raised blood glucose or reported as currently on medication for diabetes, was 34.4% ±2.9. Diabetes prevalence was significantly higher among women (38.6% ±3.3) than men (29.7% ±4.1). By age 25-44 years, nearly one third of the survey population (27.1% ±3.3) had hypertension, and by age 45-64 years this rate rose to about half of the survey sample (49.3% ±4.4).

Table 48 Prevalence of diabetes by gender and age group

Raised blood glucose or currently on medication for diabetes									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	475	24.5	±5.5	828	29.4	±4.1	1303	27.1	±3.3
45-64	382	40.7	±6.1	602	56.9	±5.6	984	49.3	±4.4
25-64	**857**	**29.7**	**±4.1**	**1430**	**38.6**	**±3.3**	**2287**	**34.4**	**±2.9**

4.10 Combined risk factors

The following five NCD risk factors were summed to indicate the overall NCD risk:

- current daily smokers,
- overweight (BMI ≥25 kg/m^2),
- raised blood pressure (SBP ≥140 and/or DBP≥90 mmHg or currently on medication),
- consumed less than five combined servings of fruit and vegetables per day, and
- low level of activity (<600 METminutes per week).

Based on these combined risk factors, three levels of the overall risk for NCDs were created:

- Low Risk: 0 risk factor
- Moderate Risk: 1-2 risk factors
- High Risk: 3-5 risk factors

Table 49 shows that 56.0% ±5.6 of Tongan men were at High Risk of NCDs, with at least 51.7% ±7.2 of those aged 25-44 years already had 3-5 risk factors. Just under half or 42.4% ±5.4 of men had Moderate Risk.

Table 50 shows that 60.2% ±6.9 of Tongan women were at High Risk of NCDs, with more than half or 55.4% ±8.3 already had 3-5 risk factors by age 25-44 years.

Overall, 57.1% ±4.6 of Tongans were deemed to be at High Risk of NCDs (Table 51), and 41.6% ±4.4 at Moderate Risk. By age 25-44 years, more than half those surveyed were at High Risk (52.8% ±5.6) and increased with age to 66.9% ±6.4 in the 45-64 age group.

Table 49 Percentage of NCD risk categories among men by age group

Summary of Combined Risk Factors							
	Men						
Age Group (years)	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	274	2.4	±2.8	45.9	±6.9	51.7	±7.2
45-64	234	0.0	----	35.4	±7.4	64.7	±7.4
25-64	**508**	**1.6**	**±1.9**	**42.4**	**±5.4**	**56.0**	**±5.6**

Table 50 Percentage of NCD risk categories among women by age group

Summary of Combined Risk Factors							
	Women						
Age Group (years)	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	187	0.4	±0.8	44.2	±8.3	55.4	±8.3
45-64	82	0.0	----	25.0	±10.4	75.0	±10.4
25-64	**269**	**0.3**	**±0.6**	**39.5**	**±6.9**	**60.2**	**±6.9**

Table 51 Percentage of NCD risk categories among both sexes by age group

Summary of Combined Risk Factors							
	Both Sexes						
Age Group (years)	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	461	1.8	±2.0	45.4	±5.4	52.8	±5.6
45-64	316	0.0	----	33.1	±6.4	66.9	±6.4
25-64	**777**	**1.3**	**±1.4**	**41.6**	**±4.4**	**57.1**	**±4.6**

4.11 Cardiovascular disease risk

Percentage of respondents aged 40-69 years with a 10-year cardiovascular disease (CVD) risk* ≥30% or with existing CVD has been calculated.

Instrument questions: combined from Step 1, 2 and 3 of the STEPS survey

- Gender, age
- Current and former smoking
- History of diabetes, CVD
- Systolic blood pressure measurements
- Fasting status, glucose and total cholesterol measurements.

Analysis of the CVD risk factors of the current smokers, raised blood pressure, total cholesterol and diabetes were undertaken to assess the CVD risk status of the population for NCDs.

Table 52 shows that one-sixth (16.6%) of 55-69 year-old men in Tonga had a high risk (≥30%) of developing CVD in the next 10 years, which needs to pay more attention.

The CVD risk increased with age as would be expected and this was shown from 40-54 years to 55-69 with a significant increased from 0.8% to 11.3%, shown in Table 52.

Overall, higher percentages of men were at risk than women with CVD risk of 16.6% and 7.0%, respectively, with no significant difference.

Table 52 Percentage of the population with a 10-year CVD risk ≥30% or with existing CVD

Percentage of respondents with a 10-year CVD risk* ≥30% or with existing CVD									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
40-54	371	0.9	0.0-1.7	550	0.7	0.0-1.4	921	0.8	0.2-1.4
55-69	122	16.6	8.9-24.4	215	7.0	2.6-11.5	337	11.3	7.1-15.5
40-69	493	4.3	2.4-6.3	765	2.4	1.1-3.7	1258	3.3	2.1-4.5

* A 10-year CVD risk of ≥30% is defined according to age, sex, blood pressure, smoking status (current smokers OR those who quit smoking less than 1 year before the assessment), total cholesterol, and diabetes (previously diagnosed OR a fasting plasma glucose concentration >7.0 mmol/l (126 mg/dl)).

5. COMPARISON WITH 2004 STEPS SURVEY

In 2004, Tonga conducted the first STEPS survey covering three island groups of Tongatapu, Ha'apai and Vava'u (WHO, 2012). This second 2012 STEPS survey provide Tonga's first population-wide trends data in behavioural and biochemical risk factors for NCDs.

Both surveys followed the WHO standardised survey sampling and data collection methodology, and both survey data weighted to the Tongan populations. To facilitate comparison, only data for 25-64 years are presented here. In this age band, a sample of 849 participants took part in the 2004 survey, and 2,457 took part in the 2012 survey.

This section reports on the 2004-2012 trends of four major NCD risk factors: tobacco use, alcohol consumption, fruit and vegetable consumption and physical activity. The prevalence of combined NCD risk categories in 2004 and 2012 is also presented, and the majority of the descriptive results presented graphically by age group, gender and overall.

5.1 Tobacco use

Overall, the proportions of current smokers (had smoked any tobacco products) declined marginally over time, with 29.8% in 2004 compared to 29.3% in 2012 (Table 55).

Among Tongan men the rates also remained stable: 46.2% in 2004 and 46.4% in 2012. There was, however, a 2% decrease in smoking prevalence among the 45-65 age group, from 49.8% in 2004 to 47.8% in 2012 (Table 53).

The rates of smoking among Tongan women, however, decreased slightly from 14.3% in 2004 to 13.4% in 2012. A 1.2% point decrease in smoking prevalence was noted for women in the 25-44 age group (Table 54).

Table 53 Current smoker comparisons for men

Current Smoker				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	44.3	±7.3	45.8	±5.1
45-64	49.8	±8.8	47.8	±5.5
25-64	**46.2**	**±5.6**	**46.4**	**±4.0**

Table 54 Current smoker comparisons for women

Current Smoker				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	16.8	±7.0	15.6	±2.9
45-64	9.9	±4.6	9.0	±3.1
25-64	**14.3**	**±4.6**	**13.4**	**±2.4**

Table 55 Current smoker comparisons for both sexes

Current Smoker				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	30.3	±4.9	30.3	±3.1
45-64	28.8	±6.2	27.3	±3.8
25-64	**29.8**	**±3.7**	**29.3**	**±2.6**

5.2 Alcohol consumption

In contrast to tobacco use, self-reported alcohol consumption over the past 12 months declined during the 2004-2012 period, overall 8.9% in 2004 to 5.7% in 2012 (Table 58).

The proportion of men consuming alcohol in the past 12 months decreased substantially, from 13.6% in 2004 to 8.7% in 2012. This decline was also reflected across both younger and older age groups over the 8-year period (Table 56).

The proportions of women consuming alcohol also saw a reduction, from 4.6% in 2004 to 2.8% in 2012, attributable mainly to the decline in consumption among the younger age group (Table 57).

Table 56 Past 12-months alcohol consumption comparison for men

Consumed Alcohol in Past 12 Months				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	16.2	±9.4	10.1	±3.1
45-64	8.5	±6.6	5.7	±2.6
25-64	**13.6**	**±7.9**	**8.7**	**±2.3**

Table 57 Past 12-months alcohol consumption comparison for women

Consumed Alcohol in Past 12 Months				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	6.9	±4.3	3.5	±1.7
45-64	0.4	±1.0	1.5	±1.4
25-64	**4.6**	**±3.0**	**2.8**	**±1.3**

Table 58 Past 12-months alcohol consumption comparison for both sexes

Consumed Alcohol in Past 12 Months				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	11.4	±6.4	6.7	±1.7
45-64	4.2	±3.4	3.5	±1.4
25-64	**8.9**	**±5.2**	**5.7**	**±1.3**

5.3 Fruit and vegetable intake

Similar to alcohol drinking, the proportions of consuming less than the recommended combined five servings of fruit and/or vegetables per day in a typical week decreased during the 2004-2012 period, overall from 92.2% in 2004 to 73.1% in 2012 (Figure 2, Table 59).

Both men and women showed similar magnitude of decline (men: from 91.4% in 2004 to 72.4% in 2012; women: from 92.9% in 2004 to 73.7% in 2012), overall and in younger and older age groups (Tables 59-61).

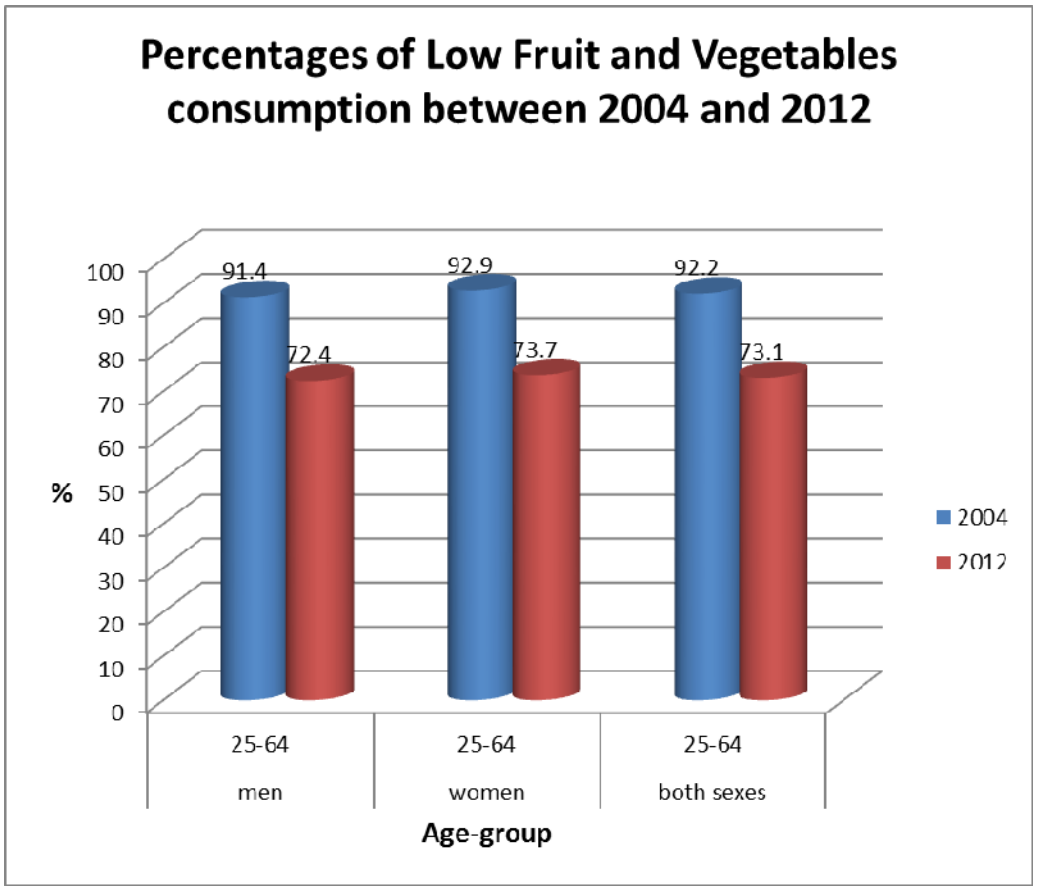


Figure 2 Percentages of the population consumed less than five combined servings of fruit and vegetables per day between 2004 and 2012 surveys

Table 59 Less than five combined servings of fruit and/or vegetables per day of the week comparison for men

Less than five servings of fruit and/or vegetables on average per day				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	90.3	±4.9	73.1	±5.5
45-64	93.6	±6.2	71.1	±5.8
25-64	**91.4**	**±3.4**	**72.4**	**±4.5**

Table 60 Less than five combined servings of fruit and/or vegetables per day of the week comparison for women

Less than five servings of fruit and/or vegetables on average per day				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	93.4	±2.9	72.9	±3.9
45-64	91.9	±3.2	75.3	±4.6
25-64	**92.9**	**±2.0**	**73.7**	**±3.1**

Table 61 Less than five combined servings of fruit and/or vegetables per day of the week comparison for both sexes

Less than five servings of fruit and/or vegetables on average per day				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	91.9	±2.4	73.0	±3.5
45-64	92.7	±4.0	73.3	±3.7
25-64	**92.2**	**±2.1**	**73.1**	**±3.0**

5.4 Physical activity

From 2004 to 2012, the proportions of Tongan reporting that they engaged in low level physical activity (<600 METminutes per week) reduced substantially by 20.2%, overall 23.7% in 2012 compared to 43.9% in 2004 (Figure 3, Table 62).

For both men and women, this magnitude of decline was observed in both younger and older age groups (Tables 62-64). In other words, the 8-year period saw a positive trend with the reduction in the overall numbers of low active Tongans.

The proportion of men who reported low level of physical activity declined by half between the two surveys, from 33.3% in 2004 to 15.1% in 2012.

The proportion of women who reported low level of physical activity also declined during the survey period, from half of the surveyed population or 53.7% in 2004 to one third or 31.7% in 2012. For men and women, both younger and older age groups experienced this positive decline.

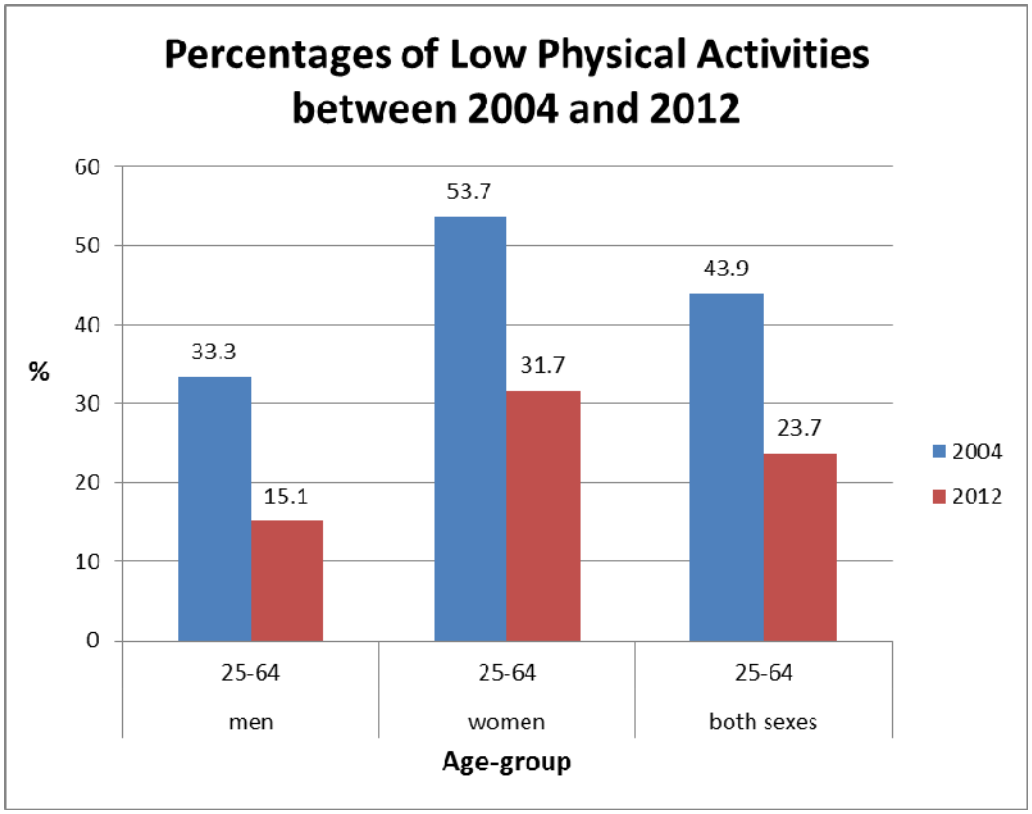


Figure 3 Low physical activity levels between 2004 and 2012 surveys

Table 62 Low physical activity comparison for men

Low Level of Physical Activity				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	31.8	±10.3	15.0	±3.5
45-64	36.1	±7.4	15.3	±4.3
25-64	**33.3**	**±7.7**	**15.1**	**±2.8**

Table 63 Low physical activity comparison for women

Low Level of Physical Activity				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	54.7	±8.0	30.8	±3.8
45-64	52.0	±8.0	33.5	±6.1
25-64	**53.7**	**±6.6**	**31.7**	**±3.8**

Table 64 Low physical activity comparison for both sexes

Low Level of Physical Activity				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	43.7	±7.2	23.0	±2.4
45-64	44.3	±6.0	25.0	±4.0
25-64	**43.9**	**±5.9**	**23.7**	**±2.2**

5.5 Overweight and obesity

Table 65 Overweight comparison for men

Overweight				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	90.4	±5.4	86.5	±3.9
45-64	87.0	±5.0	89.0	±3.9
25-64	**89.2**	**±4.7**	**87.3**	**±3.0**

Table 66 Overweight comparison for women

Overweight				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	95.2	±3.3	93.4	±2.0
45-64	94.4	±3.1	95.1	±2.3
25-64	**94.9**	**±2.3**	**94.0**	**±1.7**

Table 67 Overweight comparison for both sexes

Overweight				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	92.8	±2.5	89.9	±2.4
45-64	90.9	±3.2	92.3	±2.2
25-64	**92.1**	**±2.1**	**90.7**	**±1.8**

The 2012 survey saw a slight but non-significant decline in the proportion of people who were overweight, overall from 92.1% in 2004 to 90.7% in 2012 (Table 67).

For women, the overall proportions of overweight remained unchanged from 2004 to 2012 (94.9% and 94.0%, respectively), while prevalence of overweight in men experienced a 1.9% point decrease (89.2% in 2004 to 87.3% in 2012).

Table 68 Obesity comparison for men

Obese				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	63.5	±9.4	57.6	±5.4
45-64	55.3	±10.2	56.2	±6.1
25-64	**60.7**	**±8.9**	**57.2**	**±4.4**

Table 69 Obesity comparison for women

Obese				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	76.7	±5.2	77.3	±3.8
45-64	75.6	±5.0	78.2	±4.4
25-64	**76.3**	**±3.8**	**77.6**	**±2.9**

Table 70 Obesity comparison for both sexes

Obese				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	70.2	±4.5	67.5	±3.6
45-64	65.9	±5.3	67.9	±3.8
25-64	**68.7**	**±4.2**	**67.6**	**±2.9**

The 2012 survey saw a slight but non-significant decline in the proportion of people who were obese, overall from 68.7% in 2004 to 67.6% in 2012 (Table 70).

For women, the overall proportions of obesity increased slightly from 2004 to 2012 (76.3% and 77.6%, respectively), while prevalence of obesity in men experienced a 3.5% point decrease (60.7% in 2004 to 57.2% in 2012).

5.6 Combined risk factors

The 2012 survey saw a slight but non-significant decline in the proportion of people with 3-5 risk factors (High Risk for NCDs), overall from 60.7% in 2004 to 57.1% in 2012 (Table 73).

For women, the overall proportions of High Risk remained unchanged from 2004 to 2012 (60.8% and 60.2%, respectively), while those aged 45-64 years experienced a 9.6% point increase in the proportions of High Risk during the same period (65.4% in 2004 to 75.0% in 2012) (Table 72).

In contrast, the overall proportions of High Risk among men declined over time, from 60.5% in 2004 to 56.0% in 2012 (Table 71).

Table 71 Percentage of NCD risk categories among men by age group

% with 3-5 risk factors				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	57.9	±9.5	51.7	±7.2
45-64	65.4	±8.5	64.7	±7.4
25-64	**60.5**	**±6.9**	**56.0**	**±5.6**

Table 72 Percentage of NCD risk categories among women by age group

% with 3-5 risk factors				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	58.3	±6.3	55.4	±8.3
45-64	65.4	±7.5	75.0	±10.4
25-64	**60.8**	**±4.1**	**60.2**	**±6.9**

Table 73 Percentage of NCD risk categories among both sexes by age group

% with 3-5 risk factors				
Age Group (years)	2004		2012	
	%	95% CI	%	95% CI
25-44	58.1	±5.8	52.8	±5.6
45-64	65.4	±6.6	66.9	±6.4
25-64	**60.7**	**±4.4**	**57.1**	**±4.6**

6. DISCUSSION AND CONCLUSIONS

The WHO STEPS survey is a valuable national data resource for Tonga. At the population level, it documents the magnitude of major modifiable behavioural risk factors of NCDs, identifies who are at risk, and allows for prioritisation of public health interventions. Interventions to address "unhealthy environments" -- through policies, regulations and legislation are of critical importance. If repeated at regular intervals, the STEPS surveys provide surveillance and trends data for Tonga to benchmark and evaluate progress towards achieving agreed health and development goals.

This final section of the report reflects on key findings from the 2012 STEPS survey, discusses the differential changes from 2004 to 2012 in four health-related behavioural risk factors, and presents a range of recommendations to prevent and control NCDs in the Kingdom of Tonga.

STEPS 2012 findings

Smoking remains a public health concern in Tonga, particularly among Tongan men. Just under one half of men (42.1%) were daily smokers at the time of the survey, compared to STEPS survey data from Cook Islands (37.5%) and American Samoa (38.1%)[13-21]. Daily smoking is also well established among Tongan men in age 25-44 years (40.9%). These findings highlight the need for programs to specifically target young Tongan men in an effort to prevent experimenting and subsequently early uptake of tobacco products at an early age.

Whilst only 9.3% of Tongans are current drinkers (drank in the past 30 days), it is heavy **alcohol** drinking that presents a public health challenge in Tonga. Again, Tongan men are particular at risk with 51% consuming 6 or more standard alcoholic drinks on a drinking day, compared to 24.2% of women. These estimates are either similar or even substantially lower than those reported for Cook Islands (men: 89.3%, women: 70.7%) and American Samoa (men: 49.6%, women: 33.9%; based on 5+ drinks) [13-21]. Nonetheless, the magnitude of binge drinking in Tonga is likely to place Tongans at increased risks of NCDs and injuries, and health promotion efforts to increase awareness of the harmful effects of heavy drinking can contribute to reduce these rates.

The survey found that the majority of the survey population consumed less than the recommended intake of **fruit and vegetable** (five or more serves of fruit and vegetables per day). The low level of fruit and/or vegetable consumption did not differ significantly between men and women or across age groups. Substantial structural and policy changes will be critical to effect the Tonga food environments, and before any shift away from the tastes for high-fat, high-sugar and high-salt products can be expected.

Approximately 1 in 4 Tongans do not engage in sufficient levels of **physical activity** to confer health benefits. For those who are sufficiently active, time spent on physical activity as part of work contributed the most to the overall activity level. Not surprisingly, engaging in physical activity through work, transport or as part of leisure decrease with increasing age for both men and women. Creating an enabling physical environment supportive of physical activity, and complemented by health promotion activities to promote regular moderate-intensity physical activity done as part of everyday life are necessary to produce measureable health benefits at both individual and population level.

The current STEPS survey found high rates of **overweight and obesity** among Tongan adults, with the rate being slightly higher among women (94 %) than men (87.3%). The rates are similar to those reported for American Samoa (women: 94.4%; men: 92.7%), and Cook Islands (women: 87.1%; men: 89.8%)[13-21]. Of concern is that these high overweight/obesity rates already evident in the younger age group (25-44 years). Targeted programs tailored to those most likely to benefit but also most vulnerable to experience rapid weight gain (e.g., young adults) can confer substantial public health gains.

Just over one quarter of the survey population was found to have **elevated blood pressure**. Hypertension rates increased substantially with age across both genders, placing the older age groups at an elevated risk of developing stroke or cardiovascular disease. Nearly half of the survey population had **raised blood cholesterol**, with no significant difference in proportions between men and women. About 1 in 4 surveyed (23.8%) were at heightened risk of developing diabetes based on **their impaired fasting glycaemia** level (capillary whole blood value ≥5.6mmol/L (100mg/dl) and <6.1mmol/L (110mg/dl). Early detection and appropriate clinical management of these physiological and biochemical risk markers is highly critical to prevent the progression to cardiovascular disease or diabetes.

This survey found a high prevalence of **diabetes** among those aged 25-64 years (overall 34.4%; men: 29.7%, women: 38.6%). Earlier STEPS surveys conducted in the Pacific between 2002 and 2006 reported variable but also relatively high levels of diabetes rates among people in the same age range: 47% in American Samoa, 32% in Federated States of Micronesia (Pohnpei), 23% in Cook Islands, and 28% in Kiribati [13-21].Further investigation of these data may provide insights into potential reasons for the variations observed across these Pacific island countries and over time.

Encouraging changes in behavioural risk factors over time

The comparative analysis show promising changes in the four key modifiable risk factors of NCDs such as smoking, alcohol use, fruit and vegetable intake and physical activity. These risk factors drive NCD rates and are considered as 'bottlenecks' in NCD prevention and control (Government of Tonga, 2010). Effecting changes in these behavioural factors through structural and lifestyle changes will be essential in order to impact the causal pathway of NCDs.

The magnitude of change was particularly encouraging for fruit and vegetable intake and physical activity. In 2012, significantly more Tongans reported eating more fruit and vegetables combined compared to 2004. Significantly fewer Tongans also were engaging in low levels of physical activity in 2012 compared to 2004. There is scope for improvement, particularly in the areas of alcohol and smoking, for preventive and health promotion efforts to continue to target in an attempt to reduce these rates.

Methodological considerations

Over- or under-estimation of tobacco use, alcohol consumption, fruit and vegetable intake, and physical activity cannot be dismissed due to the self-report of data. Different data collection methods used in 2004 (paper-based survey) and in 2012 (PDA-based survey) may also impact the estimates observed. However, the STEPS questionnaire uses validated measures, and had been tested for acceptability in the Tongan context. This included conducting a pilot study to identify any potential measurement and logistic difficulties that needed to be addressed before the main survey. Accordingly, STEPS field staff received comprehensive data collection training and the STEPS questions were asked of respondents using locally developed showcards to facilitating comprehension.

A limitation of using a cross-sectional design in STEPS surveys is that the data only provides a snapshot of the risk factors compared to a longitudinal design where the same individuals are monitored over time which would provide more accurate information on determinants of behaviour changes. However, having follow-up surveys such as the repeat 2012 STEPS survey which covered the same health behaviours using the same survey instruments and data collection procedures, comparison of these risk factors was possible. The high response rate achieved indicated the acceptability of STEPS survey in Tonga and is a strength of this study.

Sustained and co-ordinated efforts critical to reverse the incidence of NCDs

The people of Tonga are at heightened risks of non-communicable diseases. About 1 in 2 of the surveyed population was classified as being in a high-risk group (with 3-5 risk factors) for developing cardiovascular disease. Premature morbidity and mortality associated with these NCD risk factors will not only increase the burden on an already stretched health system but impact negatively on social and economic development of Tonga. Sustained, diverse and co-ordinated national actions involving health and non-health partnerships are critical to reversing some of the highest rates of NCD risk factors in the region.

Encouragingly, the number of Tongans who reported engaging in NCD health risk behaviours decreased between 2004 and 2012. For these promising trends to continue existing public health efforts in Tonga need to be sustained and expanded and new partnerships forged where necessary, before Tonga can expect to see any slowing down in the incidence of NCDs.

7. RECOMMENDATIONS

These recommendations underscore the importance for the Tonga health systems and partners to promote and strengthen primary and secondary prevention of NCD risk factors and NCD-related diseases through whole of-government and whole-of-society approaches:

- Continue comprehensive tobacco control and anti-smoking programmes, like Tobacco-free workplaces and Tobacco-free Hospital, to reduce smoking rates, in particular ensure comprehensive bans on smoking in all public places and provide cessation support in all health facilities.

- Continue to increase tobacco taxes which have been showing to reduce tobacco prevalence.

- Tobacco control in children, like Tobacco-free Schools, need to be further strengthened since the majority of adult tobacco users begin their tobacco use as teenagers, and the

increased price and tax of tobacco products should decrease the prevalence of tobacco use among children effectively.

- Continue comprehensive public health programmes and regulations to reduce harmful alcohol consumption with an emphasis on preventing youth consumption, regulation of retail and marketing and developing public awareness programmes on the linkages between alcohol use and health outcomes. Alcohol consumption is also responsible for violence and road traffic injuries.

- Continue comprehensive healthy eating programmes to increase fruit and vegetable intake, and undertake policies and regulations to reduce excessive consumption of high-fat, high-salt and high-sugar foods – including the ban of sale of sugar sweetened beverages and unhealthy foods inside schools.

- Continue comprehensive and culturally-appropriate programmes to modify environments in order to promote daily physical activity such as walking and cycling.

- WHO Package of Essential NCD (PEN) Intervention Project includes CVD risk estimation as a component. By identifying people at high risk of CVD in the next 10 years, interventions can be directed at those who need it most. The proportion of people with total CVD risk is relatively low and the limited resources can be used for them. Integrated risk reduction using pharmaceutical agents and counselling can be more beneficial that individual risk factor treatment.

- Develop a system of community-based, outreached lifestyle support for the management of individuals at risk of NCDs or with diagnosed NCDs focused on families and changing eating and dietary patterns in homes.

- Promote the use of total cardiovascular risk estimation and provide management as per national agreed protocols.

- Equip health workers and health facilities with appropriate technology and drugs and medicines to manage and treat hypertension and diabetes and provide rehabilitation services that are linked to community resources for survivors of heart attacks or strokes and for amputations.

- Develop facility-based targets for reduction of numbers of patients who smoke, consume too much salt, are hypertensive or diabetic. Introduce innovative medical records systems that track individuals with multiple risks for NCDs, through patient-cards or family booklets that are monitored over by the health facility, like hospitals and health centres, over time.

- Conduct intensive analyses and extensive application of the comparable Tonga STEPS data to better understand the associations between behavioural, physical and biochemical risk factors and chronic disease status over time.

- Consider repeat STEPS surveys to further monitor trends at 6-8 year intervals, adding expanded quantitative questions (e.g., salt, sugar, fat intake). These surveillance data would provide evidence of net gains in NCD prevention and control efforts across Tonga and over time.

APPENDICES

Appendix 1. Kingdom of Tonga STEPS Survey Questionnaire

Tongan National NCD STEPS Survey Instrument (Core and Expanded)

The WHO STEPwise approach to chronic disease risk factor surveillance (STEPS)

Participant Identification Number ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋

WHO STEPS Instrument
for Chronic Disease
Risk Factor Surveillance

Tonga 2012

Survey Information

Location and Date		Response	Code
1	Cluster/Centre/Village ID	⌊_⌊_⌊_⌋	I1
2	Cluster/Centre/Village name		I2
3	Interviewer ID	⌊_⌊_⌊_⌋	I3
4	Date of completion of the instrument	⌊_⌊_⌋ dd ⌊_⌊_⌋ mm ⌊_⌊_⌊_⌊_⌋ year	I4

✂ ---------- ✂

Participant Id Number ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋

Consent, Interview Language and Name		Response	Code
5	Consent has been read and obtained	Yes 1 No 2 **If NO, END**	I5
6	Time of interview (24 hour clock)	⌊_⌊_⌋ hrs : ⌊_⌊_⌋ mins	I7
7	Family Surname		I8
8	First Name		I9

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

Participant Identification Number ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋

Step 1 Demographic Information

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

EXPANDED: Demographic Information			
13	What is the **highest level of education** you have completed?	No formal schooling 1 Less than primary school 2 Primary school completed 3 Secondary school completed 4 College/University completed 5 Post graduate degree 6 Refused 88	C5
14	What is your **ethnic background**?	Tongan 1 Non-Tongan 2 Refused 88	C6
15	What is your **marital status**?	Never married 1 Currently married 2 Separated 3 Divorced 4 Widowed 5 Cohabitating 6 Refused 88	C7
16	Which of the following best describes your **main work** status over the past 12 months? (*USE SHOWCARD)*	Government employee 1 Non-government employee 2 Self-employed 3 Non-paid 4 Student 5 Homemaker 6 Retired 7 Unemployed (able to work) 8 Unemployed (unable to work) 9 Refused 88	C8
17	How many people older than 18 years, including yourself, live in your household?	Number of people ⌊_⌊_⌋	C9

EXPANDED: Demographic Information, Continued			
Question		**Response**	**Code**
18	Taking **the past year**, can you tell me what the average earnings of the household have been? *(RECORD ONLY ONE, NOT ALL 3)*	Per week ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋ *Go to T1*	C10a
		OR per month ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋ *Go to T1*	C10b
		OR per year ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋ *Go to T1*	C10c
		Refused 88	C10d

Step 1 Behavioural Measurements

CORE: Tobacco Use			
Now I am going to ask you some questions about various health behaviours. This includes things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with tobacco.			
Question		**Response**	**Code**
19	Have you **ever smoked** any tobacco products?	Yes 1 No 2 *If No, go to T9a*	T1a
20	Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes? *(USE SHOWCARD)*	Yes 1 No 2 *If No, go to T6*	T1
21	Do you currently smoke tobacco products **daily**?	Yes 1 No 2 *If No, go to T6*	T2
22	How old were you when you **first started** smoking daily?	Age (years) Don't know 77 ⌊_⌋⌊_⌋ *If Known, go to T5a*	T3
23	Do you remember how long ago it was? *(RECORD ONLY 1, NOT ALL 3)* *Don't know 77*	In Years ⌊_⌋⌊_⌋ *If Known, go to T5a*	T4a
		OR in Months ⌊_⌋⌊_⌋ *If Known, go to T5a*	T4b
		OR in Weeks ⌊_⌋⌊_⌋	T4c
24	On average, **how many** of the following do you smoke each day? *(RECORD FOR EACH TYPE, USE SHOWCARD)* *Don't Know 77*	Manufactured cigarettes ⌊_⌋⌊_⌋	T5a
		Hand-rolled cigarettes ⌊_⌋⌊_⌋	T5b
		Pipes full of tobacco ⌊_⌋⌊_⌋	T5c
		Cigars, cheroots, cigarillos ⌊_⌋⌊_⌋	T5d
		Other ⌊_⌋⌊_⌋ *If Other, go to T5other, else go to T9a*	T5e
		Other (please specify): ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋ *Go to T9a*	T5other
25	During the past 12 months, have you tried to stop smoking?	Yes 1 No 2	X1
26	During any visit to a doctor or health care provider in the past 12 months, were you advised to quit smoking tobacco?	Yes 1 No 2 NA/ did not visit a doctor 77	X2

EXPANDED: Tobacco Use			
Question		**Response**	**Code**
27	In the past, did you **ever** smoke **daily**?	Yes 1 No 2 *If No, go to T9a*	T6
28	How old were you when you **stopped** smoking **daily**?	Age (years) Don't Know 77 ⌊_⌊_⌋ *If Known, go to T9a*	T7
29	How **long ago** did you stop smoking daily? *(RECORD ONLY 1, NOT ALL 3)* *Don't Know 77*	Years ago ⌊_⌊_⌋ *If Known, go to T9a*	T8a
		OR Months ago ⌊_⌊_⌋ *If Known, go to T9a*	T8b
		OR Weeks ago ⌊_⌊_⌋	T8c
30	During the past 7 days, on how many days did someone **in your home** smoke when you were present?	Number of days Don't know 77 ⌊_⌊_⌋	T13
31	During the past 7 days, on how many days did someone smoke in closed areas **in your workplace** (in the building, in a work area or a specific office) when you were present?	Number of days Don't know or don't work in a closed area 77 ⌊_⌊_⌋	T14

CORE: Alcohol Consumption			
The next questions ask about the consumption of alcohol.			
Question		**Response**	**Code**
32	Have you **ever** consumed an alcoholic drink such as beer, wine, spirits, fermented cider, etc? *(USE SHOWCARD OR SHOW EXAMPLES)*	Yes 1 No 2 *If No, go to D1*	A1a
33	Have you consumed an alcoholic drink within the **past 12 months**?	Yes 1 No 2 *If No, go to D1*	A1b
34	During the past 12 months, **how frequently** have you had at least one alcoholic drink? *(READ RESPONSES, USE SHOWCARD)*	Daily 1 5-6 days per week 2 1-4 days per week 3 1-3 days per month 4 Less than once a month 5	A2
35	Have you consumed an alcoholic drink within the **past 30 days**?	Yes 1 No 2 *If No, go to D1*	A3
36	During the past 30 days, on how many **occasions** did you have at least one alcoholic drink?	Number Don't know 77 ⌊_⌊_⌋	A4
37	During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion? *(USE SHOWCARD)*	Number Don't know 77 ⌊_⌊_⌋	A5
38	During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	Largest number Don't Know 77 ⌊_⌊_⌋	A6
39	During the past 30 days, how many times did you have for **men**: **five or more** for **women**: **four or more** standard alcoholic drinks in a single drinking occasion?	Number of times Don't Know 77 ⌊_⌊_⌋	A7

EXPANDED: Alcohol Consumption

40	During the past 30 days, when you consumed an alcoholic drink, how often was it with meals? Please do not count snacks.	Usually with meals 1 Sometimes with meals 2 Rarely with meals 3 Never with meals 4	A8
41	During each of the **past 7 days**, how many standard alcoholic drinks did you have each day? *(USE SHOWCARD)* *Don't Know 77*	Monday ⌊_⌋⌊_⌋	A9a
		Tuesday ⌊_⌋⌊_⌋	A9b
		Wednesday ⌊_⌋⌊_⌋	A9c
		Thursday ⌊_⌋⌊_⌋	A9d
		Friday ⌊_⌋⌊_⌋	A9e
		Saturday ⌊_⌋⌊_⌋	A9f
		Sunday ⌊_⌋⌊_⌋	A9g
42	During or following a drinking occasion, have you ever blacked out or woken up somewhere you don't know or cannot remember how you got there?	Yes 1 No 2 Do not remember 77	X3
43	After a drinking occasion, have you ever found it hard to remember events that occurred while you were drinking?	Yes 1 No 2	X4

CORE: Diet

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

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

EXPANDED: Diet

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

CORE: Physical Activity

Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.
Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

	Question	Response	Code
Work			
50	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *(USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 4*	P1
51	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊_⌋	P2
52	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P3 (a-b)
53	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously? *(USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 7*	P4
54	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊_⌋	P5
55	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P6 (a-b)
Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship.			
56	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7
57	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊_⌋	P8
58	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P9 (a-b)

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

EXPANDED: Physical Activity			
Sedentary behaviour			
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping. *(USE SHOWCARD)*			
65	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P16 (a-b)

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

EXPANDED: History of Raised Blood Pressure			
69	Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker?		
	Drugs (medication) that you have taken in the past two weeks	Yes 1 No 2	H3a
	Advice to reduce salt intake	Yes 1 No 2	H3b
	Advice or treatment to lose weight	Yes 1 No 2	H3c
	Advice or treatment to stop smoking	Yes 1 No 2	H3d
	Advice to start or do more exercise	Yes 1 No 2	H3e
70	Have you ever seen a traditional healer for raised blood pressure or hypertension?	Yes 1 No 2	H4
71	Are you currently taking any herbal or traditional remedy for your raised blood pressure?	Yes 1 No 2	H5

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

EXPANDED: History of Diabetes			
75	Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker?		
	Insulin	Yes 1 No 2	H8a
	Drugs (medication) that you have taken in the past two weeks	Yes 1 No 2	H8b
	Special prescribed diet	Yes 1 No 2	H8c
	Advice or treatment to lose weight	Yes 1 No 2	H8d
	Advice or treatment to stop smoking	Yes 1 No 2	H8e
	Advice to start or do more exercise	Yes 1 No 2	H8f
76	Have you ever seen a traditional healer for diabetes or raised blood sugar?	Yes 1 No 2	H9
77	Are you currently taking any herbal or traditional remedy for your diabetes?	Yes 1 No 2	H10

Step 2 Physical Measurements

CORE: Height and Weight			
Question		**Response**	**Code**
78	Interviewer ID	⌊_⌋⌊_⌋⌊_⌋	M1
79	Device IDs for height and weight	Height ⌊_⌋⌊_⌋ Weight ⌊_⌋⌊_⌋	M2a M2b
80	Height	in Centimetres (cm) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋	M3
81	Weight *If too large for scale 666.6*	in Kilograms (kg) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋	M4
82	**For women:** Are you pregnant?	Yes 1 *If Yes, go to M 8* No 2	M5
CORE: Waist			
83	Device ID for waist	⌊_⌋⌊_⌋	M6
84	Waist circumference	in Centimetres (cm) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋	M7
CORE: Blood Pressure			
85	Interviewer ID	⌊_⌋⌊_⌋⌊_⌋	M8
86	Device ID for blood pressure	⌊_⌋⌊_⌋	M9
87	Cuff size used	Small 1 Medium 2 Large 3	M10
88	Reading 1	Systolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M11a
		Diastolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M11b
89	Reading 2	Systolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M12a
		Diastolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M12b
90	Reading 3	Systolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M13a
		Diastolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M13b
91	During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	M14

EXPANDED: Hip Circumference and Heart Rate			
92	Hip circumference	in Centimeters (cm) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋	M15

Step 3 Biochemical Measurements

CORE: Blood Glucose			
Question		**Response**	**Code**
93	During the past 12 hours have you had anything to eat or drink, other than water?	Yes 1 No 2	B1
94	Technician ID	⌊_⌋⌊_⌋⌊_⌋⌊_⌋	B2
95	Device ID	⌊_⌋⌊_⌋	B3
96	Time of day blood specimen taken (24 hour clock)	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	B4
97	Fasting blood glucose *mmol/l*	mmol/l ⌊_⌋⌊_⌋ . ⌊_⌋⌊_⌋	B5
98	Today, have you taken insulin or other drugs (medication) that have been prescribed by a doctor or other health worker for raised blood glucose?	Yes 1 No 2	B6
CORE: Blood Lipids			
99	Device ID	⌊_⌋⌊_⌋⌊_⌋	B7
100	Total cholesterol *mmol/l*	mmol/l ⌊_⌋⌊_⌋ . ⌊_⌋⌊_⌋	B8
101	During the past two weeks, have you been treated for raised cholesterol with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	B9

Appendix 2. The Data Book of the Kingdom of Tonga STEPS Survey

WHO STEPS

Chronic Disease Risk Factor Surveillance

DATA BOOK FOR THE KINGDOM OF TONGA 2012

Demographic Information Results

Age group by sex

Description: Summary information by age group and sex of the respondents.

Instrument question:

- Sex
- What is your date of birth?

Age group and sex of respondents						
Age Group (years)	Men		Women		Both Sexes	
	n	%	n	%	n	%
25-44	520	37.0	884	63.0	1404	57.1
45-64	410	38.9	643	61.1	1053	42.9
25-64	930	37.9	1527	62.1	2457	100.0

Education

Description: Mean number of years of education among respondents.

Instrument question:

- In total, how many years have you spent at school or in full-time study (excluding pre-school)?

Mean number of years of education						
Age Group (years)	Men		Women		Both Sexes	
	n	Mean	n	Mean	n	Mean
25-44	519	11.6	881	11.5	1400	11.5
45-64	409	10.7	641	10.3	1050	10.4
25-64	**928**	**11.2**	**1522**	**11.0**	**2450**	**11.0**

Highest level of education

Description: Highest level of education achieved by the survey respondents.

Instrument question:

- What is the highest level of education you have completed?

Highest level of education							
	Men						
Age Group (years)	n	% No formal schooling	% Less than primary school	% Primary school completed	% Secondary school completed	% College/ University completed	% Post graduate degree completed
25-44	519	0.2	3.3	52.6	31.0	11.0	1.9
45-64	410	0.2	5.9	60.0	23.7	8.0	2.2
25-64	**929**	**0.2**	**4.4**	**55.9**	**27.8**	**9.7**	**2.0**

Highest level of education							
	Women						
Age Group (years)	n	% No formal schooling	% Less than primary school	% Primary school completed	% Secondary school completed	% College/ University completed	% Post graduate degree completed
25-44	882	0.1	3.1	56.1	31.2	8.0	1.5
45-64	640	0.5	5.6	69.4	17.8	5.6	1.1
25-64	**1522**	**0.3**	**4.1**	**61.7**	**25.6**	**7.0**	**1.3**

Highest level of education							
	Both Sexes						
Age Group (years)	n	% No formal schooling	% Less than primary school	% Primary school completed	% Secondary school completed	% College/ University completed	% Post graduate degree completed
25-44	1401	0.1	3.1	54.8	31.1	9.1	1.6
45-64	1050	0.4	5.7	65.7	20.1	6.6	1.5
25-64	2451	0.2	4.2	59.5	26.4	8.0	1.6

Ethnicity

Description: Summary results for the ethnicity of the respondents.

Instrument Question:

- What is your [insert relevant ethnic group/racial group/cultural subgroup/others] background?

Ethnic group of respondents			
Age Group (years)	Both Sexes		
	n	% Tongan	% Non-Tongan
25-44	1401	98.1	1.9
45-64	1051	98.8	1.2
25-64	**2452**	**98.4**	**1.6**

Marital status

Description: Marital status of survey respondents.

Instrument question:

- What is your marital status?

Marital status							
Age Group (years)	Men						
	n	% Never married	% Currently married	% Separated	% Divorced	% Widowed	% Cohabiting
25-44	519	15.4	81.1	2.5	0.6	0.4	0.0
45-64	410	3.9	89.8	0.5	1.5	4.1	0.2
25-64	**929**	**10.3**	**84.9**	**1.6**	**1.0**	**2.0**	**0.1**

Marital status							
Age Group (years)	Women						
	n	% Never married	% Currently married	% Separated	% Divorced	% Widowed	% Cohabiting
25-44	882	13.6	80.2	2.2	2.3	1.8	0.0
45-64	641	8.4	71.6	3.3	2.3	13.7	0.6
25-64	**1523**	**11.4**	**76.6**	**2.6**	**2.3**	**6.8**	**0.3**

Marital status							
Age Group (years)	Both Sexes						
	n	% Never married	% Currently married	% Separated	% Divorced	% Widowed	% Cohabiting
25-44	1401	14.3	80.5	2.3	1.6	1.3	0.0
45-64	1051	6.7	78.7	2.2	2.0	10.0	0.5
25-64	**2452**	**11.0**	**79.7**	**2.2**	**1.8**	**5.0**	**0.2**

Employment status

Description: Proportion of respondents in paid employment and those who are unpaid. Unpaid includes persons who are non-paid, students, homemakers, retired, and unemployed.

Instrument question:

- Which of the following best describes your main work status over the past 12 months?

Employment status					
	Men				
Age Group (years)	n	% Government employee	% Non-government employee	% Self-employed	% Unpaid
25-44	519	16.0	27.4	28.5	28.1
45-64	410	14.9	20.0	33.9	31.2
25-64	**929**	**15.5**	**24.1**	**30.9**	**29.5**

Employment status					
	Women				
Age Group (years)	n	% Government employee	% Non-government employee	% Self-employed	% Unpaid
25-44	882	10.2	12.9	15.0	61.9
45-64	641	7.6	8.1	16.1	68.2
25-64	**1523**	**9.1**	**10.9**	**15.4**	**64.5**

Employment status					
	Both Sexes				
Age Group (years)	n	% Government employee	% Non-government employee	% Self-employed	% Unpaid
25-44	1401	12.3	18.3	20.0	49.4
45-64	1051	10.5	12.7	23.0	53.8
25-64	**2452**	**11.5**	**15.9**	**21.3**	**51.3**

Unpaid work and unemployed

Description: Proportion of respondents in unpaid work.

Instrument question:

- Which of the following best describes your main work status over the past 12 months?

Unpaid work and unemployed							
Age Group (years)	Men						
	n	% Non-paid	% Student	% Home-maker	% Retired	Unemployed	
						% Able to work	% Not able to work
25-44	146	35.6	1.4	16.4	2.1	37.7	6.8
45-64	128	39.8	0.8	19.5	13.3	20.3	6.3
25-64	**274**	**37.6**	**1.1**	**17.9**	**7.3**	**29.6**	**6.6**

Unpaid work and unemployed							
Age Group (years)	Women						
	n	% Non-paid	% Student	% Home-maker	% Retired	Unemployed	
						% Able to work	% Not able to work
25-44	546	2.9	1.1	82.8	0.4	11.9	0.9
45-64	437	4.6	0.2	79.4	4.3	8.7	2.7
25-64	**983**	**3.7**	**0.7**	**81.3**	**2.1**	**10.5**	**1.7**

Unpaid work and unemployed							
Age Group (years)	Both Sexes						
	n	% Non-paid	% Student	% Home-maker	% Retired	Unemployed	
						% Able to work	% Not able to work
25-44	692	9.8	1.2	68.8	0.7	17.3	2.2
45-64	565	12.6	0.4	65.8	6.4	11.3	3.5
25-64	**1257**	**11.1**	**0.8**	**67.5**	**3.3**	**14.6**	**2.8**

Per capita annual income

Description: Mean reported per capita annual income of respondents in local currency.

Instrument question:

- How many people older than 18 years, including yourself, live in your household?
- Taking the past year, can you tell me what the average earning of the household has been?

Mean annual per capita income	
n	Mean
2408	**4848.3**

Tobacco Use

Current smoking

Description: Current smokers among all respondents.

Instrument questions:

- Have you ever smoked any tobacco products?
- Do you currently smoke any tobacco products, such as cigarettes, cigars, or pipes?
- Do you currently smoke tobacco products daily?

Percentage of current smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% Current smoker	95% CI	n	% Current smoker	95% CI	n	% Current smoker	95% CI
25-44	518	45.8	40.7-50.8	881	15.6	12.7-18.5	1399	30.3	27.2-33.4
45-64	409	47.8	42.4-53.3	640	9.0	5.9-12.1	1049	27.3	23.5-31.1
25-64	**927**	**46.4**	**42.4-50.4**	**1521**	**13.4**	**11.1-15.8**	**2448**	**29.3**	**26.7-31.9**

Smoking Status

Description: Smoking status of all respondents.

Instrument questions:

- Have you ever smoked any tobacco products?
- Do you currently smoke any tobacco products, such as cigarettes, cigars, or pipes?
- Do you currently smoke tobacco products daily?

Smoking status									
	Men								
Age Group (years)	n	Current smoker				Non-smokers			
		% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
25-44	518	40.9	36.1-45.7	4.9	2.6-7.1	14.6	9.9-19.2	39.7	34.6-44.8
45-64	409	44.6	39.3-49.9	3.2	1.4-5.1	14.6	10.8-18.4	37.6	32.7-42.5
25-64	**927**	**42.1**	**38.2-45.9**	**4.3**	**2.7-5.9**	**14.6**	**11.2-18.0**	**39.0**	**35.0-43.0**

Smoking status									
	Women								
Age Group (years)	n	Current smoker				Non-smokers			
		% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
25-44	881	14.5	11.8-17.3	1.1	0.4-1.8	9.1	6.7-11.4	75.3	71.8-78.8
45-64	640	8.0	5.0-11.0	1.0	0.2-1.7	5.9	3.3-8.5	85.1	81.4-88.7
25-64	**1521**	**12.4**	**10.2-14.6**	**1.0**	**0.5-1.6**	**8.0**	**6.3-9.8**	**78.5**	**75.7-81.4**

Smoking status									
	Both Sexes								
Age Group (years)	n	Current smoker				Non-smokers			
		% Daily	95% CI	% Non-daily	95% CI	% Former smoker	95% CI	% Never smoker	95% CI
25-44	1399	27.4	24.4-30.3	2.9	1.7-4.1	11.7	9.2-14.3	58.0	54.7-61.2
45-64	1049	25.3	21.7-28.9	2.0	1.1-3.0	10.0	7.7-12.3	62.7	59.0-66.4
25-64	**2448**	**26.7**	**24.3-29.2**	**2.6**	**1.8-3.5**	**11.2**	**9.3-13.1**	**59.5**	**56.8-62.1**

Frequency of smoking

Description: Percentage of current daily smokers among smokers.

Instrument question:

- Have you ever smoked any tobacco products?
- Do you currently smoke any tobacco products, such as cigarettes, cigars, or pipes?
- Do you currently smoke tobacco products daily?

Current daily smokers among smokers									
Age Group (years)	Men			Women			Both Sexes		
	n	% Daily smokers	95% CI	n	% Daily smokers	95% CI	n	% Daily smokers	95% CI
25-44	238	89.4	84.7-94.1	134	93.1	88.6-97.5	372	90.4	86.6-94.1
45-64	190	93.3	89.5-97.1	54	89.2	80.8-97.7	244	92.6	89.2-95.9
25-64	**428**	**90.7**	**87.4-94.0**	**188**	**92.2**	**88.2-96.3**	**616**	**91.0**	**88.3-93.8**

Initiation of smoking

Description: Mean age of initiation and mean duration of smoking, in years, among daily smokers (no total age group for mean duration of smoking as age influences these values).

Instrument questions:

- How old were you when you first started smoking daily?
- Do you remember how long ago it was?

Mean age started smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean age	95% CI	n	Mean age	95% CI	n	Mean age	95% CI
25-44	212	17.5	16.7-18.2	123	21.1	19.8-22.4	335	18.4	17.7-19.1
45-64	176	17.6	16.7-18.4	46	26.1	24.1-28.2	222	19.0	18.1-19.9
25-64	**388**	**17.5**	**16.9-18.0**	**169**	**22.2**	**21.0-23.3**	**557**	**18.6**	**18.1-19.2**

Mean duration of smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean age	95% CI	n	Mean age	95% CI	n	Mean age	95% CI
25-44	212	18.2	17.1-19.4	123	12.8	11.6-14.0	335	16.8	15.8-17.7
45-64	176	35.2	33.9-36.4	46	27.2	23.5-30.8	222	33.8	32.6-35.1
25-64	**388**	**23.9**	**22.6-25.2**	**169**	**15.9**	**14.3-17.6**	**557**	**22.0**	**20.9-23.1**

Manufactured cigarette smokers

Description: Percentage of smokers who use manufactured cigarettes among daily smokers.

Instrument question:

- On average, how many of the following do you smoke each day?

Manufactured cigarette smokers among daily smokers									
	Men			Women			Both Sexes		
Age Group (years)	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI
25-44	209	86.3	81.5-91.1	124	95.9	92.4-99.4	333	88.9	85.3-92.5
45-64	171	72.7	64.8-80.5	46	95.7	89.5-100.0	217	76.7	69.9-83.4
25-64	**380**	**81.8**	**77.6-86.0**	**170**	**95.9**	**92.8-98.9**	**550**	**85.2**	**81.9-88.5**

Amount of tobacco used among smokers by type

Description: Mean amount of tobacco used by daily smokers per day, by type.

Instrument question:

- On average, how many of the following do you smoke each day?

Mean amount of tobacco used by daily smokers by type									
	Men								
Age Group (years)	n	Mean # of manu-factured cig.	95% CI	n	Mean #of hand-rolled cig.	95% CI	n	Mean # of pipes of tobacco	95% CI
25-44	209	12.6	11.0-14.2	205	4.0	2.8-5.1	195	0.0	0.0-0.0
45-64	171	11.0	9.1-12.9	168	4.4	3.3-5.6	161	0.0	0.0-0.1
25-64	**380**	**12.0**	**10.8-13.3**	**373**	**4.1**	**3.3-5.0**	**356**	**0.0**	**0.0-0.0**

Mean amount of tobacco used by daily smokers by type						
	Men					
Age Group (years)	n	Mean # of cigars, cheerots, cigarillos	95% CI	n	Mean # of other type of tobacco	95% CI
25-44	196	0.6	0.1-1.1	195	0.0	0.0-0.1
45-64	160	0.6	0.1-1.1	160	0.2	0.0-0.4
25-64	**356**	**0.6**	**0.2-0.9**	**355**	**0.1**	**0.0-0.2**

Mean amount of tobacco used by daily smokers by type									
	Women								
Age Group (years)	n	Mean # of manu-factured cig.	95% CI	n	Mean #of hand-rolled cig.	95% CI	n	Mean # of pipes of tobacco	95% CI
25-44	124	8.6	7.0-10.1	122	0.6	0.2-1.0	120	0.0	0.0-0.0
45-64	46	11.4	8.0-14.8	44	1.5	0.1-3.0	44	0.0	0.0-0.0
25-64	**170**	**9.2**	**7.7-10.7**	**166**	**0.8**	**0.3-1.2**	**164**	**0.0**	**0.0-0.0**

Mean amount of tobacco used by daily smokers by type						
	Women					
Age Group (years)	n	Mean # of cigars, cheerots, cigarillos	95% CI	n	Mean # of other type of tobacco	95% CI
25-44	119	0.3	0.0-0.7	118	0.2	0.0-0.4
45-64	45	0.5	0.0-1.4	44	0.0	0.0-0.0
25-64	**164**	**0.3**	**0.0-0.7**	**162**	**0.1**	**0.0-0.3**

Mean amount of tobacco used by daily smokers by type									
Age Group (years)	Both Sexes								
	n	Mean # of manu-factured cig.	95% CI	n	Mean #of hand-rolled cig.	95% CI	n	Mean # of pipes of tobacco	95% CI
25-44	333	11.5	10.2-12.7	327	3.0	2.2-3.9	315	0.0	0.0-0.0
45-64	217	11.1	9.5-12.7	212	4.0	3.0-5.0	205	0.0	0.0-0.0
25-64	**550**	**11.3**	**10.4-12.3**	**539**	**3.3**	**2.6-4.0**	**520**	**0.0**	**0.0-0.0**

Mean amount of tobacco used by daily smokers by type						
Age Group (years)	Both Sexes					
	n	Mean # of cigars, cheerots, cigarillos	95% CI	n	Mean # of other type of tobacco	95% CI
	315	0.5	0.1-0.9	313	0.1	0.0-0.2
	205	0.6	0.1-1.0	204	0.1	0.0-0.3
	520	**0.5**	**0.2-0.8**	**517**	**0.1**	**0.0-0.2**

Frequency of daily cigarette smoking

Description: Percentage of daily cigarette smokers smoking given quantities of manufactured or hand-rolled cigarettes per day.

Instrument questions:

- On average, how many of the following products do you smoke each day?

Percentage of daily smokers smoking given quantities of manufactured or hand-rolled cigarettes per day											
	Men										
Age Group (years)	n	% <5 Cigs.	95% CI	% 5-9 Cigs.	95% CI	% 10-14 Cigs.	95% CI	% 15-24 Cigs.	95% CI	% ≥ 25 Cigs.	95% CI
25-44	201	7.0	3.1-10.9	19.2	12.6-25.9	25.7	18.4-33.0	31.5	23.6-39.4	16.5	10.4-22.6
45-64	164	4.1	1.0-7.3	19.1	12.9-25.3	26.4	18.3-34.4	33.2	23.8-42.5	17.3	9.6-24.9
25-64	**365**	**6.1**	**3.3-8.8**	**19.2**	**14.2-24.2**	**25.9**	**20.3-31.6**	**32.0**	**25.9-38.2**	**16.8**	**12.0-21.5**

Percentage of daily smokers smoking given quantities of manufactured or hand-rolled cigarettes per day											
	Women										
Age Group (years)	n	% <5 Cigs.	95% CI	% 5-9 Cigs.	95% CI	% 10-14 Cigs.	95% CI	% 15-24 Cigs.	95% CI	% ≥ 25 Cigs.	95% CI
25-44	121	28.1	16.9-39.3	32.4	21.9-43.0	19.1	11.2-27.0	17.1	8.8-25.4	3.3	0.0-6.6
45-64	44	22.7	4.2-41.3	14.3	3.8-24.8	25.6	10.5-40.8	22.2	7.1-37.3	15.2	0.5-29.8
25-64	**165**	**27.0**	**15.8-38.2**	**28.9**	**19.6-38.1**	**20.4**	**13.0-27.7**	**18.1**	**10.6-25.6**	**5.6**	**1.5-9.7**

Percentage of daily smokers smoking given quantities of manufactured or hand-rolled cigarettes per day											
	Both Sexes										
Age Group (years)	n	% <5 Cigs.	95% CI	% 5-9 Cigs.	95% CI	% 10-14 Cigs.	95% CI	% 15-24 Cigs.	95% CI	% ≥ 25 Cigs.	95% CI
25-44	322	12.9	8.3-17.5	22.9	17.1-28.7	23.9	18.0-29.7	27.5	21.3-33.6	12.8	8.3-17.3
45-64	208	7.1	2.9-11.3	18.3	12.8-23.8	26.3	18.8-33.7	31.4	23.1-39.6	16.9	10.2-23.7
25-64	**530**	**11.2**	**7.5-14.9**	**21.6**	**17.1-26.1**	**24.6**	**19.8-29.3**	**28.6**	**23.6-33.6**	**14.0**	**10.4-17.6**

Percentage of ex daily smokers in the population

Description: Percentage of ex-daily smokers among all respondents and the mean duration, in years, since ex-daily smokers quit smoking daily.

Instrument question:

- In the past did you ever smoke daily?
- How old were you when you stopped smoking daily?

Ex-daily smokers among all respondents									
Age Group (years)	Men			Women			Both Sexes		
	n	% ex daily smokers	95% CI	n	% ex daily smokers	95% CI	n	% ex daily smokers	95% CI
25-44	518	13.5	9.0-18.0	879	3.5	2.2-4.8	1397	8.4	6.0-10.8
45-64	409	12.4	8.7-16.1	640	2.9	1.5-4.3	1049	7.4	5.4-9.3
25-64	**927**	**13.1**	**9.9-16.4**	**1519**	**3.3**	**2.3-4.3**	**2446**	**8.1**	**6.4-9.7**

Mean years since cessation									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean years	95% CI	n	Mean years	95% CI	n	Mean years	95% CI
25-44	41	7.2	4.5-9.9	26	6.1	3.9-8.4	67	7.0	4.9-9.0
45-64	44	15.4	10.5-20.3	18	16.4	11.8-21.0	62	15.6	11.6-19.6
25-64	**85**	**9.7**	**6.9-12.5**	**44**	**9.1**	**6.6-11.7**	**129**	**9.6**	**7.4-11.8**

Cessation

Description: Percentage of current smokers who have tried to stop smoking during the past 12 months.

Instrument questions:

- Do you currently smoke any tobacco products, such as cigarettes, cigars, or pipes?
- During the past 12 months, have you tried to stop smoking?

Current smokers who have tried to stop smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	% Tried to stop smoking	95% CI	n	% Tried to stop smoking	95% CI	n	% Tried to stop smoking	95% CI
25-44	238	78.8	72.5-85.0	135	82.7	74.7-90.7	373	79.8	74.7-84.9
45-64	191	76.1	68.2-84.1	55	81.6	67.4-95.8	246	77.1	70.0-84.2
25-64	**429**	**77.9**	**73.2-82.6**	**190**	**82.5**	**75.3-89.6**	**619**	**79.0**	**75.2-82.8**

Advice to stop smoking

Description: Percentage of current smokers who have been advised by a doctor or other health worker to stop smoking, among those smokers who have had a visit to a doctor or other health worker in the past 12 months.

Instrument questions:

- Do you currently smoke any tobacco products, such as cigarettes, cigars, or pipes?
- During any visit to a doctor or other health worker in the past 12 months, were you advised to quit smoking tobacco?

Current smokers who have been advised by doctor to stop smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	% Advised to stop smoking	95% CI	n	% Advised to stop smoking	95% CI	n	% Advised to stop smoking	95% CI
25-44	210	41.7	33.6-49.8	116	60.6	49.4-71.8	326	46.4	39.6-53.1
45-64	172	58.6	50.0-67.3	47	74.4	60.2-88.6	219	61.1	53.6-68.6
25-64	**382**	**47.3**	**41.2-53.4**	**163**	**63.6**	**54.1-73.1**	**545**	**50.9**	**45.7-56.0**

Exposure to ETS in home in past 7 days

Description: Percentage of respondents exposed to environmental tobacco smoke in the home on one or more days in the past 7 days.

Instrument question:

- In the past 7 days, how many days did someone in the house smoke when you were present?

Exposed to ETS in home on 1 or more of the past 7 days									
Age Group (years)	Men			Women			Both Sexes		
	n	% Exposed	95% CI	n	% Exposed	95% CI	n	% Exposed	95% CI
25-44	506	34.1	28.6-39.5	873	44.2	40.5-47.9	1379	39.3	36.0-42.6
45-64	408	33.2	27.6-38.7	633	42.6	37.0-48.2	1041	38.1	34.0-42.3
25-64	**914**	**33.8**	**29.6-38.0**	**1506**	**43.7**	**40.4-47.0**	**2420**	**38.9**	**36.2-41.6**

Exposure to ETS in the workplace in past 7 days

Description: Percentage of respondents exposed to environmental tobacco smoke in the workplace on one or more days in the past 7 days.

Instrument question:

- In the past 7 days, how many days did someone smoke in closed areas in your workplace (in the building, in a work area or a specific office) when you were present?

Exposed to ETS in the workplace on 1 or more of the past 7 days									
Age Group (years)	Men			Women			Both Sexes		
	n	% Exposed	95% CI	n	% Exposed	95% CI	n	% Exposed	95% CI
25-44	459	39.3	33.9-44.7	755	26.9	22.8-31.1	1214	33.0	29.3-36.7
45-64	348	35.1	29.3-40.9	537	26.2	21.2-31.1	885	30.4	26.5-34.4
25-64	**807**	**38.0**	**33.8-42.2**	**1292**	**26.7**	**23.2-30.2**	**2099**	**32.2**	**29.3-35.2**

Alcohol Consumption

Alcohol consumption status

Description: Alcohol consumption status of all respondents.

Instrument questions:

- Have you ever consumed an alcoholic drink such as …?
- Have you consumed an alcoholic drink in the past 12 months?
- Have you consumed an alcoholic drink in the past 30 days?

Alcohol consumption status									
	Men								
Age Group (years)	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-44	519	19.7	15.4-24.0	10.1	7.0-13.2	15.0	10.7-19.3	55.3	49.4-61.1
45-64	410	9.3	6.0-12.5	5.7	3.1-8.3	21.0	16.6-25.3	64.1	58.6-69.6
25-64	**929**	**16.4**	**13.2-19.5**	**8.7**	**6.4-11.0**	**16.9**	**13.6-20.2**	**58.1**	**53.5-62.6**

Alcohol consumption status									
	Women								
Age Group (years)	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-44	881	3.9	2.3-5.5	3.5	1.8-5.2	8.6	6.5-10.8	84.0	80.7-87.3
45-64	641	0.5	0.0-1.0	1.5	0.1-2.9	6.5	3.8-9.1	91.5	88.5-94.6
25-64	**1522**	**2.8**	**1.7-3.8**	**2.8**	**1.6-4.1**	**7.9**	**6.1-9.7**	**86.5**	**83.9-89.0**

Alcohol consumption status									
	Both Sexes								
Age Group (years)	n	% Current drinker (past 30 days)	95% CI	% Drank in past 12 months, not current	95% CI	% Past 12 months abstainer	95% CI	% Lifetime abstainer	95% CI
25-44	1400	11.6	9.3-13.9	6.7	5.0-8.4	11.7	9.4-14.1	70.0	66.5-73.5
45-64	1051	4.6	3.0-6.2	3.5	2.1-4.9	13.3	10.6-16.0	78.6	75.1-82.1
25-64	**2451**	**9.3**	**7.6-11.1**	**5.7**	**4.4-6.9**	**12.2**	**10.4-14.0**	**72.8**	**70.1-75.5**

Frequency of alcohol consumption

Description: Frequency of alcohol consumption in the past 12 months among those respondents who have drank in the last 12 months.

Instrument question:

- During the past 12 months, how frequently have you had at least one alcoholic drink?

Frequency of alcohol consumption in the past 12 months											
Age Group (years)	Men										
	n	% Daily	95% CI	% 5-6 days p. week	95% CI	% 1-4 days p. week	95% CI	% 1-3 days p. month	95% CI	% < once a month	95% CI
25-44	144	0.5	0.0-1.4	3.8	0.4-7.2	24.9	16.3-33.4	34.4	24.8-44.0	36.5	26.8-46.1
45-64	61	5.8	0.0-12.0	5.2	0.0-10.5	18.3	8.3-28.2	20.0	7.3-32.6	50.7	36.5-64.9
25-64	**205**	**1.5**	**0.1-2.9**	**4.1**	**1.1-7.0**	**23.6**	**16.4-30.8**	**31.6**	**23.2-40.0**	**39.2**	**30.6-47.8**

Frequency of alcohol consumption in the past 12 months											
Age Group (years)	Women										
	n	% Daily	95% CI	% 5-6 days p. week	95% CI	% 1-4 days p. week	95% CI	% 1-3 days p. month	95% CI	% < once a month	95% CI
25-44	55	0.0	0.0-0.0	2.0	0.0-5.9	12.1	2.0-22.2	25.4	12.1-38.7	60.5	47.4-73.6
45-64	11	0.0	0.0-0.0	0.0	0.0-0.0	9.1	0.0-27.1	29.8	0.0-74.7	61.1	18.6-100.0
25-64	**66**	**0.0**	**0.0-0.0**	**1.7**	**0.0-5.2**	**11.7**	**2.5-20.9**	**26.0**	**12.7-39.2**	**60.6**	**47.6-73.6**

Frequency of alcohol consumption in the past 12 months											
Age Group (years)	Both Sexes										
	n	% Daily	95% CI	% 5-6 days p. week	95% CI	% 1-4 days p. week	95% CI	% 1-3 days p. month	95% CI	% < once a month	95% CI
25-44	199	0.4	0.0-1.1	3.4	0.6-6.3	22.4	15.1-29.7	32.6	24.4-40.8	41.2	32.9-49.4
45-64	72	5.1	0.0-10.4	4.5	0.0-9.0	17.0	8.0-26.0	21.3	8.6-33.9	52.1	38.6-65.6
25-64	**271**	**1.2**	**0.1-2.4**	**3.6**	**1.1-6.1**	**21.4**	**15.2-27.7**	**30.6**	**23.3-37.9**	**43.1**	**35.6-50.6**

Drinking occasions in the past 30 days

Description: Mean number of occasions with at least one drink in the past 30 days among current (past 30 days) drinkers.

Instrument question:

- During the past 30 days, on how many occasions did you have at least one alcoholic drink?

Mean number of drinking occasions in the past 30 days among current (past 30 days) drinkers									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	94	4.2	2.9-5.4	32	2.3	1.8-2.8	126	3.8	2.8-4.9
45-64	37	3.8	2.1-5.5	3	2.2	1.0-3.4	40	3.7	2.1-5.3
25-64	**131**	**4.1**	**3.0-5.2**	**35**	**2.3**	**1.8-2.8**	**166**	**3.8**	**2.9-4.7**

Standard drinks per drinking day

Description: Mean number of standard drinks consumed on a drinking occasion among current (past 30 days) drinker.

Instrument question:

- During the past 30 days, when you drank alcohol, on average, how many standard alcoholic drinks did you have during one occasion?

Mean number of standard drinks per drinking occasion among current (past 30 days) drinkers									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	94	8.8	6.4-11.2	32	3.6	2.6-4.6	126	7.9	5.8-9.9
45-64	38	7.2	5.2-9.2	3	3.4	2.6-4.3	41	7.0	5.1-8.9
25-64	**132**	**8.5**	**6.5-10.5**	**35**	**3.6**	**2.7-4.5**	**167**	**7.7**	**6.0-9.5**

Average volume drinking categories among all respondents

Description: Percentage of respondents engaging in category II and category III drinking.
Category III is defined as drinking ≥60g of pure alcohol on average per day for men and ≥40 g for women.
Category II is defined as drinking 40-59.9g of pure alcohol on average per day for men and 20-39.9g for women.
A standard drink contains approximately 10g of pure alcohol.

Instrument questions:

- During the past 30 days, on how many occasions did you have at least one alcoholic drink?
- During the past 30 days, when you drank alcohol, on average, how many standard alcoholic drinks did you have during one occasion?

Category III drinking among all respondents									
Age Group (years)	Men			Women			Both Sexes		
	n	% Category III	95% CI	n	% Category III	95% CI	n	% Category III	95% CI
25-44	512	1.4	0.5-2.3	880	0.0	0.0-0.0	1392	0.7	0.2-1.1
45-64	409	0.3	0.0-0.7	641	0.0	0.0-0.0	1050	0.1	0.0-0.4
25-64	**921**	**1.1**	**0.4-1.7**	**1521**	**0.0**	**0.0-0.0**	**2442**	**0.5**	**0.2-0.8**

Category II drinking among all respondents									
Age Group (years)	Men			Women			Both Sexes		
	n	% Category II	95% CI	n	% Category II	95% CI	n	% Category II	95% CI
25-44	512	0.5	0.0-1.3	880	0.0	0.0-0.0	1392	0.3	0.0-0.6
45-64	409	0.5	0.0-1.1	641	0.0	0.0-0.0	1050	0.2	0.0-0.5
25-64	**921**	**0.5**	**0.0-1.1**	**1521**	**0.0**	**0.0-0.0**	**2442**	**0.2**	**0.0-0.5**

Average volume drinking categories among current (past 30 days) drinkers

Description: Percentage of current (last 30 days) drinker engaging in category I, category II and category III drinking.
Category III is defined as drinking ≥60g of pure alcohol on average per day for men and ≥40 g for women.
Category II is defined as drinking 40-59.9g of pure alcohol on average per day for men and 20-39.9g for women.
Category I is defined as drinking <40g of pure alcohol on average per day for men and <20 for women.
A standard drink contains approximately 10g of pure alcohol.

Instrument questions:

- During the past 30 days, on how many occasions did you have at least one alcoholic drink?
- During the past 30 days, when you drank alcohol, on average, how many standard alcoholic drinks did you have during one occasion?

Category I, II and III drinking among current (past 30 days) drinkers							
	Men						
Age Group (years)	n	% Category III	95% CI	% Category II	95% CI	% Category I	95% CI
25-44	92	7.5	2.3-12.7	2.8	0.0-7.0	89.7	83.1-96.3
45-64	37	3.4	0.0-8.4	5.6	0.0-12.5	91.0	82.5-99.5
25-64	**129**	**6.8**	**2.5-11.0**	**3.3**	**0.0-6.9**	**89.9**	**84.5-95.4**

Category I, II and III drinking among current (past 30 days) drinkers							
	Women						
Age Group (years)	n	% Category III	95% CI	% Category II	95% CI	% Category I	95% CI
25-44	32	0.0	0.0-0.0	0.0	0.0-0.0	100.0	100.0-100.0
45-64	3	0.0	0.0-0.0	0.0	0.0-0.0	100.0	100.0-100.0
25-64	**35**	**0.0**	**0.0-0.0**	**0.0**	**0.0-0.0**	**100.0**	**100.0-100.0**

Category I, II and III drinking among current (past 30 days) drinkers							
	Both Sexes						
Age Group (years)	n	% Category III	95% CI	% Category II	95% CI	% Category I	95% CI
25-44	124	6.2	1.9-10.4	2.3	0.0-5.7	91.5	86.1-96.9
45-64	40	3.2	0.0-7.9	5.2	0.0-11.8	91.5	83.5-99.5
25-64	**164**	**5.7**	**2.1-9.3**	**2.8**	**0.0-5.8**	**91.5**	**86.9-96.2**

Largest number of drinks in the past 30 days

Description: Largest number of drinks consumed during a single occasion in the past 30 days among current (past 30 days) drinker).

Instrument question:

- During the past 30 days what was the largest number of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?

Mean maximum number of drinks consumed on one occasion in the past 30 days									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean maximum number	95% CI	n	Mean maximum number	95% CI	n	Mean maximum number	95% CI
25-44	91	12.4	9.8-15.0	31	8.1	4.4-11.7	122	11.6	9.4-13.9
45-64	37	10.2	7.0-13.3	3	5.7	2.7-8.6	40	9.9	6.9-12.9
25-64	**128**	**12.0**	**9.8-14.2**	**34**	**7.9**	**4.5-11.3**	**162**	**11.4**	**9.4-13.3**

Five/four or more drinks on a single occasion

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

Instrument question:

- During the past 30 days, how many times did you have
for men: **five or more**
for women: **four or more**
standard alcoholic drinks in a single drinking occasion?

Five/four or more drinks on a single occasion at least once during the past 30 days among total population						
Age Group (years)	Men			Women		
	n	% ≥ 5 drinks	95% CI	n	% ≥ 4drinks	95% CI
25-44	519	17.1	13.0-21.2	881	3.2	1.7-4.6
45-64	410	9.2	6.0-12.4	641	0.3	0.0-0.7
25-64	**929**	**14.6**	**11.6-17.6**	**1522**	**2.2**	**1.2-3.2**

Five/four or more drinks on a single occasion

Description: Mean number of times in the past 30 days on which current (past 30 days) drinker consumed five (for men)/four (for women) or more drinks during a single occasion among current (past 30 days) drinkers.

Instrument question:

- During the past 30 days, how many times did you have
for men: **five or more**
for women: **four or more**
standard alcoholic drinks in a single drinking occasion?

Mean number of times with five/four or more drinks during a single occasion in the past 30 days among current drinkers						
Age Group (years)	Men			Women		
	n	Mean number of times	95% CI	n	Mean number of times	95% CI
25-44	93	4.8	3.7-5.9	32	3.1	2.3-3.9
45-64	38	4.7	2.9-6.5	3	1.8	0.0-3.6
25-64	**131**	**4.8**	**3.8-5.7**	**35**	**3.0**	**2.3-3.8**

Drinking with meals

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

Instrument questions:

- During the past 30 days, when you consumed an alcoholic drink, how often was it with meals? Please do not count snacks.

Drinking with meals among current drinker									
	Men								
Age Group (years)	n	% Usually with meals	95% CI	% Sometimes with meals	95% CI	% Rarely with meals	95% CI	% Never with meals	95% CI
25-44	99	26.1	13.9-38.4	19.7	9.7-29.7	16.9	9.9-23.9	37.2	26.4-48.0
45-64	38	16.2	4.5-27.9	28.7	11.7-45.7	25.0	4.2-45.8	30.1	13.4-46.7
25-64	**137**	**24.4**	**14.1-34.6**	**21.3**	**12.7-29.9**	**18.4**	**11.4-25.4**	**35.9**	**26.5-45.3**

Drinking with meals among current drinker									
	Women								
Age Group (years)	n	% Usually with meals	95% CI	% Sometimes with meals	95% CI	% Rarely with meals	95% CI	% Never with meals	95% CI
25-44	33	27.5	11.7-43.2	36.3	15.2-57.4	8.5	0.0-20.5	27.8	8.4-47.1
45-64	3	78.3	35.1-100.0	21.7	0.0-64.9	0.0	0.0-0.0	0.0	0.0-0.0
25-64	**36**	**30.4**	**14.6-46.2**	**35.5**	**15.3-55.6**	**8.0**	**0.0-19.3**	**26.2**	**7.8-44.5**

Drinking with meals among current drinker									
	Both Sexes								
Age Group (years)	n	% Usually with meals	95% CI	% Sometimes with meals	95% CI	% Rarely with meals	95% CI	% Never with meals	95% CI
25-44	132	26.4	16.1-36.6	22.6	13.8-31.3	15.5	9.3-21.7	35.6	26.1-45.0
45-64	41	19.6	7.3-32.0	28.3	12.2-44.5	23.6	3.8-43.5	28.4	12.7-44.1
25-64	**173**	**25.3**	**16.5-34.1**	**23.5**	**15.8-31.2**	**16.8**	**10.7-22.9**	**34.4**	**26.0-42.9**

Past 7 days drinking

Description: Frequency and quantity of drinks consumed in the past 7 days by current (past 30 days) drinkers, grouped into three categories.

Instrument question:

- During each of the past 7 days, how many standard drinks of any alcoholic drink did you have each day?

Frequency and quantity of drinks consumed in the past 7 days							
	Men						
Age Group (years)	n	% Drank on 4+ days	95% CI	% 5+ drinks on any day	95% CI	% 20+ drinks in 7 days	95% CI
25-44	87	4.4	0.0-10.2	66.3	53.4-79.1	21.6	11.1-32.0
45-64	37	25.6	7.2-44.0	41.5	21.3-61.7	8.9	0.0-18.5
25-64	**124**	**8.5**	**2.3-14.7**	**61.5**	**50.4-72.6**	**19.1**	**10.3-27.9**

Frequency and quantity of drinks consumed in the past 7 days							
	Women						
Age Group (years)	n	% Drank on 4+ days	95% CI	% 4+ drinks on any day	95% CI	% 15+ drinks in 7 days	95% CI
25-44	31	4.6	0.0-10.4	38.9	18.5-59.3	17.2	0.0-36.1
45-64	3	0.0	0.0-0.0	21.7	0.0-65.1	21.7	0.0-65.1
25-64	**34**	**4.3**	**0.0-9.8**	**37.8**	**18.3-57.4**	**17.5**	**0.0-35.4**

Frequency and quantity of drinks consumed in the past 7 days			
	Both Sexes		
Age Group (years)	n	% Drank on 4+ days	95% CI
25-44	118	4.4	0.0-9.4
45-64	40	24.1	6.7-41.6
25-64	**158**	**7.8**	**2.5-13.1**

Fruit and Vegetable Consumption

Mean number of days of fruit and vegetable consumption

Description: mean number of days fruit and vegetables consumed.

Instrument questions:

- In a typical week, on how many days do you eat fruit?
- In a typical week, on how many days do you eat vegetables?

Mean number of days fruit consumed in a typical week

Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of days	95% CI	n	Mean number of days	95% CI	n	Mean number of days	95% CI
25-44	515	3.3	3.0-3.6	877	3.4	3.1-3.6	1392	3.3	3.1-3.5
45-64	408	3.3	3.0-3.6	635	3.4	3.2-3.7	1043	3.4	3.2-3.6
25-64	**923**	**3.3**	**3.0-3.5**	**1512**	**3.4**	**3.2-3.6**	**2435**	**3.4**	**3.2-3.5**

Mean number of days vegetables consumed in a typical week

Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of days	95% CI	n	Mean number of days	95% CI	n	Mean number of days	95% CI
25-44	515	3.9	3.6-4.2	876	4.4	4.2-4.7	1391	4.2	4.0-4.4
45-64	406	3.9	3.6-4.1	633	4.4	4.2-4.6	1039	4.2	4.0-4.3
25-64	**921**	**3.9**	**3.7-4.1**	**1509**	**4.4**	**4.3-4.6**	**2430**	**4.2**	**4.1-4.3**

Mean number of servings of fruit and vegetable consumption

Description: mean number of fruit, vegetable, and combined fruit and vegetable servings on average per day.

Instrument questions:

- In a typical week, on how many days do you eat fruit?
- How many servings of fruit do you eat on one of those days?
- In a typical week, on how many days do you eat vegetables?
- How many servings of vegetables do you eat on one of those days?

Mean number of servings of fruit on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	515	2.0	1.6-2.3	876	1.7	1.5-1.9	1391	1.8	1.6-2.0
45-64	408	2.0	1.6-2.3	633	1.7	1.5-2.0	1041	1.8	1.6-2.0
25-64	**923**	**2.0**	**1.7-2.2**	**1509**	**1.7**	**1.6-1.9**	**2432**	**1.8**	**1.7-2.0**

Mean number of servings of vegetables on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	515	2.0	1.8-2.3	876	2.1	1.9-2.4	1391	2.1	1.9-2.3
45-64	406	2.0	1.8-2.3	632	2.2	1.9-2.5	1038	2.1	1.9-2.3
25-64	**921**	**2.0**	**1.8-2.2**	**1508**	**2.2**	**2.0-2.4**	**2429**	**2.1**	**2.0-2.3**

Mean number of servings of fruit and/or vegetables on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
25-44	516	4.0	3.5-4.5	879	3.9	3.5-4.2	1395	3.9	3.6-4.2
45-64	408	4.0	3.5-4.5	635	3.9	3.4-4.4	1043	4.0	3.6-4.3
25-64	**924**	**4.0**	**3.6-4.4**	**1514**	**3.9**	**3.6-4.2**	**2438**	**3.9**	**3.7-4.2**

Fruit and vegetable consumption per day

Description: Frequency of fruit and/or vegetable consumption.

Instrument questions:

- In a typical week, on how many days do you eat fruit?
- How many servings of fruit do you eat on one of those days?
- In a typical week, on how many days do you eat vegetables?
- How many servings of vegetables do you eat on one of those days?

Number of servings of fruit and/or vegetables on average per day									
Age Group (years)	Men								
	n	% no fruit and/or vegetables	95% CI	% 1-2 servings	95% CI	% 3-4 servings	95% CI	% ≥5 servings	95% CI
25-44	516	18.2	14.2-22.2	34.0	28.8-39.3	20.8	15.0-26.6	26.9	21.4-32.5
45-64	408	17.4	12.8-22.1	33.7	28.6-38.9	19.9	15.1-24.7	28.9	23.1-34.7
25-64	**924**	**18.0**	**14.8-21.2**	**33.9**	**30.0-37.9**	**20.5**	**16.3-24.8**	**27.6**	**23.1-32.0**

Number of servings of fruit and/or vegetables on average per day									
Age Group (years)	Women								
	n	% no fruit and/or vegetables	95% CI	% 1-2 servings	95% CI	% 3-4 servings	95% CI	% ≥5 servings	95% CI
25-44	879	15.5	12.1-18.8	36.8	33.2-40.5	20.6	17.6-23.7	27.1	23.2-31.0
45-64	635	11.1	8.1-14.1	42.3	37.1-47.6	21.9	17.8-26.0	24.7	20.1-29.3
25-64	**1514**	**14.0**	**11.5-16.6**	**38.6**	**35.5-41.8**	**21.1**	**18.6-23.5**	**26.3**	**23.2-29.4**

Number of servings of fruit and/or vegetables on average per day									
Age Group (years)	Both Sexes								
	n	% no fruit and/or vegetables	95% CI	% 1-2 servings	95% CI	% 3-4 servings	95% CI	% ≥5 servings	95% CI
25-44	1395	16.8	14.1-19.5	35.5	32.5-38.4	20.7	17.7-23.7	27.0	23.5-30.5
45-64	1043	14.1	11.2-16.9	38.3	34.5-42.0	21.0	17.8-24.2	26.7	23.0-30.3
25-64	**2438**	**15.9**	**13.8-18.1**	**36.4**	**34.0-38.7**	**20.8**	**18.6-23.0**	**26.9**	**23.9-29.9**

Fruit and vegetable consumption per day

Description: Percentage of those eating less than five servings of fruit and/or vegetables on average per day.

Instrument questions:

- In a typical week, on how many days do you eat fruit?
- How many servings of fruit do you eat on one of those days?
- In a typical week, on how many days do you eat vegetables?
- How many servings of vegetables do you eat on one of those days?

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	n	% < five servings per day	95% CI
25-44	516	73.1	67.5-78.6	879	72.9	69.0-76.8	1395	73.0	69.5-76.5
45-64	408	71.1	65.3-76.9	635	75.3	70.7-79.9	1043	73.3	69.7-77.0
25-64	**924**	**72.4**	**68.0-76.9**	**1514**	**73.7**	**70.6-76.8**	**2438**	**73.1**	**70.1-76.1**

Type of oil used most frequently

Description: Type of oil or fat most often used for meal preparation in households (presented only for both sexes because results are for the household not individuals).

Instrument question:

- What type of oil or fat is most often used for meal preparation in your household?

Type of oil or fat most often used for meal preparation in household								
n (house-holds)	% Vegetable oil	95% CI	% Lard	95% CI	% Butter	95% CI	% Margarine	95% CI
2436	**73.3**	**70.5-76.0**	**5.1**	**4.0-6.2**	**7.9**	**6.0-9.7**	**1.6**	**1.0-2.3**

Type of oil or fat most often used for meal preparation in household						
n (house -holds)	% none in particular	95% CI	% None used	95% CI	% Other	95% CI
2436	**1.2**	**0.7-1.7**	**1.7**	**0.9-2.5**	**9.2**	**7.7-10.8**

Eating outside home

Description: Mean number of meals per week eaten outside a home.

Instrument question:

- On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.

Mean number of meals eaten outside a home

Age Group (years)	Men			Women			Both Sexes		
	n	mean	95% CI	n	mean	95% CI	n	mean	95% CI
25-44	516	0.9	0.7-1.1	872	0.6	0.5-0.7	1388	0.8	0.6-0.9
45-64	407	0.5	0.4-0.7	635	0.5	0.4-0.6	1042	0.5	0.4-0.6
25-64	**923**	**0.8**	**0.7-1.0**	**1507**	**0.6**	**0.5-0.7**	**2430**	**0.7**	**0.6-0.8**

Physical Activity

Introduction

A population's physical activity (or inactivity) can be described in different ways. The two most common ways are
(1) to estimate a population's mean or median physical activity using a continuous indicator such as MET-minutes per week or time spent in physical activity, and
(2) to classify a certain percentage of a population as 'inactive' by setting up a cut-point for a specific amount of physical activity.

When analyzing GPAQ data, both continuous as well as categorical indicators are used.

Metabolic Equivalent (MET)

METs (Metabolic Equivalents) are commonly used to express the intensity of physical activities, and are also used for the analysis of GPAQ data.

Applying MET values to activity levels allows us to calculate total physical activity. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. For the analysis of GPAQ data, existing guidelines have been adopted: It is estimated that, compared to sitting quietly, a person's caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active.

Therefore, for the calculation of a person's total physical activity using GPAQ data, the following MET values are used:

Domain	MET value
Work	• Moderate MET value = 4.0 • Vigorous MET value = 8.0
Transport	Cycling and walking MET value = 4.0
Recreation	• Moderate MET value = 4.0 • Vigorous MET value = 8.0

WHO global recommen-dations on physical activity for health

For the calculation of the categorical indicator on the recommended amount of physical activity for health, the total time spent in physical activity during a typical week and the intensity of the physical activity are taken into account.

Throughout a week, including activity for work, during transport and leisure time, adults should do at least

- 150 minutes of moderate-intensity physical activity OR
- 75 minutes of vigorous-intensity physical activity OR
- An equivalent combination of moderate- and vigorous-intensity physical activity achieving at least 600 MET-minutes.

Former recommen-dations for comparison

For comparison purposes, tables presenting cut-offs from former recommendations are also included in GPAQ data analysis.

purposes

The three levels of physical activity suggested for classifying populations were low, moderate, and high. The criteria for these levels are shown below.

- **High**

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

- **Moderate**

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

- **Low**

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

Not meeting WHO recommendations on physical activity for health

Description: Percentage of respondents not meeting WHO recommendations on physical activity for health (respondents doing less than 150 minutes of moderate-intensity physical activity per week, or equivalent).

Instrument questions
- activity at work
- travel to and from places
- recreational activities

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
25-44	515	12.3	9.3-15.4	867	27.2	23.3-31.0	1382	19.9	17.5-22.2
45-64	404	10.5	7.1-14.0	636	29.4	23.2-35.5	1040	20.5	16.6-24.4
25-64	**919**	**11.7**	**9.4-14.1**	**1503**	**27.9**	**24.1-31.7**	**2422**	**20.1**	**17.9-22.3**

Levels of total physical activity

Description: Percentage of respondents classified into three categories of total physical activity.

Instrument questions:
- activity at work
- travel to and from places
- recreational activities

Level of total physical activity							
Age Group (years)	Men						
	n	% Low	95% CI	% Moderate	95% CI	% High	95% CI
25-44	515	15.0	11.5-18.5	11.0	7.6-14.3	74.0	69.4-78.7
45-64	404	15.3	11.0-19.6	24.7	19.5-29.8	60.1	53.6-66.5
25-64	**919**	**15.1**	**12.3-17.9**	**15.2**	**12.4-18.1**	**69.7**	**65.8-73.5**

Level of total physical activity							
Age Group (years)	Women						
	n	% Low	95% CI	% Moderate	95% CI	% High	95% CI
25-44	867	30.8	27.0-34.6	31.9	28.1-35.6	37.4	33.3-41.4
45-64	636	33.5	27.4-39.7	32.5	26.9-38.0	34.0	28.5-39.6
25-64	**1503**	**31.7**	**27.9-35.5**	**32.1**	**28.9-35.2**	**36.3**	**32.8-39.7**

Level of total physical activity

Age Group (years)	Both Sexes						
	n	% Low	95% CI	% Moderate	95% CI	% High	95% CI
25-44	1382	23.0	20.6-25.4	21.6	18.9-24.3	55.4	52.0-58.8
45-64	1040	25.0	21.0-28.9	28.8	24.9-32.7	46.2	41.7-50.8
25-64	**2422**	**23.7**	**21.5-25.8**	**23.9**	**21.6-26.3**	**52.4**	**49.7-55.1**

Total physical activity-mean

Description: Mean minutes of total physical activity on average per day.

Instrument questions
- activity at work
- travel to and from places
- recreational activities

Mean minutes of total physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	n	Mean minutes	95% CI
25-44	515	245.8	222.8-268.9	867	116.8	105.6-128.1	1382	180.1	166.0-194.3
45-64	404	194.1	171.4-216.8	636	101.8	88.0-115.5	1040	145.1	131.2-158.9
25-64	**919**	**229.6**	**212.5-246.8**	**1503**	**111.8**	**102.4-121.3**	**2422**	**168.8**	**157.5-180.0**

Total physical activity-median

Description: Median minutes of total physical activity on average per day.

Instrument questions
- activity at work
- travel to and from places
- recreational activities

Median minutes of total physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)
25-44	515	214.3	72.9-342.9	867	60.0	17.1-171.4	1382	120.0	30.0-270.0
45-64	404	150.0	60.0-265.7	636	60.0	12.9-158.6	1040	98.6	30.0-218.6
25-64	**919**	**192.9**	**64.3-321.4**	**1503**	**60.0**	**15.0-171.4**	**2422**	**111.4**	**30.0-257.1**

Domain-specific physical activity-mean

Description: Mean minutes spent in work-, transport- and recreation-related physical activity on average per day.

Instrument questions:

- activity at work
- travel to and from places
- recreational activities

Mean minutes of work-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	n	Mean minutes	95% CI
25-44	515	154.3	135.8-172.8	867	74.8	64.5-85.0	1382	113.8	102.5-125.0
45-64	404	121.7	104.7-138.7	636	64.9	51.9-78.0	1040	91.5	80.4-102.6
25-64	**919**	**144.1**	**130.5-157.6**	**1503**	**71.5**	**62.9-80.0**	**2422**	**106.6**	**97.9-115.3**

Mean minutes of transport-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	n	Mean minutes	95% CI
25-44	515	55.6	48.2-62.9	867	32.4	28.5-36.2	1382	43.7	39.2-48.3
45-64	404	51.1	43.4-58.8	636	31.7	26.4-37.0	1040	40.8	36.0-45.6
25-64	**919**	**54.2**	**48.5-59.8**	**1503**	**32.1**	**28.9-35.3**	**2422**	**42.8**	**39.3-46.3**

Mean minutes of recreation-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean minutes	95% CI	n	Mean minutes	95% CI	**n**	**Mean minutes**	**95% CI**
25-44	515	36.0	29.0-43.0	867	9.7	7.3-12.1	1382	22.6	18.7-26.5
45-64	404	21.3	14.1-28.5	636	5.1	3.3-7.0	1040	12.7	8.8-16.6
25-64	**919**	**31.4**	**26.1-36.7**	**1503**	**8.2**	**6.4-9.9**	**2422**	**19.4**	**16.6-22.3**

Domain-specific physical activity - median

Description: Median minutes spent on average per day in work-, transport- and recreation-related physical activity.

Instrument questions:

- activity at work
- travel to and from places
- recreational activities

Median minutes of work-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)
25-44	515	128.6	0.0-231.4	867	0.0	0.0-102.9	1382	45.0	0.0-188.6
45-64	404	85.7	0.0-205.7	636	0.0	0.0-102.9	1040	32.1	0.0-162.9
25-64	**919**	**102.9**	**0.0-214.3**	**1503**	**0.0**	**0.0-102.9**	**2422**	**42.9**	**0.0-180.0**

Median minutes of transport-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)
25-44	515	30.0	1.4-85.7	867	12.9	0.0-45.0	1382	20.0	0.0-60.0
45-64	404	25.7	0.0-64.3	636	12.9	0.0-51.4	1040	20.0	0.0-60.0
25-64	**919**	**30.0**	**1.4-77.1**	**1503**	**12.9**	**0.0-45.0**	**2422**	**20.0**	**0.0-60.0**

Median minutes of recreation-related physical activity on average per day									
Age Group (years)	Men			Women			Both Sexes		
	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)	n	Median minutes	Inter-quartile range (P25-P75)
25-44	515	0.0	0.0-42.9	867	0.0	0.0-0.0	1382	0.0	0.0-17.1
45-64	404	0.0	0.0-0.0	636	0.0	0.0-0.0	1040	0.0	0.0-0.0
25-64	**919**	**0.0**	**0.0-34.3**	**1503**	**0.0**	**0.0-0.0**	**2422**	**0.0**	**0.0-5.7**

No physical activity by domain

Description: Percentage of respondents classified as doing no work-, transport- or recreational-related physical activity.

Instrument questions:

- activity at work
- travel to and from places
- recreational activities

No work-related physical activity									
Age Group (years)	Men			Women			Both Sexes		
	n	% no activity at work	95% CI	n	% no activity at work	95% CI	n	% no activity at work	95% CI
25-44	515	28.1	23.3-32.8	867	51.7	47.4-56.0	1382	40.1	36.7-43.4
45-64	404	33.4	27.7-39.2	636	53.7	47.3-60.0	1040	44.2	39.7-48.7
25-64	**919**	**29.7**	**26.0-33.5**	**1503**	**52.3**	**48.3-56.3**	**2422**	**41.4**	**38.6-44.2**

No transport-related physical activity									
Age Group (years)	Men			Women			Both Sexes		
	n	% no activity for transport	95% CI	n	% no activity for transport	95% CI	n	% no activity for transport	95% CI
25-44	515	24.8	20.8-28.9	867	38.2	34.1-42.3	1382	31.6	28.6-34.6
45-64	404	25.1	20.2-30.0	636	36.6	29.9-43.3	1040	31.2	26.8-35.6
25-64	**919**	**24.9**	**21.6-28.2**	**1503**	**37.7**	**33.7-41.6**	**2422**	**31.5**	**28.9-34.1**

No recreation-related physical activity									
Age Group (years)	Men			Women			Both Sexes		
	n	% no activity at recreation	95% CI	n	% no activity at recreation	95% CI	n	% no activity at recreation	95% CI
25-44	515	57.5	51.6-63.3	867	82.2	78.7-85.8	1382	70.1	66.6-73.5
45-64	404	76.1	71.1-81.2	636	87.6	84.1-91.0	1040	82.2	79.0-85.4
25-64	**919**	**63.3**	**58.8-67.8**	**1503**	**84.0**	**81.1-86.9**	**2422**	**74.0**	**71.5-76.5**

Composition of total physical activity

Description: Percentage of work, transport and recreational activity contributing to total activity.

Instrument questions:

- activity at work
- travel to and from places
- recreational activities

Composition of total physical activity							
	Men						
Age Group (years)	n	% Activity from work	95% CI	% Activity for transport	95% CI	% Activity during leisure time	95% CI
25-44	479	53.8	49.6-57.9	31.6	27.7-35.5	14.7	12.3-17.1
45-64	380	51.8	47.0-56.6	38.4	33.5-43.4	9.8	7.5-12.1
25-64	**859**	**53.1**	**50.0-56.3**	**33.7**	**30.7-36.7**	**13.1**	**11.3-14.9**

Composition of total physical activity							
	Women						
Age Group (years)	n	% Activity from work	95% CI	% Activity for transport	95% CI	% Activity during leisure time	95% CI
25-44	705	45.7	41.7-49.7	44.3	40.2-48.5	10.0	7.2-12.7
45-64	522	45.6	39.8-51.4	49.3	43.6-55.0	5.1	3.6-6.6
25-64	**1227**	**45.7**	**42.1-49.2**	**46.0**	**42.5-49.5**	**8.4**	**6.5-10.3**

Composition of total physical activity							
	Both Sexes						
Age Group (years)	n	% Activity from work	95% CI	% Activity for transport	95% CI	% Activity during leisure time	95% CI
25-44	1184	50.0	46.8-53.1	37.6	34.4-40.8	12.5	10.6-14.3
45-64	902	48.7	44.9-52.6	43.8	40.0-47.6	7.5	6.0-9.0
25-64	**2086**	**49.6**	**47.1-52.1**	**39.6**	**37.1-42.0**	**10.9**	**9.5-12.2**

No vigorous physical activity

Description: Percentage of respondents not engaging in vigorous physical activity.

Instrument questions:

- activity at work
- recreational activities

No vigorous physical activity									
Age Group (years)	Men			Women			Both Sexes		
	n	% no vigorous activity	95% CI	n	% no vigorous activity	95% CI	n	% no vigorous activity	95% CI
25-44	515	37.1	31.8-42.4	867	84.0	80.7-87.3	1382	61.0	57.5-64.5
45-64	404	53.8	47.9-59.7	636	89.6	86.2-92.9	1040	72.8	69.0-76.6
25-64	**919**	**42.3**	**38.2-46.5**	**1503**	**85.8**	**83.2-88.5**	**2422**	**64.8**	**62.2-67.4**

Sedentary Description: Minutes spent in sedentary activities on a typical day.

Instrument question:

- sedentary behaviour

Minutes spent in sedentary activities on average per day					
	Men				
Age Group (years)	n	Mean minutes	95% CI	Median minutes	Inter-quartile range (P25-P75)
25-44	519	157.1	142.0-172.2	120.0	60.0-180.0
45-64	409	163.2	149.3-177.2	120.0	60.0-240.0
25-64	**928**	**159.0**	**147.6-170.5**	**120.0**	**60.0-180.0**

Minutes spent in sedentary activities on average per day					
	Women				
Age Group (years)	n	Mean minutes	95% CI	Median minutes	Inter-quartile range (P25-P75)
25-44	882	170.1	160.3-180.0	120.0	60.0-240.0
45-64	640	162.8	150.2-175.4	120.0	60.0-240.0
25-64	**1522**	**167.7**	**159.4-176.1**	**120.0**	**60.0-240.0**

Minutes spent in sedentary activities on average per day					
	Both Sexes				
Age Group (years)	n	Mean minutes	95% CI	Median minutes	Inter-quartile range (P25-P75)
25-44	1401	163.8	155.2-172.3	120.0	60.0-240.0
45-64	1049	163.0	152.9-173.1	120.0	60.0-240.0
25-64	**2450**	**163.5**	**156.7-170.4**	**120.0**	**60.0-240.0**

Blood Pressure and Diabetes History

Blood pressure measurement and diagnosis

Description: Blood pressure measurement and diagnosis among all respondents.

Instrument questions:

- Have you ever had your blood pressure measured by a doctor or other health worker?
- Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?
- Have you been told in the past 12 months?

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
25-44	519	53.5	47.6-59.4	43.2	37.3-49.0	1.1	0.0-2.4	2.2	0.5-3.8
45-64	409	33.7	28.1-39.2	53.7	47.5-59.8	1.9	0.0-3.8	10.8	7.1-14.4
25-64	**928**	**47.2**	**42.8-51.7**	**46.5**	**41.9-51.0**	**1.4**	**0.3-2.4**	**4.9**	**3.3-6.5**

Blood pressure measurement and diagnosis									
	Women								
Age Group (years)	n	% Never measured	95% CI	% measured, not diagnosed	95% CI	% diagnosed, but not within past 12 months	95% CI	% diagnosed within past 12 months	95% CI
25-44	881	32.6	28.9-36.3	61.6	57.7-65.5	3.3	1.9-4.7	2.5	1.4-3.6
45-64	639	20.6	16.6-24.6	56.1	52.0-60.2	3.4	1.6-5.2	19.9	16.2-23.7
25-64	**1520**	**28.6**	**25.7-31.5**	**59.8**	**56.9-62.6**	**3.4**	**2.2-4.5**	**8.2**	**6.7-9.8**

Blood pressure measurement and diagnosis									
	Both sexes								
Age Group (years)	n	% Never measured	95% CI	% measured, not diagnosed	95% CI	% diagnosed, but not within past 12 months	95% CI	% diagnosed within past 12 months	95% CI
25-44	1400	42.8	39.2-46.4	52.6	48.9-56.3	2.3	1.3-3.2	2.3	1.4-3.3
45-64	1048	26.7	23.3-30.2	54.9	51.4-58.5	2.7	1.4-4.0	15.6	12.9-18.4
25-64	**2448**	**37.6**	**34.7-40.5**	**53.4**	**50.5-56.2**	**2.4**	**1.6-3.2**	**6.6**	**5.5-7.7**

Blood pressure treatment among those diagnosed

Description: raised blood pressure treatment results among those previously diagnosed with raised blood pressure.

Instrument questions:

- Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?
- Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker?
- Drugs (medication) that you have taken in the last 2 weeks?

Currently taking blood pressure drugs prescribed by doctor or health worker among those diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	% taking meds	95% CI	n	% taking meds	95% CI	n	% taking meds	95% CI
25-44	17	39.5	5.6-73.4	55	19.9	8.3-31.4	72	26.7	12.0-41.5
45-64	46	75.2	61.0-89.4	139	71.0	62.0-80.0	185	72.4	64.7-80.1
25-64	**63**	**62.3**	**46.9-77.7**	**194**	**53.7**	**44.5-63.0**	**257**	**56.6**	**48.6-64.6**

Blood pressure lifestyle advice

Description: Percentage of respondents who received lifestyle advice from a doctor or health worker to treat raised blood pressure among those previously diagnosed with raised blood pressure.

Instrument questions:

- When was your blood pressure last measured by a health professional?
- Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?
- Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker?

Advised by doctor or health worker to reduce salt intake among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	17	67.4	35.5-99.3	55	65.8	50.6-81.1	72	66.4	51.7-81.1
45-64	46	79.1	64.8-93.5	139	81.0	73.8-88.2	185	80.4	73.8-87.0
25-64	**63**	**74.9**	**60.1-89.8**	**194**	**75.9**	**67.8-84.0**	**257**	**75.6**	**68.4-82.8**

Advised by doctor or health worker to lose weight among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	17	55.9	23.1-88.7	55	66.8	52.2-81.4	72	63.0	48.3-77.7
45-64	46	84.1	71.8-96.5	139	82.4	74.9-89.8	185	82.9	76.7-89.1
25-64	**63**	**73.9**	**59.2-88.7**	**194**	**77.1**	**69.4-84.9**	**257**	**76.1**	**69.1-83.0**

Advised by doctor or health worker to stop smoking among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	17	52.9	19.9-85.9	55	46.2	31.6-60.8	72	48.6	33.7-63.4
45-64	46	68.2	52.2-84.1	139	65.2	54.8-75.6	185	66.2	57.6-74.7
25-64	**63**	**62.7**	**46.9-78.4**	**194**	**58.8**	**49.5-68.0**	**257**	**60.1**	**52.2-67.9**

Advised by doctor or health worker to start or do more exercise among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	17	65.3	33.2-97.3	55	75.1	60.9-89.3	72	71.7	57.2-86.1
45-64	46	81.3	67.6-95.0	139	87.9	82.2-93.5	185	85.7	79.8-91.6
25-64	**63**	**75.5**	**60.8-90.2**	**194**	**83.6**	**77.1-90.0**	**257**	**80.9**	**74.3-87.4**

Blood pressure advice by a traditional healer

Description: Percentage of respondents who have sought advice or received treatment from traditional healers for raised blood pressure among those previously diagnosed with raised blood pressure.

Instrument questions:

- When was your blood pressure last measured by a health professional?
- Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?
- Have you ever seen a traditional healer for raised blood pressure?
- Are you currently taking any herbal or traditional remedy for your high blood pressure?

Seen a traditional healer among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	17	15.2	0.0-34.5	55	8.8	1.7-16.0	72	11.1	3.1-19.1
45-64	46	24.6	10.7-38.6	139	11.1	5.5-16.7	185	15.5	9.2-21.9
25-64	**63**	**21.3**	**9.6-32.9**	**194**	**10.3**	**5.8-14.9**	**257**	**14.0**	**9.0-19.0**

Currently taking herbal or traditional remedy for high blood pressure among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	17	12.3	0.0-28.1	55	14.7	3.1-26.3	72	13.9	4.5-23.2
45-64	46	16.9	5.9-27.9	139	12.7	6.5-18.8	185	14.1	8.7-19.4
25-64	**63**	**15.2**	**6.0-24.4**	**194**	**13.4**	**7.6-19.1**	**257**	**14.0**	**9.2-18.8**

Diabetes measurement and diagnosis

Description: Diabetes measurement and diagnosis among all respondents.

Instrument questions:

- Have you ever had your blood sugar measured by a doctor or other health worker?
- Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?
- Have you been told in the past 12 months?

Blood sugar 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
25-44	519	60.8	55.0-66.6	37.0	31.1-42.8	0.6	0.0-1.3	1.6	0.5-2.7
45-64	409	38.4	32.6-44.2	49.2	43.2-55.2	0.3	0.0-0.9	12.0	8.3-15.7
25-64	**928**	**53.7**	**49.4-58.1**	**40.9**	**36.4-45.3**	**0.5**	**0.1-1.0**	**4.9**	**3.4-6.4**

Blood sugar measurement and diagnosis									
	Women								
Age Group (years)	n	% Never measured	95% CI	% measured, not diagnosed	95% CI	% diagnosed, but not within past 12 months	95% CI	% diagnosed within past 12 months	95% CI
25-44	881	33.0	28.8-37.1	59.3	55.1-63.5	4.0	2.5-5.5	3.8	2.5-5.1
45-64	637	25.9	21.3-30.4	54.4	49.6-59.2	1.6	0.6-2.7	18.1	14.4-21.8
25-64	**1518**	**30.6**	**27.4-33.9**	**57.7**	**54.5-60.8**	**3.2**	**2.1-4.3**	**8.5**	**7.0-10.0**

Blood sugar measurement and diagnosis									
	Both sexes								
Age Group (years)	n	% Never measured	95% CI	% measured, not diagnosed	95% CI	% diagnosed, but not within past 12 months	95% CI	% diagnosed within past 12 months	95% CI
25-44	1400	46.5	42.8-50.2	48.4	44.6-52.2	2.3	1.5-3.2	2.7	1.8-3.6
45-64	1046	31.8	28.0-35.6	51.9	48.0-55.9	1.0	0.4-1.6	15.2	12.6-17.8
25-64	**2446**	**41.8**	**38.8-44.8**	**49.6**	**46.6-52.5**	**1.9**	**1.3-2.5**	**6.8**	**5.7-7.8**

Diabetes treatment among those diagnosed

Description: Diabetes treatment results among those previously diagnosed with raised blood sugar or diabetes.

Instrument questions:

- Have you ever had your blood sugar measured by a doctor or other health worker?
- Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?
- Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker?

Currently taking insulin prescribed for diabetes among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	% taking insulin	95% CI	n	% taking insulin	95% CI	n	% taking insulin	95% CI
25-44	14	0.0	0.0-0.0	69	10.2	1.8-18.7	83	8.0	1.3-14.8
45-64	51	14.2	4.8-23.6	121	25.5	14.6-36.4	172	21.5	13.5-29.4
25-64	**65**	**10.2**	**3.3-17.1**	**190**	**18.7**	**10.8-26.7**	**255**	**16.2**	**10.1-22.2**

Currently taking oral drugs prescribed for diabetes among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	% taking meds	95% CI	n	% taking meds	95% CI	n	% taking meds	95% CI
25-44	14	44.3	16.1-72.6	69	28.9	16.8-41.0	83	32.2	20.5-43.9
45-64	51	77.9	65.6-90.2	121	75.7	66.3-85.0	172	76.5	68.9-84.0
25-64	**65**	**68.5**	**56.2-80.7**	**190**	**54.8**	**45.7-64.0**	**255**	**59.0**	**51.4-66.5**

Diabetes lifestyle advice

Description: Percentage of respondents who received diabetes lifestyle advice from a doctor or health worker among those previously diagnosed with diabetes.

Instrument questions:

- Have you ever had your blood sugar measured by a doctor or other health worker?
- Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?
- Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker?

Advised by doctor or health worker to have special prescribed diet among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	14	72.5	47.9-97.2	69	35.7	23.1-48.3	83	43.6	31.4-55.8
45-64	51	56.2	41.7-70.7	121	70.6	60.7-80.5	172	65.4	56.7-74.0
25-64	**65**	**60.8**	**48.2-73.4**	**190**	**55.0**	**46.5-63.6**	**255**	**56.8**	**49.6-64.0**

Advised by doctor or health worker to lose weight among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	14	67.9	42.1-93.7	69	57.8	43.6-72.0	83	60.0	47.5-72.4
45-64	51	79.0	66.9-91.1	121	70.7	59.0-82.5	172	73.7	65.1-82.3
25-64	**65**	**75.9**	**64.5-87.3**	**190**	**65.0**	**55.4-74.5**	**255**	**68.3**	**60.8-75.7**

Advised by doctor or health worker to stop smoking among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	14	38.8	11.1-66.6	69	39.9	25.5-54.2	83	39.7	27.0-52.4
45-64	51	68.8	53.8-83.8	121	63.9	52.7-75.2	172	65.7	56.8-74.6
25-64	**65**	**60.4**	**46.9-73.9**	**190**	**53.2**	**43.9-62.6**	**255**	**55.4**	**47.7-63.1**

Advised by doctor or health worker to start or do more exercise among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	14	72.5	47.9-97.2	69	59.6	44.9-74.3	83	62.4	49.6-75.1
45-64	51	85.1	74.8-95.4	121	85.1	77.9-92.2	172	85.1	79.1-91.0
25-64	**65**	**81.6**	**71.3-91.9**	**190**	**73.7**	**65.4-82.0**	**255**	**76.1**	**69.5-82.7**

Diabetes advice by traditional healer

Description: Percentage of respondents who are have sought advice or treatment from traditional healers for diabetes among those previously diagnosed.

Instrument questions:

- Have you ever had your blood sugar measured by a doctor or other health worker?
- Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?
- Have you ever seen a traditional healer for diabetes or raised blood sugar?
- Are you currently taking any herbal or traditional remedy for your diabetes?

Seen a traditional healer for diabetes among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	14	0.0	0.0-0.0	69	8.6	0.9-16.4	83	6.8	0.6-12.9
45-64	51	23.3	10.3-36.4	121	19.8	8.2-31.5	172	21.1	12.3-29.9
25-64	**65**	**16.8**	**6.7-26.9**	**190**	**14.9**	**7.4-22.3**	**255**	**15.4**	**9.3-21.6**

Currently taking herbal or traditional treatment for diabetes among those previously diagnosed									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	14	0.0	0.0-0.0	69	4.3	0.0-9.0	83	3.4	0.0-7.1
45-64	51	20.9	5.6-36.2	121	10.3	4.3-16.3	172	14.1	7.3-21.0
25-64	**65**	**15.0**	**3.5-26.6**	**190**	**7.6**	**3.6-11.6**	**255**	**9.9**	**5.4-14.4**

Physical Measurements

Height, weight and BMI

Description: Mean height, weight, and body mass index among all respondents (excluding pregnant women for weight and BMI).

Instrument questions:

- Height
- Weight

Mean height (cm)							
Age Group (years)	Men			Women			
	n	Mean	95% CI		n	Mean	95% CI
25-44	491	178.6	177.7-179.5		848	167.6	166.7-168.5
45-64	389	176.5	175.8-177.2		618	165.8	165.1-166.5
25-64	**880**	**177.9**	**177.3-178.6**		**1466**	**167.0**	**166.3-167.7**

Mean weight (kg)							
Age Group (years)	Men			Women			
	n	Mean	95% CI		n	Mean	95% CI
25-44	491	100.0	97.8-102.2		791	97.3	95.8-98.7
45-64	388	98.1	95.6-100.5		616	98.5	96.2-100.8
25-64	**879**	**99.4**	**97.6-101.1**		**1407**	**97.7**	**96.4-98.9**

Mean BMI (kg/m^2)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	489	31.2	30.6-31.8	786	34.5	34.0-35.0	1275	32.8	32.4-33.3
45-64	388	31.5	30.7-32.2	610	35.5	34.8-36.3	998	33.6	33.0-34.2
25-64	**877**	**31.3**	**30.8-31.8**	**1396**	**34.8**	**34.4-35.3**	**2273**	**33.1**	**32.7-33.5**

BMI categories

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

Instrument questions:

- Height
- Weight

BMI classifications									
	Men								
Age Group (years)	n	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% BMI 25.0-29.9	95% CI	% Obese ≥30.0	95% CI
25-44	489	0.2	0.0-0.7	13.3	9.4-17.2	28.9	24.0-33.7	57.6	52.2-63.0
45-64	388	0.2	0.0-0.5	10.8	6.9-14.7	32.8	27.4-38.1	56.2	50.1-62.3
25-64	**877**	**0.2**	**0.0-0.5**	**12.5**	**9.5-15.5**	**30.1**	**26.3-34.0**	**57.2**	**52.8-61.6**

BMI classifications									
	Women								
Age Group (years)	n	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% BMI 25.0-29.9	95% CI	% Obese ≥30.0	95% CI
25-44	786	0.0	0.0-0.0	6.6	4.6-8.7	16.1	12.8-19.4	77.3	73.5-81.1
45-64	610	0.0	0.0-0.0	4.9	2.6-7.2	16.9	12.9-20.9	78.2	73.8-82.6
25-64	**1396**	**0.0**	**0.0-0.0**	**6.0**	**4.3-7.7**	**16.4**	**13.9-18.9**	**77.6**	**74.7-80.5**

BMI classifications									
	Both Sexes								
Age Group (years)	n	% Under-weight <18.5	95% CI	% Normal weight 18.5-24.9	95% CI	% BMI 25.0-29.9	95% CI	% Obese ≥30.0	95% CI
25-44	1275	0.1	0.0-0.3	9.9	7.6-12.3	22.5	19.4-25.5	67.5	63.9-71.1
45-64	998	0.1	0.0-0.2	7.7	5.4-9.9	24.3	20.9-27.7	67.9	64.2-71.7
25-64	**2273**	**0.1**	**0.0-0.3**	**9.2**	**7.4-11.0**	**23.1**	**20.7-25.5**	**67.6**	**64.8-70.5**

BMI ≥25

Description: Percentage of respondents being classified as overweight (BMI≥25)

Instrument questions:

- Height
- Weight

BMI≥25									
Age Group (years)	Men			Women			Both Sexes		
	n	% BMI≥25	95% CI	n	% BMI≥25	95% CI	n	% BMI≥25	95% CI
25-44	489	86.5	82.5-90.4	786	93.4	91.3-95.4	1275	89.9	87.6-92.3
45-64	388	89.0	85.1-92.9	610	95.1	92.8-97.4	998	92.3	90.0-94.5
25-64	**877**	**87.3**	**84.3-90.3**	**1396**	**94.0**	**92.3-95.7**	**2273**	**90.7**	**88.9-92.5**

Waist circumference

Description: Mean waist circumference among all respondents (excluding pregnant women).

Instrument question:

- Waist circumference measurement

Waist circumference (cm)							
Age Group (years)	Men				Women		
	n	Mean	95% CI		n	Mean	95% CI
25-44	488	102.2	100.6-103.8		792	105.1	103.9-106.2
45-64	385	105.7	104.0-107.4		613	109.7	108.2-111.2
25-64	**873**	**103.3**	**102.1-104.6**		**1405**	**106.7**	**105.7-107.6**

Hip circumference

Description: Mean hip circumference among all respondents (excluding pregnant women).

Instrument question:

- Hip circumference measurement

Hip circumference (cm)							
Age Group (years)	Men				Women		
	n	Mean	95% CI		n	Mean	95% CI
25-44	488	110.4	109.1-111.6		792	118.3	117.2-119.4
45-64	385	109.6	108.2-111.0		613	119.5	118.2-120.8
25-64	**873**	**110.1**	**109.2-111.1**		**1405**	**118.7**	**117.8-119.6**

Waist / hip ratio

Description: Mean waist-to-hip ratio among all respondents (excluding pregnant women).

Instrument question:

- Waist and hip circumference measurement

Mean waist / hip ratio							
Age Group (years)	Men				Women		
	n	Mean	95% CI		n	Mean	95% CI
25-44	488	0.9	0.9-0.9		792	0.9	0.9-0.9
45-64	385	1.0	1.0-1.0		613	0.9	0.9-0.9
25-64	**873**	**0.9**	**0.9-0.9**		**1405**	**0.9**	**0.9-0.9**

Blood pressure

Description: Mean blood pressure among all respondents, including those currently on medication for raised blood pressure.

Instrument question:

- Reading 1-3 systolic and diastolic blood pressure

Mean systolic blood pressure (mmHg)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	486	128.8	127.5-130.0	847	121.4	120.3-122.5	1333	124.9	124.0-125.8
45-64	385	136.4	134.2-138.7	614	139.3	137.2-141.3	999	138.0	136.4-139.6
25-64	**871**	**131.2**	**130.0-132.4**	**1461**	**127.3**	**126.1-128.6**	**2332**	**129.2**	**128.3-130.0**

Mean diastolic blood pressure (mmHg)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	486	77.0	75.9-78.2	847	76.4	75.6-77.2	1333	76.7	75.9-77.5
45-64	385	80.5	79.2-81.9	614	82.2	81.3-83.0	999	81.4	80.6-82.3
25-64	**871**	**78.2**	**77.3-79.1**	**1461**	**78.3**	**77.7-79.0**	**2332**	**78.2**	**77.7-78.8**

Raised blood pressure

Description: Percentage of respondents with raised blood pressure.

Instrument question:

- During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?
- Reading 1-3 systolic and diastolic blood pressure

SBP ≥140 and/or DBP ≥ 90 mmHg, excluding those on medication for raised blood pressure									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	480	21.4	17.1-25.7	835	13.5	10.8-16.2	1315	17.2	14.7-19.7
45-64	349	35.4	29.3-41.5	508	42.2	36.5-47.9	857	38.9	34.5-43.3
25-64	**829**	**25.6**	**21.9-29.2**	**1343**	**21.8**	**18.9-24.7**	**2172**	**23.6**	**21.2-26.0**

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
25-44	486	22.1	17.8-26.3	847	14.3	11.6-17.1	1333	18.0	15.5-20.5
45-64	385	41.3	35.4-47.3	614	52.9	47.5-58.2	999	47.5	43.3-51.8
25-64	**871**	**28.2**	**24.6-31.9**	**1461**	**27.1**	**24.2-30.0**	**2332**	**27.6**	**25.2-30.0**

SBP ≥160 and/or DBP ≥ 100 mmHg, excluding those on medication for raised blood pressure									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	480	4.9	2.3-7.5	835	2.6	1.3-3.9	1315	3.7	2.3-5.1
45-64	349	11.2	7.4-15.1	508	12.7	9.5-16.0	857	12.0	9.4-14.6
25-64	**829**	**6.8**	**4.6-9.0**	**1343**	**5.5**	**4.1-6.9**	**2172**	**6.1**	**4.8-7.5**

SBP ≥160 and/or DBP ≥ 100 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
25-44	486	5.7	3.0-8.4	847	3.5	2.1-5.0	1333	4.6	3.1-6.0
45-64	385	19.4	14.8-24.0	614	28.9	24.9-32.8	999	24.5	21.4-27.5
25-64	**871**	**10.1**	**7.7-12.5**	**1461**	**11.9**	**10.1-13.8**	**2332**	**11.1**	**9.5-12.6**

Treatment and control of raised blood pressure

Description: Percentage of respondents with treated and/or controlled of raised blood pressure among those with raised blood pressure (SBP ≥140 and/or DBP ≥ 90 mmHg) or currently on medication for raised blood pressure.

Instrument questions:

- During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?
- Reading 1-3 systolic and diastolic blood pressure

Respondents with treated and/or controlled raised blood pressure							
	Men						
Age Group (years)	n	% On medication and SBP<140 and DBP<90	95% CI	% On medication and SBP≥140 and/orDBP≥90	95% CI	% Not on medication and SBP≥140 and/orDBP≥90	95% CI
25-44	112	0.0	0.0-0.0	4.1	0.7-7.4	95.9	92.6-99.3
45-64	159	5.3	2.0-8.6	16.9	10.5-23.4	77.8	70.6-85.0
25-64	**271**	**2.5**	**0.9-4.0**	**10.1**	**6.5-13.7**	**87.4**	**83.4-91.5**

Respondents with treated and/or controlled raised blood pressure							
	Women						
Age Group (years)	n	% On medication and SBP<140 and DBP<90	95% CI	% On medication and SBP≥140 and/orDBP≥90	95% CI	% Not on medication and SBP≥140 and/orDBP≥90	95% CI
25-44	137	2.2	0.0-4.4	4.6	1.1-8.0	93.3	89.0-97.5
45-64	311	11.0	7.2-14.8	24.0	17.8-30.1	65.1	58.7-71.4
25-64	**448**	**7.9**	**5.3-10.4**	**17.1**	**12.7-21.5**	**75.0**	**70.2-79.8**

Respondents with treated and/or controlled raised blood pressure							
	Both Sexes						
Age Group (years)	n	% On medication and SBP<140 and DBP<90	95% CI	% On medication and SBP≥140 and/orDBP≥90	95% CI	% Not on medication and SBP≥140 and/orDBP≥90	95% CI
25-44	249	0.9	0.0-1.8	4.3	1.9-6.7	94.8	92.2-97.4
45-64	470	8.7	6.1-11.3	21.1	16.5-25.8	70.2	65.3-75.1
25-64	**719**	**5.3**	**3.7-6.9**	**13.7**	**10.8-16.7**	**81.0**	**77.8-84.2**

Biochemical Measurements

Mean fasting blood glucose

Description: mean fasting blood glucose results including those currently on medication for diabetes (non-fasting recipients excluded).

Instrument questions:

- During the last 12 hours have you had anything to eat or drink, other than water?
- Blood glucose measurement

Mean fasting blood glucose (mmol/L)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	475	5.9	5.7-6.2	828	6.3	6.1-6.5	1303	6.1	6.0-6.3
45-64	382	6.8	6.5-7.1	602	7.5	7.2-7.8	984	7.2	6.9-7.4
25-64	**857**	**6.2**	**6.0-6.4**	**1430**	**6.7**	**6.5-6.9**	**2287**	**6.5**	**6.3-6.6**

Mean fasting blood glucose (mg/dl)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	475	106.9	103.0-110.8	828	113.9	110.0-117.8	1303	110.5	107.8-113.3
45-64	382	122.3	116.6-128.1	602	135.2	129.7-140.6	984	129.2	125.0-133.3
25-64	**857**	**111.9**	**108.6-115.2**	**1430**	**121.0**	**117.6-124.4**	**2287**	**116.7**	**114.2-119.1**

Raised blood glucose

Description: Categorization of respondents into blood glucose level categories and percentage of respondents currently on medication for raised blood glucose (non-fasting recipients excluded).

Instrument questions:

- Are you currently receiving any of the following treatments for diabetes prescribed by a doctor or other health worker? Insulin? Oral drugs (medication) that you have taken in the last 2 weeks?
- During the last 12 hours have you had anything to eat or drink, other than water?
- Blood glucose measurement
- Today, have you taken insulin or other drugs (medication) that have been prescribed by a doctor or other health worker?

Impaired Fasting Glycaemia*									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	475	22.1	17.5-26.8	828	24.7	20.9-28.4	1303	23.5	20.6-26.3
45-64	382	27.5	21.9-33.0	602	22.2	18.3-26.0	984	24.6	21.1-28.1
25-64	**857**	**23.9**	**20.3-27.5**	**1430**	**23.8**	**21.3-26.4**	**2287**	**23.8**	**21.7-26.0**

Raised blood glucose or currently on medication for diabetes **									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	475	24.5	18.9-30.0	828	29.4	25.3-33.5	1303	27.1	23.7-30.4
45-64	382	40.7	34.6-46.8	602	56.9	51.3-62.5	984	49.3	44.9-53.7
25-64	**857**	**29.7**	**25.6-33.8**	**1430**	**38.6**	**35.2-41.9**	**2287**	**34.4**	**31.5-37.3**

Currently on medication for diabetes									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	520	1.1	0.2-2.1	884	2.9	1.8-4.1	1404	2.1	1.3-2.8
45-64	410	10.8	7.3-14.4	643	16.4	12.8-20.0	1053	13.8	11.2-16.3
25-64	**930**	**4.2**	**2.9-5.6**	**1527**	**7.4**	**5.9-8.8**	**2457**	**5.8**	**4.9-6.8**

* Impaired fasting glycaemia is defined as either

- plasma venous value: ≥6.1mmol/L (110mg/dl) and <7.0mmol/L (126mg/dl)
- capillary whole blood value: ≥5.6mmol/L (100mg/dl) and <6.1mmol/L (110mg/dl)

** Raised blood glucose is defined as either

- plasma venous value: ≥ 7.0 mmol/L (126 mg/dl)
- capillary whole blood value: ≥ 6.1 mmol/L (110 mg/dl)

Total cholesterol

Description: Mean total cholesterol among all respondents including those currently on medication for raised cholesterol.

Instrument questions:

- Total cholesterol measurement

Mean total cholesterol (mmol/L)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	444	5.1	5.0-5.1	727	4.9	4.8-4.9	1171	5.0	4.9-5.0
45-64	354	5.4	5.3-5.5	540	5.5	5.4-5.6	894	5.4	5.4-5.5
25-64	**798**	**5.2**	**5.1-5.2**	**1267**	**5.1**	**5.0-5.1**	**2065**	**5.1**	**5.1-5.2**

Mean total cholesterol (mg/dl)									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
25-44	444	195.3	192.3-198.3	727	188.7	186.1-191.2	1171	191.9	189.8-194.1
45-64	354	209.4	204.4-214.4	540	211.0	207.2-214.7	894	210.2	207.1-213.3
25-64	**798**	**199.9**	**197.1-202.7**	**1267**	**196.3**	**194.1-198.4**	**2065**	**198.0**	**196.1-199.9**

Raised total cholesterol

Description: Percentage of respondents with raised total cholesterol and percentage of respondents currently on medication for raised cholesterol.

Instrument questions:

- Total cholesterol measurement
- During the past two weeks, have you been treated for raised cholesterol with drugs (medication) prescribed by a doctor or other health worker?

Total cholesterol ≥ 5.0 mmol/L or ≥ 190 mg/dl or currently on medication for raised cholesterol									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	444	44.1	39.0-49.2	727	38.2	33.7-42.7	1171	41.1	37.7-44.5
45-64	354	60.3	54.4-66.1	540	67.5	62.6-72.5	894	64.1	60.2-68.0
25-64	**798**	**49.3**	**45.3-53.4**	**1267**	**48.2**	**44.7-51.7**	**2065**	**48.8**	**45.8-51.7**

Total cholesterol ≥ 6.2 mmol/L or ≥ 240 mg/dl or currently on medication for raised cholesterol									
Age Group (years)	Men			Women			Both Sexes		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-44	444	13.8	10.3-17.3	727	6.3	4.3-8.3	1171	10.0	7.9-12.0
45-64	354	27.0	21.6-32.4	540	24.1	19.5-28.6	894	25.4	22.0-28.9
25-64	**798**	**18.1**	**15.1-21.1**	**1267**	**12.3**	**10.3-14.3**	**2065**	**15.1**	**13.3-16.9**

Summary of Combined Risk Factors

Summary of Combined Risk Factors

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

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

Instrument questions: combined from Step 1 and Step 2

Summary of Combined Risk Factors							
	Men						
Age Group (years)	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	274	2.4	0.0-5.2	45.9	38.9-52.8	51.7	44.5-59.0
45-64	234	0.0	0.0-0.0	35.4	27.9-42.8	64.7	57.2-72.1
25-64	**508**	**1.6**	**0.0-3.5**	**42.4**	**37.0-47.8**	**56.0**	**50.4-61.6**

Summary of Combined Risk Factors							
	Women						
Age Group (years)	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	187	0.4	0.0-1.2	44.2	35.9-52.6	55.4	47.0-63.7
45-64	82	0.0	0.0-0.0	25.0	14.5-35.4	75.0	64.6-85.5
25-64	**269**	**0.3**	**0.0-0.9**	**39.5**	**32.6-46.5**	**60.2**	**53.2-67.1**

Summary of Combined Risk Factors							
	Both Sexes						
Age Group (years)	n	% with 0 risk factors	95% CI	% with 1-2 risk factors	95% CI	% with 3-5 risk factors	95% CI
25-44	461	1.8	0.0-3.8	45.4	39.9-50.8	52.8	47.2-58.5
45-64	316	0.0	0.0-0.0	33.1	26.7-39.5	66.9	60.5-73.3
25-64	**777**	**1.3**	**0.0-2.6**	**41.6**	**37.2-46.0**	**57.1**	**52.6-61.7**

Appendix 3. List of STEPS Field Survey Staff from the Kingdom of Tonga

National Field Survey Team

Catherine Latu
Kalesita Fotu
Paula Vivili
Fusi Kaho
Latu Fusimalohi
‘Elisiva Naati
Seilini Soakai
Mele Vuki
Ada Moadsiri
Meleane Eke
Elisapesi Niulala
Luseane Liongitau
Lesieli Vanisi
Mele Fifita
Moe Veikoso
Ema Mafi
Molimoli Pole
Siu Kaihea

Rural Tongatapu Field Survey Team

‘Ana Pouhila
Seini Pasa
Stella Minoneti
Mele Fangaloka
Powai Schaaf
Lineti Koloi
Losaline Kaufusi
‘Ofa Talanoa
Ongoalupe Oliveti
Kafoatu Tupou
Paea Hingano
Liliani Latukefu
Simione Tei
Limisesi Kaivelata

Urban Tongatapu Field Survey Team

Sanitina Makaafi
Makelesi Pese
Vasitai Toli
Malanata Mata’uvave
Maumi Kengike
Kuluveti Wolfgramm
Ofa Tukuafu
Kalolaine Malolo
‘Onita Sila
Tupou Taufa
Evilingi Mahe
Sela Tuitupou

Outer Islands Field Survey Teams

VAVAU

‘Emeline Takai
Teisa 'One'one -
Sivihiva Kivalu
Tapaita Lea -
Malanata Mata'uvave
Emeline Takai
‘Ana Tautua'a

HA’APAI

Saane Fahamokioa
Paea Fifita
Halaevalu Tonga’onevai
Kalo Hoeft
Mele Latavao

‘EUA

Sailopa Vea
Sela Latu
Kalo Latu
Kaufo’ou Taufa
Peni

NIUATOPUTAPU

Ana Hakaumotu

Appendix 4: Group Photos of the High-level Multi-sectoral National NCD Workshops Held in the Kingdom of Tonga since 1 June, 2012


Stakeholders' Meeting on Tobacco Taxation in Tonga
International Dateline Hotel, 30 Aug, 2012
KAUIKALILO


Priority Setting Workshop on
Healthy Eating and Physical Activity for the School Children in Tonga
International Dateline Hotel, 18-19 Sept., 2012


National Training Workshop on the
Package of Essential NCD (PEN) Intervention in Tonga
Fa'onelua Convention Centre, 3-4 April, 2013


NCD PEN Project Review Workshop
Multi-purpose Hall, Ministry of Health, Kingdom of Tonga, 12 August, 2014

Appendix 5. References

1. World Health Organization. Preventing chronic diseases: A vital investment. WHO global report. Geneva: World Health Organization, 2005.

2. World Health Organization. Global status report on noncommunicable diseases 2010. Geneva: World Health Organization, 2011.

3. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet, 349(9061):1269-1276, 1997.

4. United Nations. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases,. A/66/L.1, 2011.

5. Ministry of Health, Tonga. Health Service Delivery Profile, Kingdom of Tonga, 2012. Ministry of Health and World Health Organization, 2012.

6. Government of Tonga. 2nd National Millennium Development Goals Report. Status and Progress between 1990-2010 Ministry of Finance and National Planning, 2010.

7. Smith BJ, Phongsavan P, Havea D, Halavatau V, Chey T, Members of the Health Behaviour and Lifestyle of Pacific Youth Survey Collaborating Group, Tonga Core Survey Team. Body mass index, physical activity and dietary behaviours among adolescents in the Kingdom of Tonga. Public Health Nutrition, 10:137–144, 2007.

8. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. British Medical Journal, 320: 1240–1243, 2000.

9. Bonita R, de Courten M, Dwyer T, Jamrozik K, Winkelmann R. Surveillance of risk factors for noncommunicable diseases: The WHO STEPwise approach. Summary. Geneva:
World Health Organization, 2001.

10. UNDP. United Nations Development Program. International Human Development Indicators. Tonga. Http://data.un.org/DocumentData.aspx?id=324, 2014.

11. Armstrong T, Bull F. Development of the World Health Organization Global Physical Activity Questionnaire (GPAQ). Journal of Public Health, 14(2):66-70, 2006.

12. WHO. World Health Organization. Global physical activity Questionnaire (GPAQ). Analysis Guide. World Health Organization. Access 5 June 2012. http://www.who.int/chp/steps/ instrument/en/index.html, 2005.

13. Keke K, Phongsavan P, Li D, Bacigalupo M, et al, eds. Nauru NCD Risk Factors STEPS Report. Suva, Fiji: Ministry of Health, Nauru and World Health Organization, 2007.

14. Maga A, Courten M, Li D, Uele F, et al, eds. American Samoa NCD Risk Factors STEPS Report. Suva, Fiji: Department of Health, American Samoa and World Health Organization, 2007.

15. Nelesone T, Pryor J, Li D, Tavite S, et al, eds. Tokelau NCD Risk Factors STEPS Report. Suva, Fiji: Department of Health, Tokelau and World Health Organization, 2007.

16. Samo M, Phongsavan P, Li D, Riley L, et al, eds. Federated States of Micronesia (Pohnpei) NCD Risk Factors STEPS Report. Suva, Fiji: Department of Health and Social Affairs, FSM and World Health Organization, 2008.

17. Luta T, Phongsavan P, Li D, Riley L, et al, eds. Kiribati NCD Risk Factors STEPS Report. Suva, Fiji: Ministry of Health and Medical Services, Kiribati and World Health Organization, 2009.

18. Laesango N, Roberts G, Li D, Paulsen J, et al, eds. Solomon Islands NCD Risk Factors STEPS Report. Suva, Fiji: Ministry of Health and Medical Services, Solomon Islands and World Health Organization, 2010.

19. Tairea K, Phongsavan P, Li D, Fariu R, et al, eds. Cook Islands NCD Risk Factors STEPS Report. Suva, Fiji: Ministry of Health, Cook Islands and World Health Organization, 2011.

20. Samo M, Roberts G, Li D, Marar J, et al, eds. Federated States of Micronesia (Chuuk) NCD Risk Factors STEPS Report. Suva, Fiji: Department of Health and Social Affairs, FSM and World Health Organization, 2012.

21. Palu T, Phongsavan P, Li D, Riley L, et al, eds. Kingdom of Tonga NCD Risk Factors STEPS Report. Suva, Fiji: Ministry of Health, Tonga and World Health Organization, 2012.

KEY CONTACTS

Tonga Ministry of Health Contact:

Dr Siale ‘Akau’ola
Chief Executive Officer
Ministry of Health
P. O. Box 59
Nuku’alofa, Kingdom of Tonga
Tel: (676) 28233
Fax: (676) 24291
Email: sakauola@health.gov.to

WHO Contacts:

Dr Li Dan
World Health Organization Country Liaison Officer;
United Nations Country Security Focal Point
P.O. Box 70
Nuku’alofa, Kingdom of Tonga
Tel: (676) 25522, 23217
Fax: (676) 23938
Email: lid@wpro.who.int

Dr Cherian Varghese
Team Leader
Pacific NCD & Health through the Life-Course
Division of Pacific Technical Support/Office for the South Pacific
World Health Organization
Plaza 1, Downtown Boulevard, P. O. Box 113
Suva, Fiji
Tel: (679) 3234127
Fax: (679) 3234166
Email: varghesec@wpro.who.int

University of Sydney Contact:

Dr Philayrath Phongsavan
Prevention Research Collaboration
School of Public Health
Sydney Medical School
Charles Perkins Centre
University of Sydney NSW 2006
Sydney, Australia
Tel: (61 2) 8627 1875
Fax: (61 2) 8627 1875
Email: philayrath.phongsavan@sydney.edu.au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