# The Seychelles Heart Study 2004: methods and main findings

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## EXECUTIVE SUMMARY

**Background**: Chronic diseases (NCD), and more specifically cardiovascular disease (CVD), are the leading causes of the morbidity and mortality burden worldwide and in the Seychelles. CVD accounts for approximately 40% of all deaths in Seychelles. NCD, and particularly CVD, are strongly related to a few lifestyles and physiological risk factors. Detrimental lifestyles include smoking, unhealthy nutrition (mostly high intake of saturated fats, salt, and low intake of fruit and vegetables) and sedentary habits. Physiological risk factors, which are strongly linked to lifestyles, include overweight, high blood pressure (HBP), blood lipid disorders (e.g. high blood cholesterol) and diabetes. It is well established that up to 80% of cases of premature CVD, and a substantial proportion of other chronic diseases (e.g. lung cancer, renal failure) could be prevented or delayed if these few risk factors were kept at favorable levels throughout life in the population, using strategies targeting both the entire population and high risk individuals.

**Aim of the survey**: To assess, in a representative sample of the adult population, the levels of major risk factors of chronic diseases and gather information on related knowledge, attitudes and practices (KAP).

**Methods**: The methodology of the survey followed the STEPwise approach advised by the World Heath Organization (core, expanded and optional modules). The sampling frame consisted of a sex- and age-stratified random sample of the entire population aged 25-64 selected from national population census data. A structured questionnaire was administered to all participants (see appendix in this report). Questions assessed tobacco use, physical activity, nutrition and alcohol intake, socioeconomic variables and KAP. Blood pressure, weight, height and waist circumference were measured. Blood glucose, cholesterol, microalbuminuria and A1c were measured with point-of-care analyzers and results given on same day while a broad range of other biological factors were analyzed later on frozen serum (blood lipids, renal function markers, insulin, CRP, etc). B-mode ultrasound was performed to assess vasculature characteristics (artery thickness –IMT- and atherosclerosis plaques) in carotid and femoral arteries.

**Scope of this report**: This report presents an overview of the main results with minimal comments on their significance. Data in 2004 are compared with results from a similar population-based survey in 1989 to identify trends over time. Separate other reports present selected issues of particular interest, e.g. diabetes, hypertension, microalbuminuria, findings on peripheral atherosclerosis, etc (see appendix in this report).

**Main overall results:**

- The population-based design of the survey allows inferring results to the general adult population of Seychelles.
- Results show high prevalence of several major modifiable cardiovascular risk factors: particularly smoking (men), sedentary habits, low intake of fruit and vegetables, high blood cholesterol, high blood pressure, overweight, and diabetes. The high prevalence of these main cardiovascular risk factors is consistent with both a high prevalence of peripheral atherosclerosis found in this survey and high mortality rates of stroke and ischemic heart disease in the Seychelles (vital statistics).
- The largely increasing prevalence of overweight/obesity and diabetes between 1989 and 2004 –as observed in many middle or high income countries- is a major public health challenge in view of the strong association of obesity/diabetes with CVD, chronic diseases and overall premature mortality.
- Results show limited cardiometabolic control in persons treated for diabetes and high blood pressure.
- Indicators of knowledge, attitudes and practices show generally good awareness on chronic disease but also some inappropriate beliefs (e.g. belief that treatment for hypertension does not need to be taken for long or that adoption of healthy lifestyles only has limited impact on chronic diseases), which may undermine interventions for prevention and control of such conditions.
- See on next page a summary of findings (Fact Sheet)

**Public health action**: The results of the Seychelles Heart Survey 2004, which can be compared with similar population-based data in 1989 and 1994, provide a useful tool for assessing national health objectives, for identifying and characterizing risk populations, and for designing and evaluating health care services as well as health promotion and disease prevention programs and policies. The 2004 data indicate a continued need to further 1) strengthen health promotion and prevention programs to promote healthy lifestyles in the general population -in order to reduce new cases of chronic diseases- and 2) improve health care to patients with chronic conditions such as HBP or diabetes -in order to reduce complications of these conditions-. The data also provide quantifiable information for measuring progress towards achieving these goals at national level.

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## INTRODUCTION

### Burden of chronic diseases

Chronic diseases are the leading causes of morbidity and mortality worldwide (1-6). In particular, it has been estimated that a few major risk factors account, in middle-income countries, for a large proportion of total mortality: high blood pressure (HBP): 5.0%, total tobacco: 4.0%, high cholesterol: 2.1% and obesity: 2.7% (5). In the Seychelles, CVD accounts for approximately 40% of all deaths according to vital statistics (7).

### Risk factors for chronic diseases

A limited number of health risk behaviors, such as cigarette smoking, poor nutrition, physical inactivity, and under use of prevention practices, are linked to chronic diseases (1-6). These behaviors are linked to physiological risk factors such as hypertension, blood lipid disorders and diabetes. In order to reduce the subsequent morbidity and mortality attributable to chronic diseases, the major strategies for prevention and control are 1) to reduce the prevalence of risk behaviors related to NCD in the entire population and 2) to control raised CVD risk factors among high risk individuals to reduce complications of these conditions.

### Impact of CVD

The rising tide of chronic diseases has a huge impact that cuts across several sectors of the society (8-11). CVD is a main cause of suffering in the society due to high frequency of CVD, severity of complications (e.g. stroke, myocardial infarction, congestive heart failure, kidney failure) and critical age at which CVD occurs (e.g. middle age when people have responsibilities at work and in their family). CVD has important social and economic consequences in relation to life-long costs incurred by treatment and loss of productivity, which impact on microeconomic (household) and macroeconomic (society at large, national) levels. From a health system perspective, huge resources are drained for providing health care to large numbers of chronic patients for decades and for getting and sustaining highly skilled workforce and increasingly sophisticated equipment. Hence, the mergence of chronic diseases is a huge public health, social and economic challenge for both developed and developing countries.

### Population strategies vs. treatment approaches to reduce CVD

While CVD remains the largest single cause of death in most countries worldwide, CVD mortality rates have decreased substantially in many industrialized countries since the 1980s (12-14). Few data exist on trends in developing countries. However, preliminary analysis of mortality data in Seychelles shows that mortality rates for both stroke and myocardial infarction heart disease have also decreased in Seychelles between 1989 and 2005, based on a re-analysis of age-standardized data from vital statistics (15). Studies consistently suggest that 50%-75% of the decrease in cardiovascular deaths can be attributed to population-wide improvements in a few modifiable major risk factors, particularly smoking, total cholesterol and blood pressure (12-14). The remaining 25%-50% of the decreased mortality fall is generally explained by modern cardiology treatments for known CHD patients, such as thrombolysis, ACE inhibitors, statins, and coronary artery bypass surgery (12-14). Compared with secondary prevention, primary prevention can achieve a two-fold larger reduction in CHD deaths (16). Hence, by reducing risk factors in the entire population, population approaches have the largest potential to reduce CVD (17). Future national policies for prevention and control of NCD should therefore prioritize nationwide interventions that promote healthy lifestyles, e.g. physical activity, healthy diet and a smoke-free environment (11) while appraising and implementing strategies for improving health care for high risk individuals that are most cost-effective.

### Need to examine the epidemiological situation at a population level

Although it may seem counterintuitive, the majority of cases with chronic disease do not arise from the minority of people with high levels of risk factors (i.e. those with very high blood pressure level, those with diabetes, etc) but, instead, from the majority of people with moderately elevated levels of risk factors, the so called “prevention paradox” (17). This explains that pertinent epidemiological information for action cannot be obtained solely from data collected at hospital or in other selected sub-populations but, instead, there is a need to examine the distribution of risk factors in the entire population (i.e. survey must examine individuals selected from representative samples of the entire population (e.g. random sample of the entire population).

**Need to focus epidemiological assessment on current levels of risk factors**

Current cases of with chronic diseases (heart attack, stroke, advanced renal failure) reflect high levels of risk factors present many years ago. In contrast, current levels of risk factors in the population will predict rates of chronic diseases to expect in the coming years/decades ("cardiovascular diseases of today are risk factors of yesterday, risk factors of today are chronic disease of tomorrow"). Monitoring current population levels of lifestyle and physiological risk factors provides therefore the best means for predicting the future burden of non communicable diseases. Collecting and interpreting data on current levels of risk factor levels in the entire population is therefore instrumental for appropriately guide policy, programs and health care for NCD for the years to come.

**Previous NCD surveys in Seychelles**

In addition to the Seychelles Heart Survey in 2004, two previous population-based surveys of cardiovascular risk factors were conducted in 1989 and 1994. These past surveys have used largely similar methods as compared to the survey in 2004 and direct comparison of data is therefore possible between these surveys. Results of the surveys in 1989 and 2004 have been reported in several reports and publications (18-26). Hence, based on such survey data, trends can be assessed and insight can be gained with regards to the dynamics of the epidemiology of chronic disease in Seychelles over the past 15 years.

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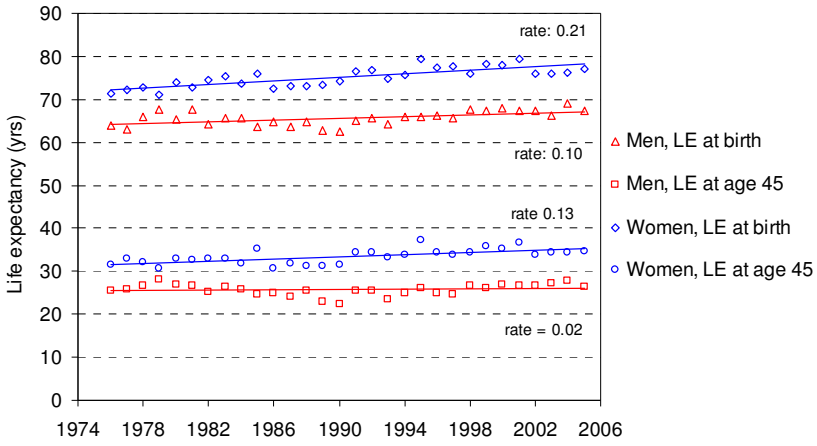
## PARTICIPANTS AND METHODS

### I. THE SEYCHELLES

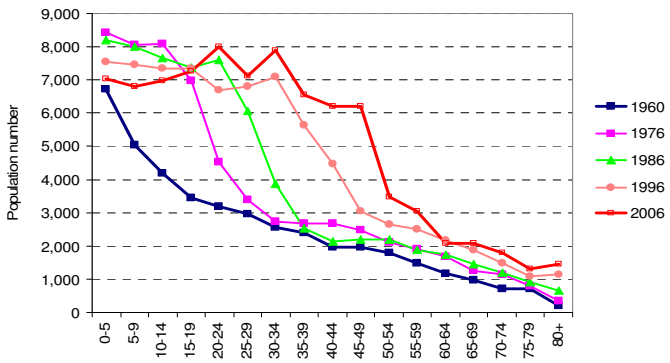
The Republic of Seychelles is a group of islands in the Indian Ocean situated approximately 1800 km east of Kenya and 2000 km north of Mauritius or Madagascar. A large majority of the population is of African descent with minorities of European, Indian and Chinese descent and a substantial proportion of persons of mixed descent. Health care (including medications) is available at no direct cost at the point of health care delivery to all residents through a National Health System while a few private doctors also provide services on a fee-paying basis. The gross domestic product (GDP) per capita increased from US$600 in 1976 to US$8492 in 2004 (from US$ 2927 in 1980 to US$ 5239 in 2004 in real terms). Annual government expenditure on health was US$307 per capita per year in 2004. All deaths are registered in Seychelles and Vital Statistics indicate a life expectancy of 69 years in men and 76 years in women. AIDS and CVD account for respectively approximately 1% and 38% of total mortality (7). The largely different life expectancy between men and women, particularly at middle age (e.g. >45 years), indicates a larger mortality in middle-aged men than women, likely largely related to chronic diseases (particularly CVD) as well as a larger exposure of men than women to NCD related risk factors (e.g. smoking and alcohol).

**Figure 1. Life expectancy (LE) at birth and age 45 in Seychelles, 1976-2005**




- Life expectancy (LE) at birth is 10 years higher in women than in men (77.1 vs. 67.4 years in 2005). The observed 10-year gender difference is particularly large by international standards.
- Life expectancies at birth and at age 45 have increased over time in women. Gain (at birth) is 0.21 in men and 013 years per calendar year in women.
- However, LE has at the age of 45 years not increased substantially in men and women (0.10 and 0.02 years of LE per calendar year, respectively).
- The larger difference in life expectancy in men than women is consistent with larger mortality (and particularly CVD) in middle-aged men than women.
- This sex differential is also consistent with higher rates of smoking and excess alcohol drinking in men than women (as will be shown later).

**Figure 2. Distribution of the population of Seychelles over past 3 decades**



- The size of the middle-aged population (25-64 years old) has increased largely from 1960 to 2005, both in absolute and relative terms.
- The absolute number of persons aged 25-45 has increased dramatically between 1970 and 2006.
- While the demographic transition further develops, one can expect a large absolute and relative increase in the population aged 50-65 over the next 15 years (e.g. a two or three fold increase).
- This demographic transition has important public health implications, in particular because chronic diseases are particularly frequent in this age range.
- Hence, one must expect a large increase in the total number of persons with chronic diseases in the population over the next 15 years (i.e. diabetes, HBP, stroke, heart attack, heart failure, renal failure, etc.) as well as other age-related chronic conditions (cancer, osteoarthritis, mental diseases such as Alzheimer, etc).

## II. OVERALL SURVEY ORGANIZATION

The survey was conducted in 2004 under the auspices of the Ministry of Health of the Republic of Seychelles (Seychelles Heart Study III) and in collaboration with several other institutions, including the University of Lausanne (Switzerland) and the World Health Organization.

The survey took place between May and September 2004. In view of large number of investigations for each participants, around 15 participants were scheduled to participate every day.

Participants were invited to participate to the survey through a personalized letter sent two weeks in advance (**Appendix I**). The sequence was ranked by alphabetic order of participants' last name. Participants were invited to attend the study center as from 7:30 am but not later than 10:00 am. Participants were informed in the invitation letter that they should report fasting since midnight (except for pure water) and that they would receive a snack (sandwich, tea) at the study center after blood collection. Survey centers were located in secluded places: the old Outpatient Clinic in Victoria (Mahé island), Baie Ste Anne Hospital (Praslin island), and the Community Center (La Digue island).

The same staff was involved with the study throughout the survey (the survey was organized in one study center at a time). This included two senior nurses (administration of questionnaire to participants using direct data entry on two laptop computers, clinical assessment of participants, tracing missing participants), one senior nurse (blood collection, running tests with point-of-care analyzers [lipids, microalbuminuria], conducting glucose tolerance tests when appropriate, centrifugation of blood, storage serum in freezer), one secretary (welcome of participants, explanation and signature of informed consent form, first and last automatic BP measurements, updating attendance list, phone calls to non-participants and resources contacts such as district administrators), one person for support (cleaning premises, preparation of snacks), one doctor specialist in ultrasound (performing ultrasound in up to 7 participants per day), one doctor (PI, general administration of the survey, funding issues, preparation and update of invitation letters, update and order of supplies for reagents and study material, quality control for laboratory tests, backup of data, 5-10 minute explanation of results and advice to each participant before leaving study center). Several medical students conducting electives at Victoria Hospital were attached to the survey for a few week periods (one student at a time) and they helped in the data collection.

## III. ETHICS AND INFORMED CONSENT

The survey was approved by the Ministry of Health after technical and ethical reviews. Participants were free to participate and were asked to provide a signed informed consent at the time they attended the study center (**Appendix II**). All participants were informed in their invitation letter that they would receive a 50-rupee voucher (~$US 10, that can be considered similar to half-day salary for a laborer) from the main local food distribution company (Seychelles Marketing Board). This voucher had to be used toward foods purchased at the main SMB supermarket in town.

## IV. SAMPLING FRAMEWORK

The sampling frame consisted of a sex- and age-stratified random sample of the entire population aged 25-64 years. It was possible to draw a simple random sample since individual data including names, age and address of residence were available (in an electronic file) for all inhabitants from a national census data thereafter regularly updated by civil authorities. Stratification on age was chosen to over-sample older vs. younger persons in order to maximize statistical power of prevalence estimates in all age categories (by having similar numbers of participants in each 10 year age category).

There were various way to differentiate between non-participation and non-eligibility. We provided the immigration authorities with a list of initially eligible participants and the immigration services could provide names of persons who had left the country on a long duration basis. Based on data from the vital statistics, we could identify initially eligible participants who had died in the interval. Letters sent to initially eligible participants that were returned unopened by the postal services (with an appropriate official stamp that the person could not be traced) were considered as unknown. Initially eligible participants who were abroad for a long period, who died before appointment date to the survey, or could not be traced by the postal services were excluded from the eligible sample.

Intensive efforts were made throughout the survey period to contact eligible participants who did not attend on the scheduled days. Tracing these non participants included repeated telephone calls to persons with same or similar name (a majority of households in Seychelles have a fixed line phone at home) and by contacting district administrators (who often know personally most persons living in their constituency). Eligible non-participants were given repeated chances to attend on new scheduled dates that were convenient to them. At the end of the survey, intensive efforts were made to convince, once more, the non-participants to participate during a final two-week period. In some instances (a dozen of persons), participants who had restricted mobility were visited at home.

## V. QUESTIONNAIRE

A structured questionnaire was administered by trained survey officers. Language used was most of the time in Creole, unless participants preferred another official Seychelles language (English or French). The questionnaire was available on a computer (laptop) using a dedicated software developed for the survey (development jointly by UnitedPro in India and IUMSP in Lausanne). Answers given by participants where therefore entered directly on laptop and an *ad hoc* database of answers was automatically generated. The software was designed to show only one question and all its possible answers at a time in one computer screen. The software provided various filters and validation procedures (e.g. proceed to next question only if an optional answer is entered; questions sequence appearing along a logical order, e.g. no question asked on number of cigarettes smoked if participants had reported to be a non smoker; etc).

The questionnaire was largely derived from the WHO STEPS instrument (27). However, a number of other questions were also integrated, including a dietary module, and several questions that had either local relevance or were identical to questions asked in previous surveys (in order to allow direct comparison of results in different survey).

The questions assessed a number of dimensions: socio economic, personal, lifestyles, history of various conditions (diabetes, hypertension), knowledge, attitudes and behaviors related to chronic diseases, lifestyles and health promotion, prevention and diseases, etc. The questionnaire included 183 questions, including a 50-question food frequency module prepared in collaboration with the Nutrition Unit in the Ministry of Health. Overall, the use of filters facilitated the administration of the questionnaire since most participants did not have to answer to all questions (e.g. many questions were skipped for non smokers, non drinkers, non-hypertensive persons, non diabetic persons, those reporting no physical activity, etc). Most participants could answer the questionnaire within 30-45 minutes. A condensed English version of the questionnaire is provided in **Appendix III**.

## VI. ASSESSMENT OF ALCOHOL INTAKE FREQUENCY AND VOLUME

A drink was defined as the equivalent of one beer (~3dl), one 2-dl glass of wine, one 50 ml peg of whisky, or one 3-5 dl cup of homebrew (e.g. toddy). It corresponds to around 15 ml of pure alcohol (ethanol). Daily drinking volume (in ml of ethanol) was calculated from the reported number of units of alcoholic beverages and content of alcohol of each beverage. The following beverages were considered: bottles/cans of non Guinness beer (0.28l, 4.9%), bottles of Guinness (0.3l; 7.5%); wine (glass of 0.2l; 12%); pegs of spirit (0.05l, 43%); glasses or bottles of “baka” (fermented sugar cane) (4 glasses of 3-5 dl [“lamok”] ~ 1 bottle of 1.5l; 9%); glasses or bottles of “lapire” (9%); glasses or bottles of “kalou” (toddy) (9%). Because the questionnaire was administered face-to-face to participants by trained senior health professionals, reported volumes and frequency could be discussed with each participant, using drawings, and improve the reliability of the information reported. Many issues related to assessment of drinking habits and available drinks and alcohol content (particularly homebrews) in Seychelles have been discussed in a previous paper on alcohol drinking in the 1994 survey (31).

## VII. PHYSICAL MEASUREMENTS

Weight was measured with precision electronic medical scales (Seca, Germany) and height measured with a fixed stadiometer (Seca). Weight was measured without shoed and with light garments. Body mass index (BMI) was calculated as weight divided by height squared (kg/m$^2$). Overweight is defined as BMI ≥25 kg/m$^2$ and obesity as BMI ≥30 kg/m$^2$.

## VIII. BLOOD PRESSURE

Blood pressure was measured 6 times. A first measurement was taken by the secretary upon arrival of the participants to the study center, while recording personnel data or participants and filling the consent of participation. This first measurement was made with an electronic device, Omron M5. Three measurements were made by nurses while they interviewed the participants, at the end of the interview, at least 30 minutes after a participant had arrived at the study center and at intervals of more than 2 minutes. These 3 measurements were made using a mercury device and a cuff that automatically adapts width to the arm circumference (Tricuff). The reason to use a mercury device was to ensure comparability with previous surveys in 1989 and 2004 (mercury devices were used). Before the participants were discharged from the study centers, the secretary measured BP two more times at a 2 minute interval (Omron M5, often 2-4 hours after arrival to survey center) while completing administrative information and discharge report of the participants (reimbursement for bus fare, clinical and laboratory results obtained during visit at study center, etc). Blood pressure was defined as the average of the last two of three measurements with a mercury sphygmomanometer. BP categories are defined along current guidelines (28-31).

## IX. BLOOD ANALYSES

Blood was taken between 7:00 and 10:00 am. Serum was obtained within 2 hours of blood collection and immediately frozen to -20° Celsius. Except for HbA1c (which was done only in known or newly discovered diabetic persons), blood analyses were made in all participants. All participants were asked if they were actually fasting before collecting blood. Participants reporting to be not fasting (there were only a few) were asked to report on another day for blood collection.

***Blood glucose***. Fasting plasma glucose (FBG) was measured on whole blood with a point-of-care analyzer (Cholestec LDX, Hayward, USA) (32). If FBG was ≥5.6 mmol/l, an additional capillary measurement was performed within 10 minutes (Ascencia Elite glucometer, Bayer). The Cholestec LDX automatically separates plasma from blood cells so that the readings are plasma equivalent values. The Ascencia glucometer automatically adjusts readings made on capillary blood into plasma equivalent values. Whenever there were two measurements (Cholestec and Ascencia), the average of the two readings was considered. Diabetes was defined based on plasma cuff off values as fasting blood glucose ≥7.0 mmol/l (33). The mean difference between the first measurement (Cholestec) and the second measurement (Ascentia Elite) was as small as -0.49 mmol/l (SD: 0,48). Since the measurement with Ascencia was always taken after the reading with Cholestec and only for high values with Cholestec (>5.6 mmol/l), this difference may represent in part regression to the mean and not necessarily the actual difference between the two devices.

***Glucose tolerance test.*** Individuals who had fasting blood glucose ≥5.6 mmol/l and <7.0 mmol/l and who were not aware of having diabetes were submitted to an oral glucose tolerance test (OGTT) using a meal with75 g glucose dissolved in 300 ml water. Capillary glucose (Ascentia Elite) was measured 120 minutes later (2hBG).

***Categories of impaired glucose.*** Categories of impaired glucose regulation (IGR) were based on the 2004 criteria of the American Diabetes Association (34). Diabetes was defined as plasma FBG ≥7.0 mmol/l, 2hBG ≥11.1 mmol/l or current history of glucose-lowering medication. Impaired fasting glucose (IFG) refers to FBG of 5.6-6.9 mmol/l. Impaired glucose tolerance (IGT) was defined as FBG <7.0 mmol/l and 2hBG of 7.8-11.0 mmol/l. Normal glucose tolerance (NGT) was defined as 2hBG <7.8 mmol/l. Normal fasting glucose (NFG) refers to FBG values <5.6 mmol/l. Since subjects with NFG were not tested for 2-hour glucose, we cannot determine DM based on 2hBG ≥11.1 mmol/l and NFG.

***Glycated hemoglobin (Hb1Ac).*** Glycated hemoglobin (HbA1c) was measured in known or new diabetes persons using a point-of-care analyzer (DCA 2000, Bayer). The DCA 2000 is one of the very few point-of-care analyzers that have been rated as reliable and been recommended for measurement of HbA1c outside of the laboratory (35).

***Insulin.*** Fasting serum insulin (FSI) was measured on frozen serum samples at the Physiology Institute of the University of Lausanne (Director: Prof Luc Tappy) using commercial RIA kits (LINCO Research Inc, Missouri, USA). HOMA-IR (homeostasis model assessment of insulin resistance) was calculated as [FSI (µU/ml) x FBG (mmol/l)]/22.5 (36).

***Cholesterol, HDL-cholesterol, triglycerides.*** Analyses for blood lipids were conducted with a point-of-care instrument (Cholestec LDX) in order to be able to provide results to the participants on the same day of their attendance (at the time of their discharge from the stud center). However, all results reported in this report relate to analyses made with standard laboratory methods on frozen samples at the Canton Laboratory for Biochemistry and Hematology, St Gallen, Switzerland. Analyses were made within 6-12 months of blood collection. Blood cholesterol was measured by an enzymatic colorimetric test using cholesterol esterase and cholesterol oxidase (CHOD-PAP, Roche) on a Hitachi 917 instrument (Roche). Triglycerides were measured with an enzymatic colorimetric test GPO-PAP, Roche) on a Hitachi 917 instrument (Roche). HDL-cholesterol was measured with a homogeneous enzymatic colorimetric test (HDL-C plus 2$^{nd}$ generation, Roche) using Dextransulfate and PEG-modified enzyme on a Hitachi 917 instrument. Blood lipids categories are in line with current guidelines (37).

***Cystatin C.*** Cystatin C was measured on frozen serum samples at the Canton Laboratory for Biochemistry and Hematology, St Gallen, Switzerland by means of a particle-enhanced immunonephelometric assay with a nephelometer (BNII, Dade Behring) (38). The range of detection of the assay is 0.195 to 7.330 mg/l, with the reference range for young, healthy persons reported as 0.53 to 0.95 mg/l. A previous study has shown that the assay remained stable, even after freezing (38).

***Creatinine.*** Creatinine was measured on frozen serum samples in 2006 at the Canton Laboratory for Biochemistry and Hematology, St Gallen, Switzerland by means of a kinetic Jaffe method (Hitachi 917, Japan; reagents from Roche Diagnostics). We estimated GFR using the abbreviated Modification of Diet in Renal Disease (MDRD) equation (39).

***Uric acid.*** Uric acid was measured in 2007, at the Canton Laboratory for Biochemistry and Hematology, St Gallen, Switzerland.

***Metabolic syndrome.*** The metabolic syndrome was defined along the American guidelines (37), which requires 3 or more of the following: increased waist (102 cm in men and 88 in women), increased triglycerides (≥1.7 mmol/l), low HDL-cholesterol (<1.03 mmol/l in men and 1.29 in women), elevated BP (≥130/85 mmHg), and increased fasting blood glucose (≥6.1 mmol/l).

## X. URINE ANALYSES

***Microalbuminuria.*** Microalbuminuria was measured on a second morning urine spot after an overnight fast. Analysis was first made with a Bayer Clinitek Status point-of-care analyzer that has been shown to be a reliable screening procedure for microalbuminuria (40). It provides semi-quantitative estimation of urinary albumin excretion adjusted to creatininuria, and determines participants with microalbuminuria (30-300 mg albumin/g creatinine) and those with normal albuminuria (<30 mg/g) (40,41). If measurement with Clinitek was positive, another analysis was made quantitatively on the same spot urine with a Bayer DCA 2000 device. This Bayer Clinitek analyzer uses a sulphonaphthalein dye binding to measure albumin and the peroxidase-like activity of copper creatinine complexes to measure creatinine. The color yields of the separate reaction pads are monitored and compared to a preprogrammed calibration algorithm (42). Thus, it provides four categories of albumin concentration (10, 30, 80 and 150 mg/l) and five categories of creatinine concentration (0.9, 4.4, 8.8, 17.7 and 26.5 mmol/l), resulting in three calculated categories of ACR: normal albuminuria (<3.4 mg albumin/mmol creatinine), microalbuminuria (3.4-33.9 mg albumin/mmol creatinine) and macroalbuminuria (> 33.9 mg albumin/mmol creatinine).

## XI. ULTRASOUND OF ARTERIES

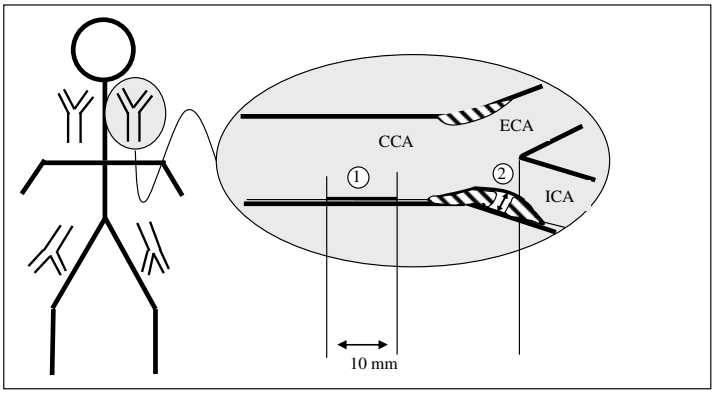
***Sub sample of participants screened with ultrasound.*** Participants in this study included all 501 consecutive participants (225 men and 276 women) aged 45-64 who attended the study during the first 17 weeks. We restricted ultrasound to this age range because middle-aged individuals are more likely to present ATS plaques than younger persons. A random sub-sample of participants aged 35-44 was also submitted to ultrasound. Restriction to a 17-week period corresponded to the period during which an experienced ultrasonographer (PY) was available. We excluded 5 subjects for whom femoral ultrasound could not be done in good conditions because of excessively deep location of the artery (>4 cm). The total sample for this study includes 496 subjects (223 men and 273 women).

***Ultrasound system used.*** High resolution B-mode ultrasound was performed with a portable system (LOGIQ Book, General Electric Health Care, Waukesha, USA) connected to a 6-10 MHz linear array transducer. The ultrasound system was equipped with software of arterial wall analysis with a semi-automated edge detection system and electronic caliper (M'ATH, ICN-Metris, Paris, France). All scans and measurements were performed by the same experienced investigator (PY), who was blinded to the CVRF status of the subjects.

***Intima media thickness (IMT).*** Intima media thickness (IMT), defined as the distance from the leading edge of the lumen-intima interface to the leading edge of the media-adventitia interface, was measured on the far wall of both common carotid arteries and common femoral arteries on a 10 mm segment located 2 cm upstream from the flow divider. Optimal longitudinal frames of these segments were frozen in late diastole before analysis with the M'ATH software. The recorded IMT value was the mean thickness measured along the whole segment. In case of plaque occurrence on the reference site, the mean IMT value was substituted for the maximal thickness of this plaque.

***Atherosclerosis plaques.*** Atherosclerosis (ATS) plaques were defined as a focal wall thickening ≥1200 µm protruding into the arterial lumen (43,44). Plaques were identified on both the near and the far walls in all the above described arterial segments by thorough transversal and longitudinal scanning. After detection, plaques were scanned in the best longitudinal view perpendicularly crossing the most prominent part of the lesions, and scans frozen in late diastole. The ATS burden was quantified by measuring two parameters, plaque thickness and plaque area. Plaque thickness was considered as the distance between the plaque-lumen interface and the plaque-adventitia interface of the thickest plaque visualized on each site. Plaque area was measured for all visible plaques identified in any of the four defined artery sites. Surface measurement was based on longitudinal views showing the largest extent of each identified plaque. The perimeter of each identified plaque was outlined on frame by means of an electronic cursor and plaque area was automatically calculated by the software.

***Reproducibility of ultrasound findings***. The intra-observer reproducibility was achieved by a second evaluation of 40 vascular sites on 10 randomly selected participants at a time interval of 26-60 days between the two examinations. The variability for the presence of plaques showed 95% agreement between measurements at the first and second examinations with a Kappa value of 0.9 ($p<0.001$). For carotid IMT, the coefficient of variation was 4.8%, which is similar to previous studies on IMT reproducibility (44). For femoral IMT, coefficient of variation was 9.2%. For maximal plaque thickness, the coefficient of variation was 9.5% and 6.8% at carotid and femoral levels, respectively. For maximal plaque area, coefficients were 18.8% and 13.9% at carotid and femoral levels, respectively.




***Ultrasound screening of abdominal aortic aneurysm (AAA)***. Screening of abdominal aortic aneurysm (AAA) was performed in 353 consecutive individuals aged 50-64. We restricted screening to this age range because AAA is very rare at younger ages.

**XII. ANALYSIS AND AGE STANDARDIZATION**

Results are provided by sex and 10-year categories. Standard errors and 95% confidence intervals are available for all estimates and can be provided upon request. Overall prevalence estimates in the population aged 25-64 were standardized to the new age distribution of the World Health Organization (45). The weights for age categories 25-34, 35-44, 45-54, and 55-64 are respectively 0.32, 0.28, 0.23, and 0.17. For analyses comparing data in 1989 and 2004, the same standard WHO age distribution was used. The statistical software Stata 8.2 was used for statistical analysis.

## RESULTS

### I. SAMPLING FRAMEWORK

**Table I-1. Sampling framework of Seychelles Heart Study 2004**

| | Men | | | | | Women | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25-34 | 35-44 | 45-54 | 55-64 | All | 25-34 | 35-44 | 45-54 | 55-64 | All | Grand total |
| Sampled | 207 | 206 | 206 | 193 | 812 | 203 | 203 | 209 | 205 | 820 | 1632 |
| Abroad | 3 | 3 | 3 | 1 | 10 | 6 | 1 | 6 | 0 | 13 | 23 |
| Dead | 0 | 1 | 4 | 5 | 10 | 0 | 0 | 1 | 3 | 4 | 14 |
| Letter returned | 10 | 8 | 4 | 4 | 26 | 3 | 2 | 1 | 0 | 6 | 32 |
| Abroad, dead or no address | 13 | 12 | 11 | 10 | 46 | 9 | 3 | 8 | 3 | 23 | 69 |
| Eligible | 194 | 194 | 195 | 183 | 766 | 194 | 200 | 201 | 202 | 797 | 1563 |
| Did not attend | 62 | 49 | 38 | 28 | 177 | 33 | 25 | 18 | 16 | 92 | 269 |
| Refused | 3 | 3 | 8 | 7 | 21 | 4 | 4 | 2 | 8 | 18 | 39 |
| Did not participate | 65 | 52 | 46 | 35 | 198 | 37 | 29 | 20 | 24 | 110 | 308 |
| Participated | 129 | 142 | 149 | 148 | 568 | 157 | 171 | 181 | 178 | 687 | 1255 |
| Participation rate | 66.5 | 73.2 | 76.4 | 80.9 | 74.2 | 80.9 | 85.5 | 90.0 | 88.1 | 86.2 | 80.3 |

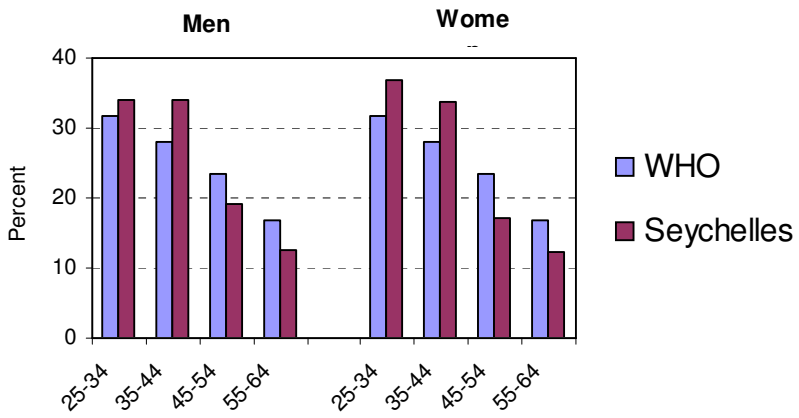
- 1255 out of 1565 eligible individuals participated, a participation rate of 80.3%.
- At 80%, the participation can be considered as very good for such examination surveys based on persons selected on census (i.e. not on those present in a household at the time of a survey) and for a study where selected persons are asked to attend a study center on a scheduled date.
- However, 20% of eligible participants did not participate and it is known that non-participants generally tend to be less healthy than participants.
- Hence, our estimates on risk factors (smoking, drinking, high blood pressure, etc) may tend to underestimate actual levels of risk factors in the population.

**Table I-2. Distribution of the population of Seychelles in 1989 and 2004**

| | Number | | | Percent | | |
|---|---|---|---|---|---|---|
| Age | 1976 | 1989 | 2004 | 1976 | 1989 | 2004 |
| 0-24 | 36'066 | 37'818 | 35'287 | 60.9 | 56.4 | 42.8 |
| 25-64 | 19'637 | 24'902 | 40'653 | 33.2 | 37.2 | 49.3 |
| 65+ | 3'523 | 4'282 | 6'534 | 5.9 | 6.4 | 7.9 |
| Total | 59'226 | 67'002 | 82'474 | 100 | 100 | 100 |

- The relative and absolute size of the middle-aged population (25-64) is increasing from 1976 to 2004.
- This emphasizes the growing importance of age-related health problems, such as NCD.

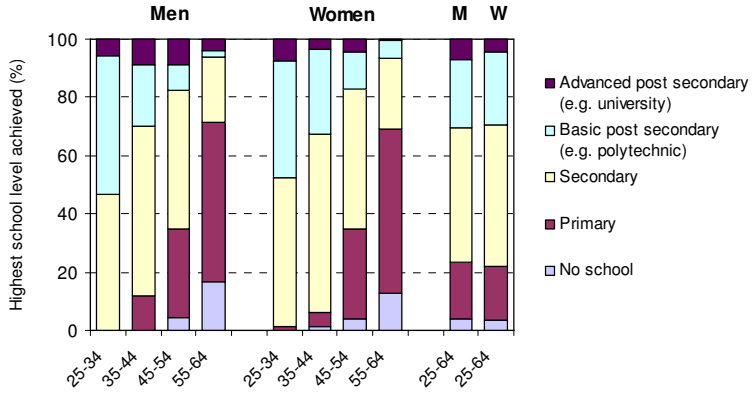
**Figure I-1**. Distribution of Seychelles population in 2004 and WHO world population




- The WHO age distribution (Ahmad version [45]) takes into account figures from numerous countries, not only the generally young populations of developing countries.
- This age standardization tends to put slightly more weight on older than younger age categories than the actual current age distribution of Seychelles.
- Of course, this not an issue for prevalence estimates given for 10-year age categories since such age stratified estimates are not standardized for age.

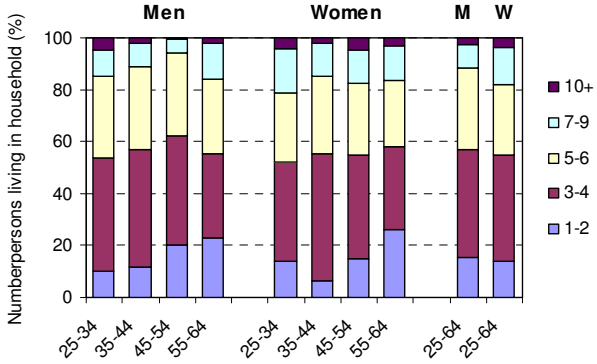
## II. SOCIO ECONOMIC STATUS

### Figure II-1. Highest school level attained



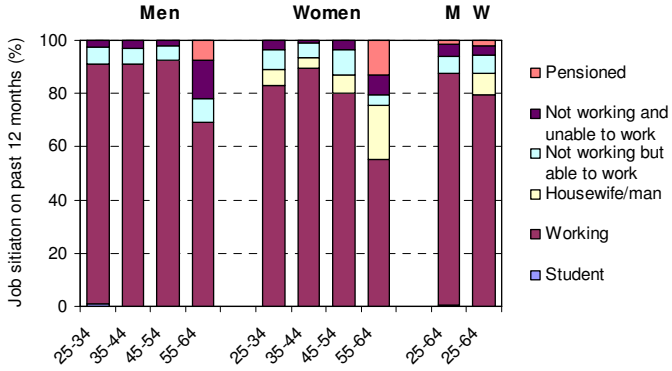

- There is a strong inverse relation between highest school attended and participants' age.
- This is consistent with the situation in Seychelles that less people attended secondary or higher school in the past than recently. Highest school level attended is therefore confounded by participants' age.
- This suggests that a limitation for the use of an "education" indicator as a covariate in analyses.
- There is little difference in proportions attending different school levels between men and women.
- This is consistent with little sex difference in access to education in Seychelles.

### Figure II-2. Number of persons living in same household



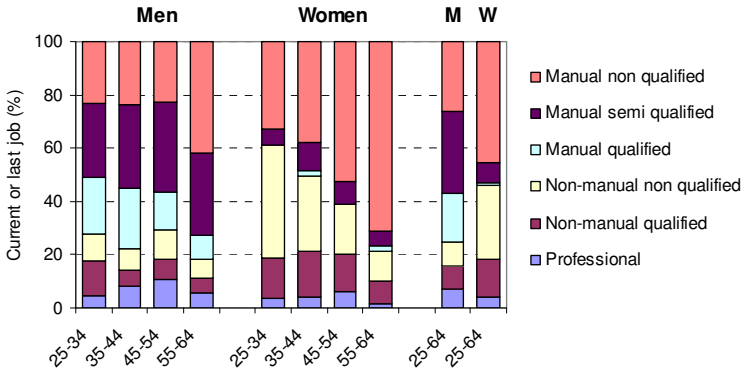

- The reported figures include the respondent as one of the household members.
- Less than 20% of all households have 1 or 2 persons and a half of them included 5 persons or more.

### Figure II-3. Prevalence of participants' job situation during the past 12 months



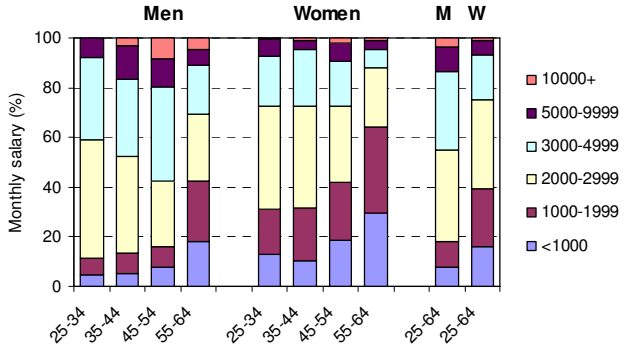

- Up to age 54, as many as approximately 90% of men and 85% of women report working.

**Figure II-4. Prevalence of job categories of participants**



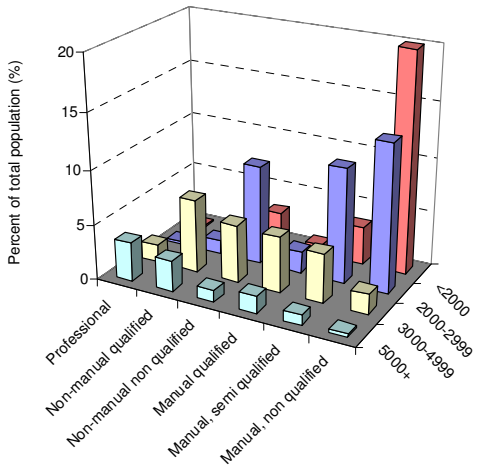

- Higher proportions of women than men report a manual non qualified occupation.
- Unqualified occupation is found less often in younger than older women.
- Slightly more women than men report a professional or qualified non manual occupation.

**Figure II-5. Prevalence of categories of monthly salary**




- Approximately 50% of men and 70% of women report a salary of less than SR 3000 per month.
- More women (~40%) than men (~20%) report a salary of less than SR 2000 per month.

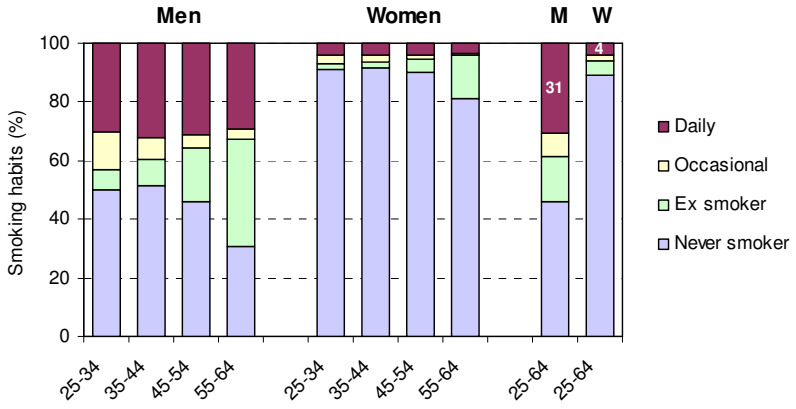
**Figure II-6. Relationship between salary and occupation**




- Reported occupation refers to current job or last job if no current job.
- There is a strong association between professional qualification and reported salary.
- Indeed, low socio economic status is generally a main predictor of various detrimental health conditions and behaviors.

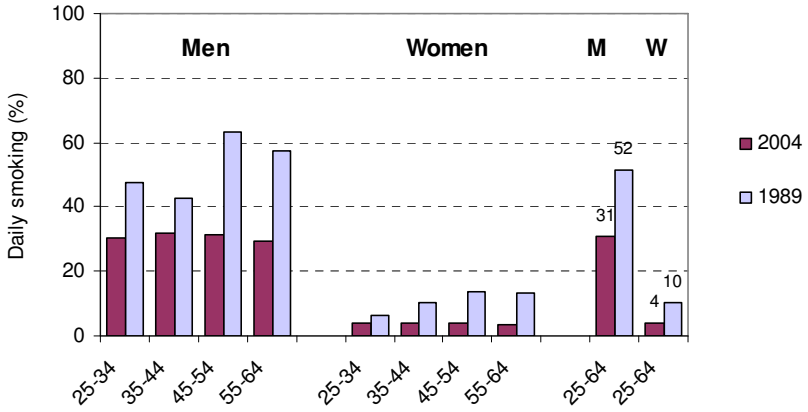
## III. SMOKING HABITS

### Figure III-1. Prevalence of smoking habits



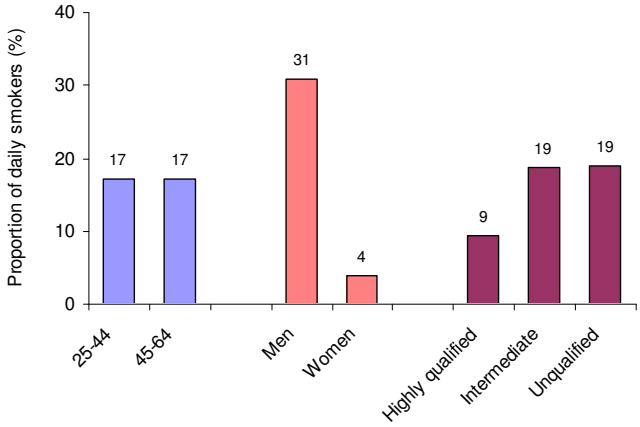

- The prevalence of smoking is much higher in men than in women (31% vs. 4%).
- As expected, the prevalence of ex-smoking increases with age (as many smokers end up to quit smoking after years of smoking).

### Figure III-2. Prevalence of daily smoking in 1989 and 2004



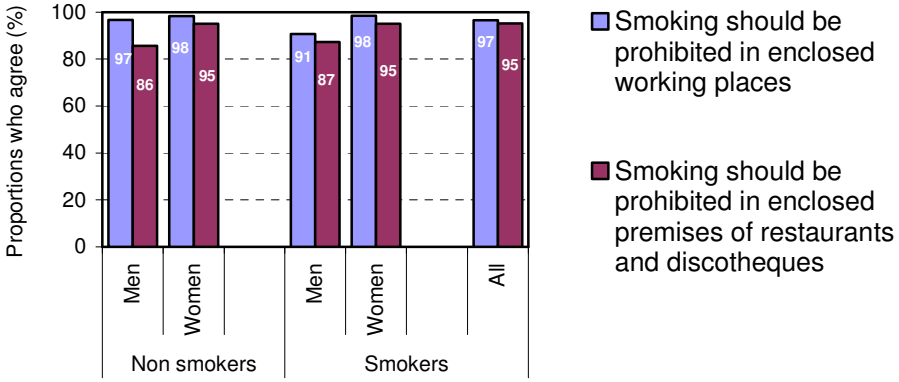

- The prevalence of smoking decreased substantially between 1989 and 2004.
- This may reflect a real decrease subsequent to active tobacco control interventions in the past decade (health education programs, high taxes on cigarettes, ban on tobacco advertisement, etc).
- However, one cannot rule out that some of the decrease is related to a “social desirability” reporting bias (i.e. more current smokers could have denied smoking in 2004 than in 1989 because of increased social pressure against smoking during the interval).

**Figure III-3. Smoking prevalence by sex, age and occupation**




- The prevalence of smoking is larger in men than in women and persons with an occupation of low vs. high qualification.

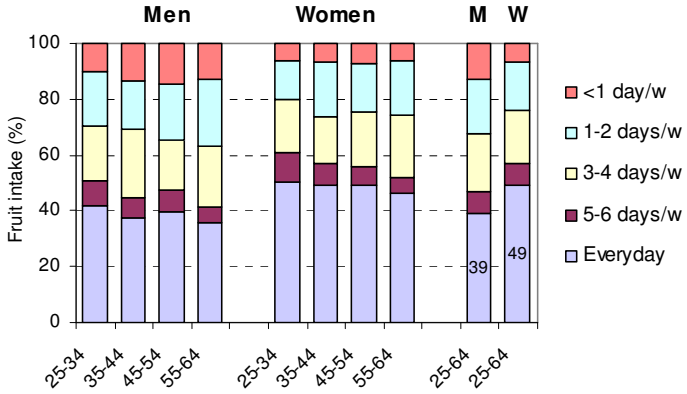
**Figure III-4. Opinion on a smoking ban in enclosed public places**




- A large majority of both smokers and non-smokers favor a ban on smoking in enclosed working places and in enclosed public places such as restaurants or discotheques.
- Similar figures are typically found in similar surveys in most countries, and they underlie the fact that most smokers support some restrictions on smoking.
- This is also consistent with findings in many studies that up to 80% of smokers wish to quit smoking.

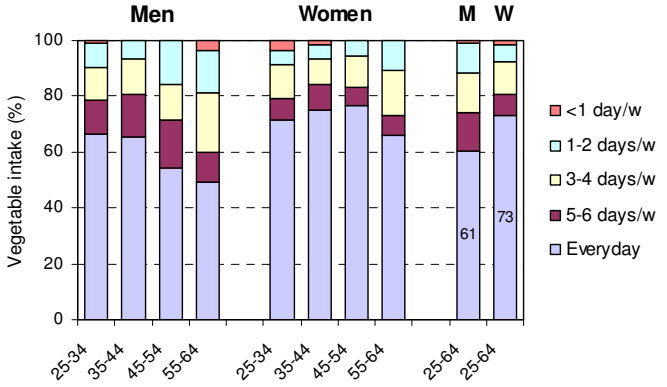
## IV. CONSUMPTION OF FRUITS, VEGETABLES AND OTHER FOODS

### Figure IV-1. Consumption of fruits



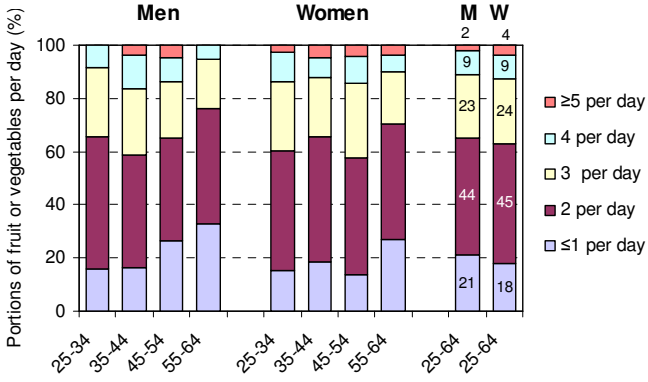

- While recommendations advise that everyone should have several portions of fruit every day (e.g. "Take Five" campaign), nearly half of participants of all ages do not eat fruit on a daily basis.
- Patterns are fairly similar in men and women and in all age categories.
- Low consumption of fruit is a health concern as fruit and vegetables intake is a strong preventive factor for chronic diseases, and also considering that local (tropical) fruits are often broadly available to many inhabitants in Seychelles.

### Figure IV-2. Consumption of vegetables



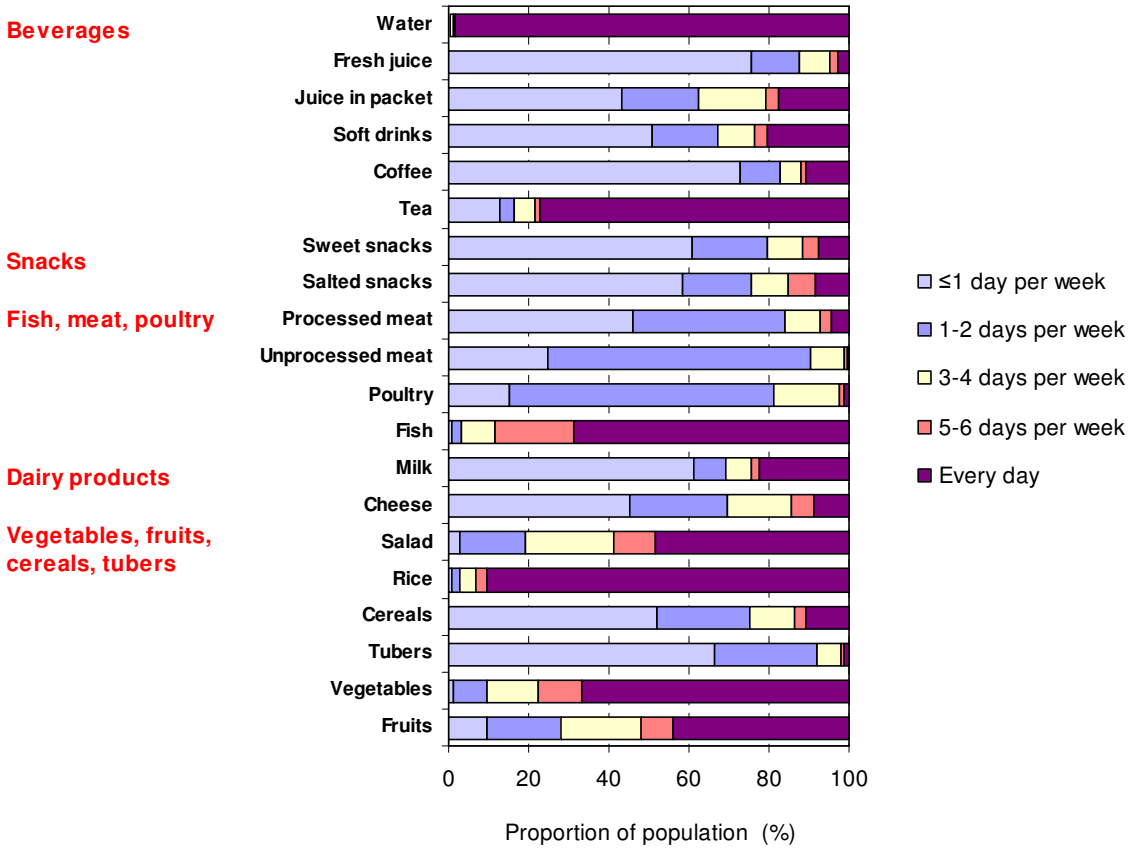

- While it is recommenced that everyone eats several portions of vegetables every day (e.g. "Take five" campaign), nearly a third of people of all ages do not eat vegetables on a daily basis.
- Women tend to report a larger vegetables intake than men.

### Figure IV-3. Portions of fruits or vegetables consumed per day



- Less than 5% of adults achieve the goal of eating at least 5 portions of fruit or vegetables a day.
- This finding underlies a major area for prevention as consumption of fruit and vegetables is an important preventive factor of cardiovascular disease, cancer and other diseases.

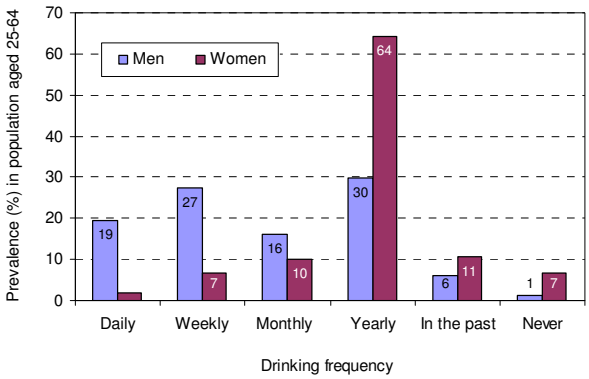
**Figure IV-4. Dietary patterns in population aged 25-64**




- The findings suggest that a large consumption of calories can be attributed to sweetened drinks such as soft drinks, juices in packets and tea (tea is generally taken with large amount of sugar).
- Almost 90% of people consume fish on a daily or almost daily basis.
- However, this does not exclude a substantial fat intake (and calorie intake) as fish is traditionally often prepared by frying it.
- Approximately 90% of people eat rice on a daily basis. The figures do not provide details on volume of rice served daily (which is traditionally large in Seychelles).
- It should be acknowledged that rice available in Seychelles is polished (i.e. low content in vitamins).
- Consumption of milk and cheese are low (hence limited intake of calcium, particularly as the population is ageing and bone problems may subsequently increase).
- As emphasized in previous figures, the intake of vegetables and fruit is far below the recommended intake target of at least 5 portions per day.
- These findings emphasize several areas and targets for interventions.

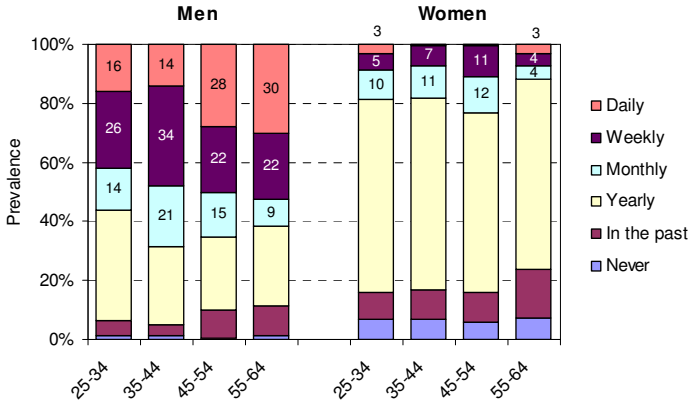
## V. CONSUMPTION OF ALCOHOL

### Figure V-1. Overall drinking frequency in men and women aged 25-64



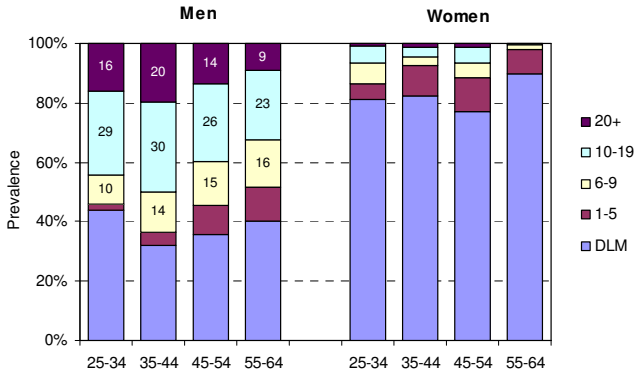

- Approximately 60% of men and 20% of women drink on a regular basis (daily, weekly or monthly).
- It should be recalled that excessive alcohol drinking is detrimental to health, but not moderate intake.
- Inversely, infrequent drinking is not necessarily associated with good health if alcohol is consumed in excess on drinking occasions (binge drinking).

### Figure V-2. Drinking frequency by sex and age




- Drinking frequency is much higher among men than women.
- Drinking frequency did not largely differ by age.

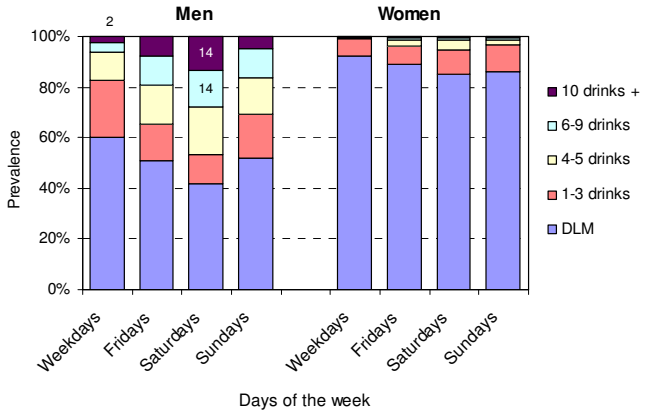
### Figure V-3. Drinking volume by sex and age




- Among the approximately 60% of men who drink regularly, only a minority drink in moderation (1-30 ml alcohol/day, i.e. 1-2 drinks/day), i.e. a consumption pattern that is compatible with a healthy lifestyle.
- Nearly 20% of all men drink in excess (>75 ml alcohol/day, i.e. equivalent of >5 drinks/day).
- Note: DLM = drinks less than monthly.

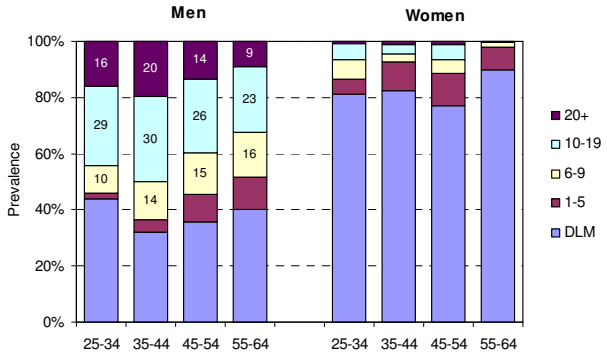
**Figure V-4. Drinking volume in relation to days of the week**

*Note: DLM = drinks less than monthly*



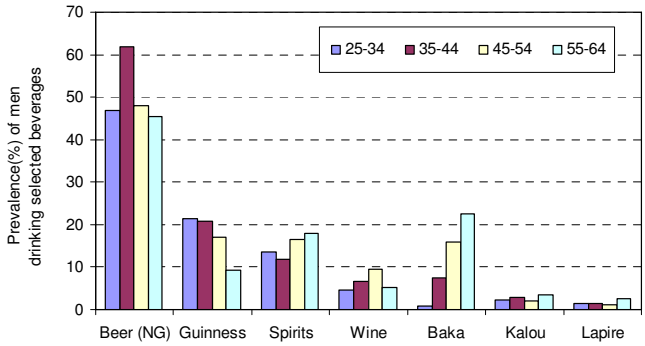

- Around 40% of men drink on week days and ~60% on Saturdays.
- Excess drinking (>5 drinks/day) is reported by ~20% of men on weekdays and ~50% on Saturdays.
- More than 10% of all men report ≥10 drinks on Saturdays (i.e. binge drinking).

**Figure V-5. Maximal number of drinks per day on special occasions**



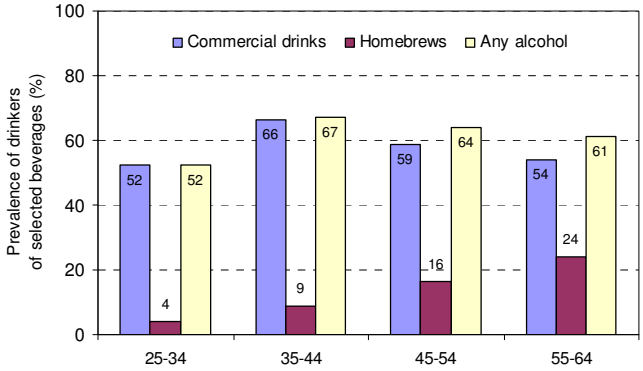

- Approximately 40% of men have ≥10 drinks and 15% ≥20 drinks on special occasions (binge drinking).
- Prevalence is not largely different by age, with a trend to highest consumption at age 35-44.
- In contrast, binge drinking is reported by much lower proportions of women than men.
- High proportions of binge drinking in men emphasize high social tolerance for drinking (at least among men), which has important implications for implementing/enforcing risk reduction interventions.

**Figure V-6. Drinking frequency by type of beverage and age (men)**



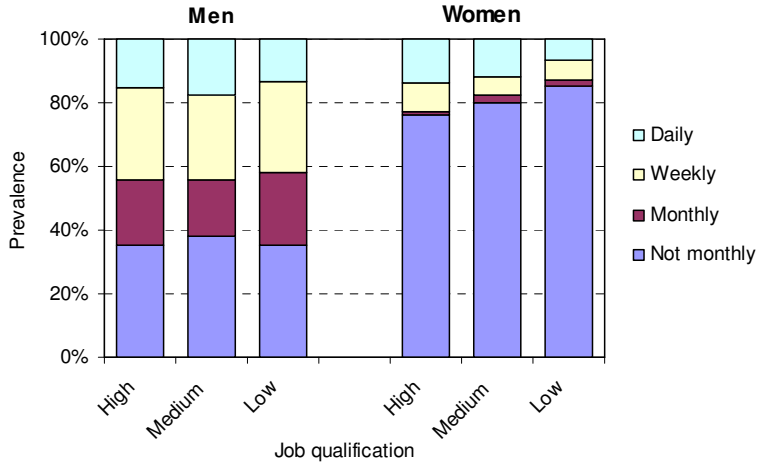

- Beer is by far the alcoholic beverage consumed most often.
- Not shown in the figure, 56% of men and 14% of women drink any type of beer (Lager or Guinness).
- These drinking patterns do not differ by age, except for “baka” (fermented sugar cane) which is consumed much often by older persons.

**Figure V-7. Drinking frequency by beverage type and age (men)**



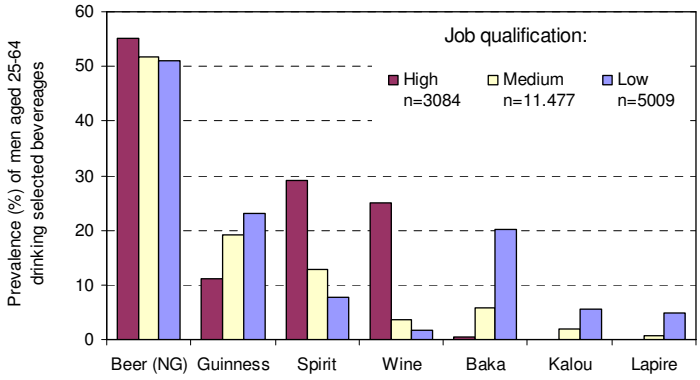

- The prevalence of drinking commercial beverages does not change largely across age categories.
- However, the prevalence of homebrew drinking increases strongly with age.

**Figure V-8. Drinking frequency by sex and job category**



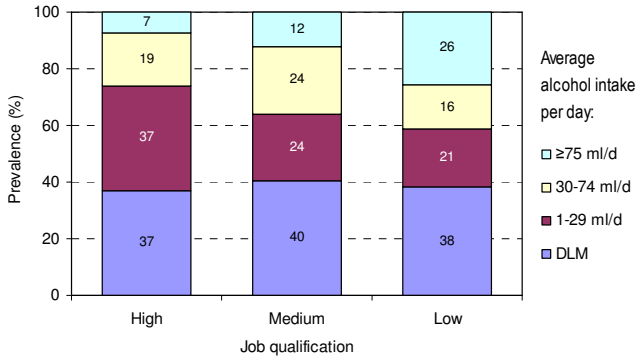

- Drinking frequency does not substantially differ across job categories.

**Figure V-9. Drinking frequency by job category (men)**



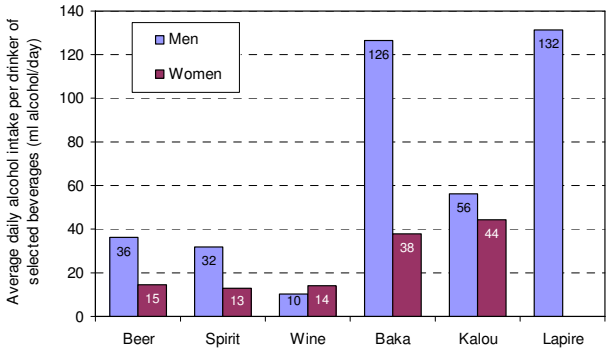

- Consumption of bear is not related to job qualification
- Guinness and homebrews are consumed more often by persons of low than high job qualification.
- Spirits and wine are consumed more often by persons of high than low job qualification.

**Figure V-10. Drinking volume per job category (men)**



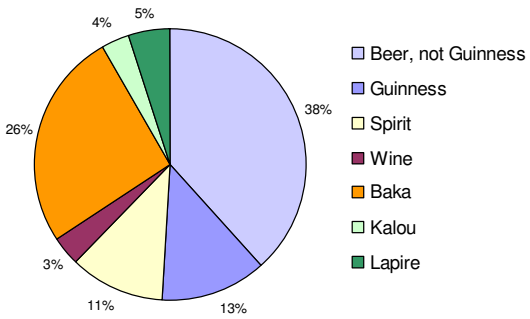

- The prevalence of drinking (any amount) is similar across job qualification categories, but the prevalence of men drinking in excess is much higher in men with low than high job qualification.
- It cannot be ruled out that persons with high job occupation tend to underestimate their drinking volume but such a bias is unlikely to fully account for the large observed differences.

**Figure V-11. Drink specific alcohol volume**




- The average alcohol intake per drinker (in ml of ethanol per day) is larger in men than in women for most drinks (except for wine).
- The figure shows, for example, that among drinkers of beer, men have 26 ml ethanol per day derived from beer and women 15 ml per day, on average.
- The large alcohol volume (intake) among homebrew drinkers is likely related to the much cheaper cost of homebrews than commercial beverages (5-10 times difference in cost per ml of pure ethanol) and the large volume of bottles generally used for the sale of homebrews (often 1.5 l bottles).

**Figure V-12. Contribution of different beverages to total alcohol consumption in Seychelles**




- Overall, homebrews account for 27% of all alcohol (ethanol) consumed while all commercial beverages accounts for 73% of total alcohol (ethanol) consumed (in population aged 25-64).
- Beer accounts for nearly half of the total alcohol (ethanol) consumed.

**Table V-1. Consumption of selected beverages per capita aged 25-64**

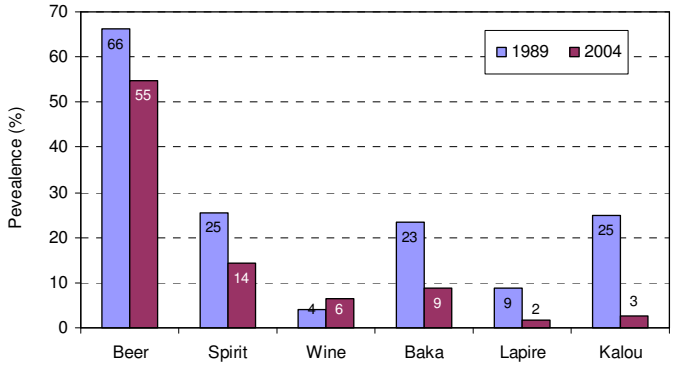
| | Mean alcohol intake per capita (ml/day) | Alcohol per capita per year (l) | Proportion of total alcohol intake in population aged 25-64 (%) |
|---|---|---|---|
| Any beer | 10.9 | | |
| Beer, not Guinness | 8.3 | 3.0 | 38.4 |
| Guinness | 2.7 | 1.0 | 12.5 |
| Spirit | 2.4 | 0.9 | 11.4 |
| Wine | 0.7 | 0.3 | 3.4 |
| Baka | 5.6 | 2.0 | 25.9 |
| Kalou | 0.8 | 0.3 | 3.5 |
| Lapire | 1.0 | 0.4 | 4.9 |
| Total | 21.5 | 7.8 | 100.0 |
| Total men | 39.8 | 14.5 | |
| Total women | 3.8 | 1.4 | |

- Based on reported frequency and volume (questions asked for each boradcategory of alcohol beverages consumed and separately for week days and weekend), consumption of alcohol per capita of all inhabitants aged 25-64 is 7.8 liters ethanol per year (14.5 liters for men and 1.4 liters for women).
- Assuming a same consumption by persons aged 18-24 and 65+ (who account for respectively 17% and 7% of the total population of Seychelles) and zero alcohol consumption by children aged <15 (who account for 26% of the total population), consumption per capita of total population can be estimated at ~11 liters ethanol per year (20 l/year for men and 2 l/year for women).

**Methodological notes**

- Detailed alcohol consumption was asked only to persons reporting drinking at least once per month. Hence we did not capture alcohol consumption by persons drinking less than monthly. This source of underreporting is likely small.
- Consumption of beer estimated from the survey (self-reported data) accounts for ~50% of the actual 12-month sales in the country. This underreporting is consistent with a ~50-60% underreporting in most similar studies in other populations based on self-reported consumption (23).
- *This survey allows assessing consumption of non-commercial homebrews beverages, for which no official sales data are available*.
- Characteristics of studies based on reporting must be taken into account when comparing different types of data (e.g. questionnaire-based surveys vs. data based on aggregate commercial sales data).

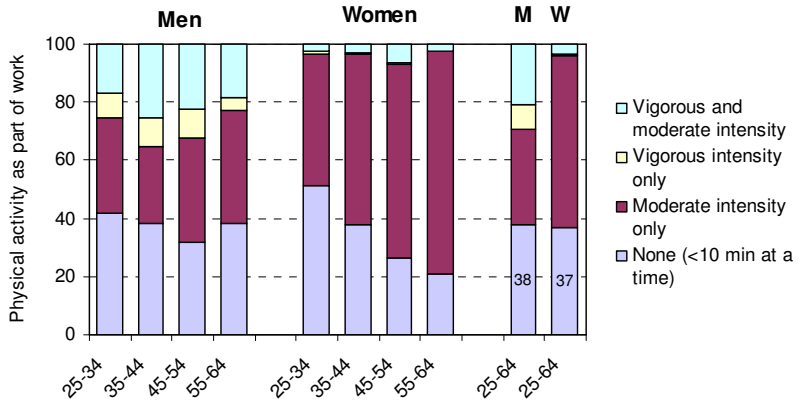
**Figure V-13. Trends in drinking frequency between 1989 and 2004 (men)**




- Alcohol data were collected in 1989 using a same population-based design and similar questionnaire assessing frequency and volume of same broad beverage categories, which allows direct comparison.
- However, questions on alcohol consumption were asked to all participants in 1989 but only to persons reporting drinking on at least a monthly basis in 2004, hence a possible small underreporting bias in 2004 vs. 1989.
- The prevalence of homebrew drinkers has decreased largely from 1989 and 2004.
- This 15-year large decrease in homebrew drinking is consistent with rapidly changing drinking patterns in a rapidly modernizing socio-economic environment.
- However the much cheaper cost of homebrews than commercial drinks, per alcohol unit, will remain a strong incentive to buy homebrews, particularly for low-income persons.

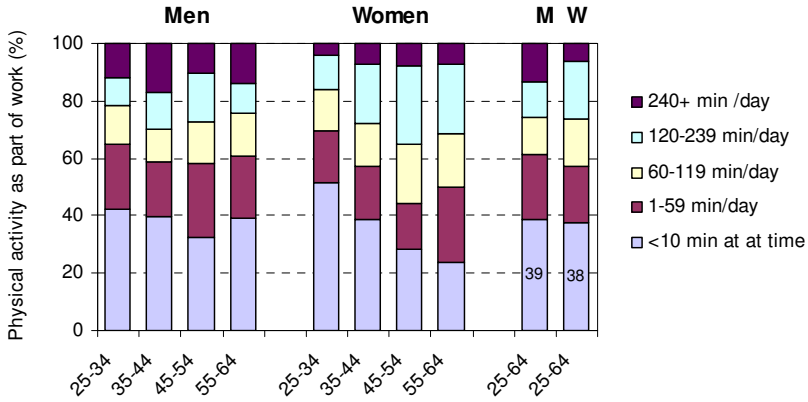
## VI. PHYSICAL ACTIVITY

### Figure VI-1. Prevalence of categories of physical activity as part of work



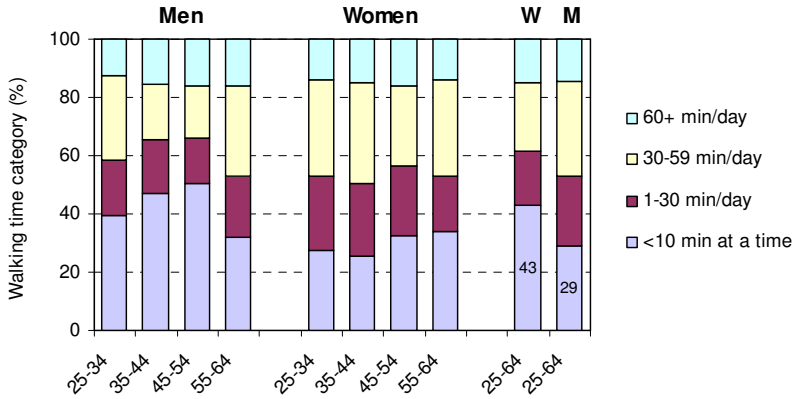

- Around 40% of both men and women have no significant physical activity at work.
- The proportion reporting no significant physical activity increases with age, particularly in women.
- This may reflect that many older women have little job qualification and work in physically strenuous jobs.
- More men than women have of moderate or vigorous physical activity at work.

### Figure VI-2. Amount of daily moderate or vigorous physical activity as part of work



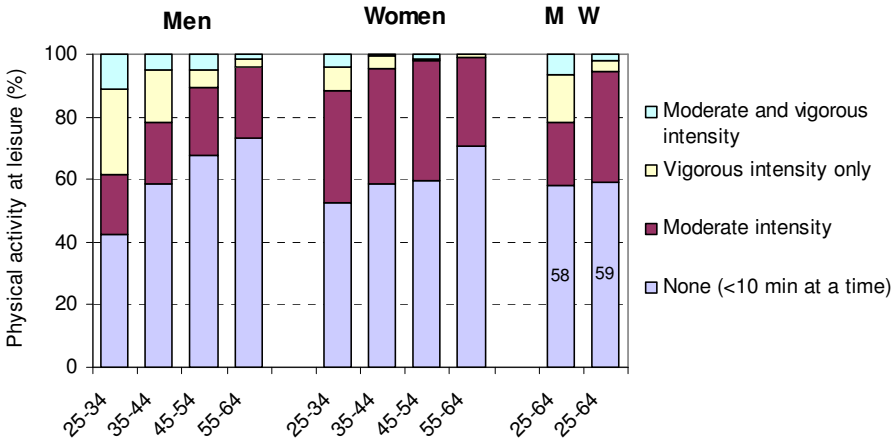

- Approximately 40% of men and women have no significant amount of physical activity at wok.

### Figure VI-3. Prevalence of categories of daily walking (not part of work)



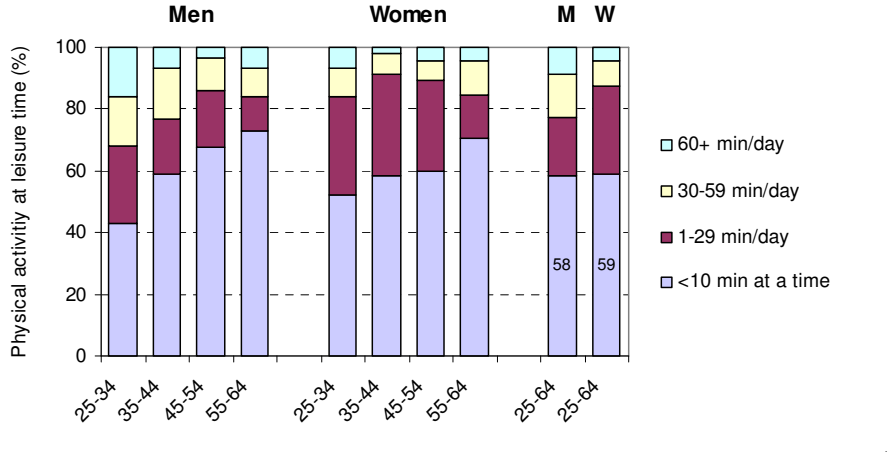

- Approximately 40% of adults report no significant walking (more than 10 min in a raw in a day).
- Around 50% of people report walking for at least 30 minutes per day.

**Figure VI-4. Prevalence of categories of physical activity at leisure time**



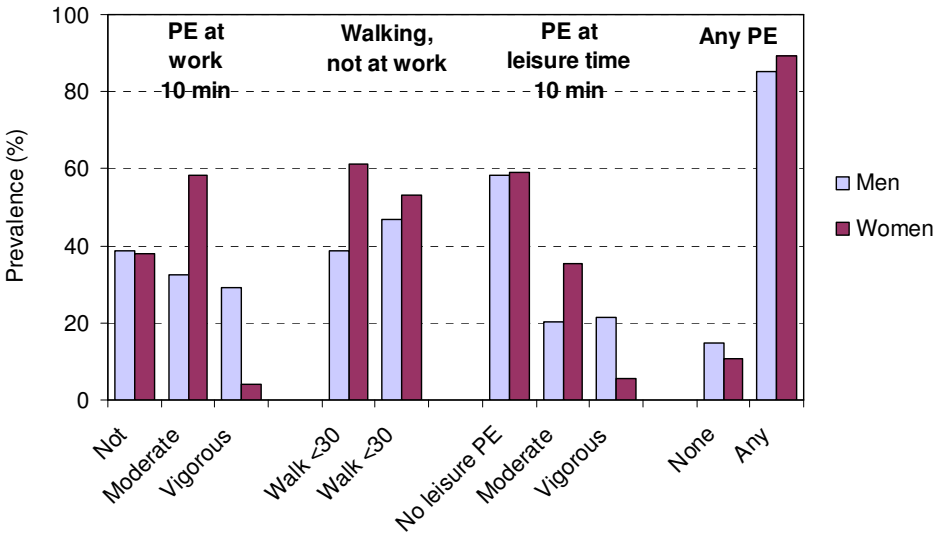

- Almost two thirds of adults report no significant physical activity during their leisure time.
- This proportion increases with age for both men and women.
- A substantial proportion of men report vigorous intensity leisure activity (40% at age 25-34) but this proportion decreases strongly with age.

**Figure VI-5. Amount of physical activity at leisure time**




- Almost two thirds of people do not report significant physical activity during their leisure time.
- This proportion increases with age in both men and women.
- Among those reporting physical activity during leisure time, a large proportion of men and a majority of women report a duration of less than 30 minutes.
- Overall, figures on physical activity show that a substantial proportion of men and women have little physical activity.
- The findings emphasize areas for intervention as sedentary habits are related strongly with detrimental conditions such as overweight, high blood pressure, blood lipid disorders and the metabolic syndrome as well as heart disease, cancer and other chronic diseases.

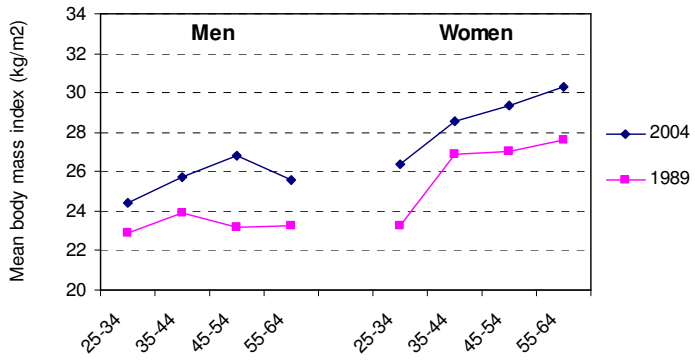
**Figure VI-6. Summary of physical activity reported at work and leisure**




- The proportions of persons doing some exercise at work (>10 min at a time) or during their leisure time (>10 min at a time) are fairly low but only a few persons do not report any physical activity at all.
- However, these figures only represent the proportions who report some frequency of physical activity (at least for 10 consecutive minutes in at least one day per week).
- Further analyses using metabolic equivalents (MET) will be analyzed and presented separately.

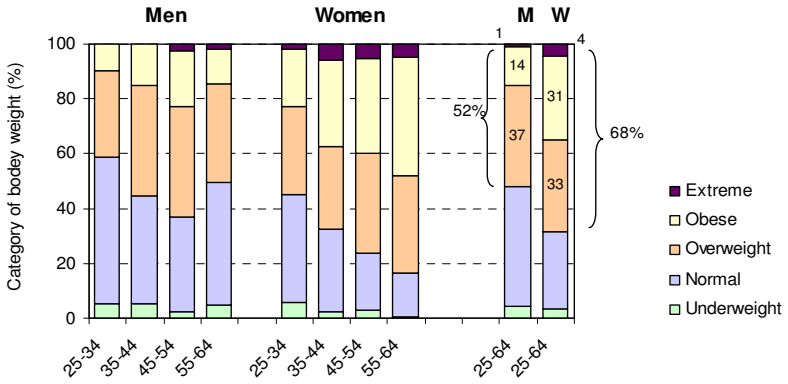
## VII. BODY WEIGHT

### Figure VII-1. Mean body mass index by sex, age and year of survey



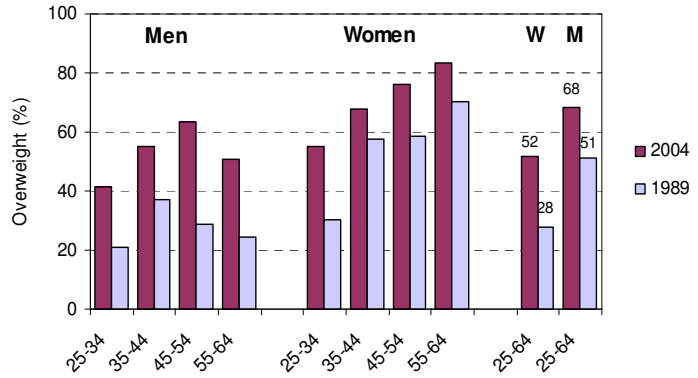

- Mean body mass index (BMI) is higher in women than in men.
- Mean BMI has increased largely between 1989 and 2004, irrespective of sex and age.

### Figure VII-2. Prevalence of body weight categories



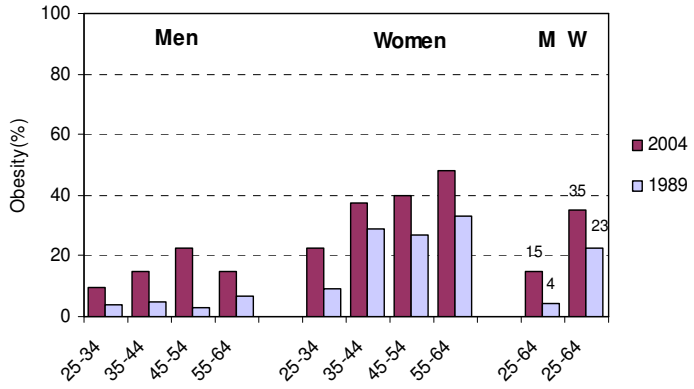

- The prevalence of categories of “excess” body weight is larger in women than in men.
- The prevalence of persons with normal weight is decreasing with age, particularly in women.
- Only approximately 50% of men and 30% of women have normal weight.
- Approximately 1% of men and 5% of women have extreme obesity (BMI ≥40 kg/m$^2$).

### Figure VII-3. Prevalence of overweight (including obesity) in 1989 and 2004



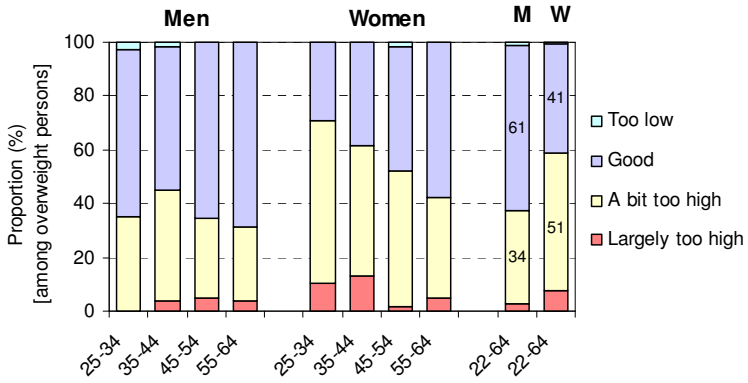

- The prevalence of excess weight (overweight or obese: BMI ≥25 kg/m$^2$) has increased largely between 1989 and 2004, irrespective of sex and age.

**Figure VII-4. Prevalence of obesity**



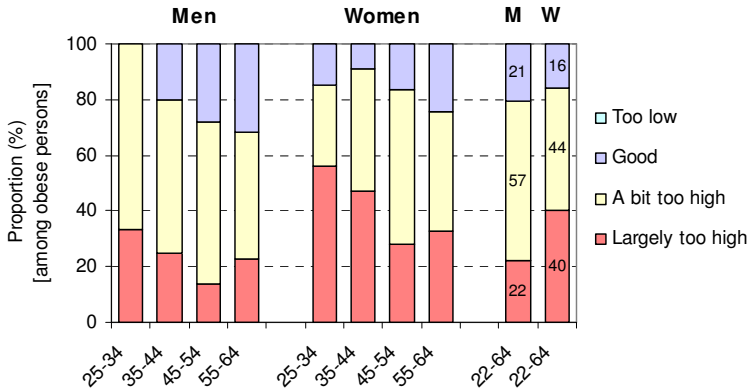

- The prevalence of obesity (BMI ≥30 kg/m$^2$) has increased largely in men and in women at all ages.

**Figure VII-5. Perceived own body weight among overweight persons**



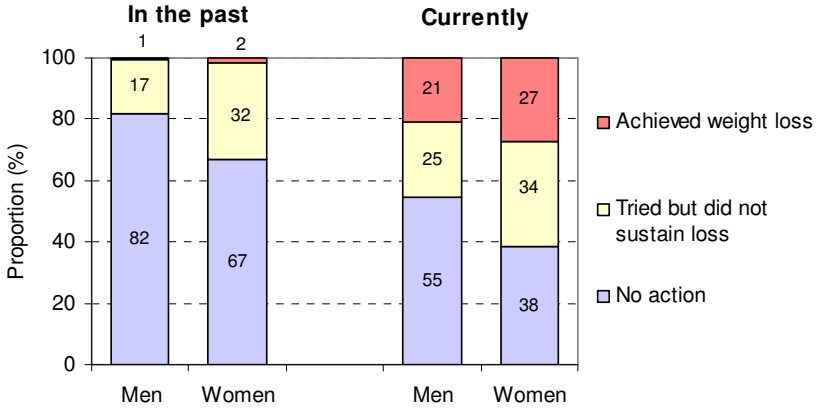

- At least one third of persons with overweight (BMI: 25-29 kg /m$^2$) perceive that their weight is “good”.
- This has implications as persons with this belief are unlikely to attempt to lose weight.

**Figure VII-6. Perceived own body weight among obese persons**




- Among persons with obesity (BMI: ≥30 kg /m$^2$), as many as approximately 20% believe their body weight is “good” and an additional 50% believe their weight is “a bit too high”.
- This has implications as persons with this belief are unlikely to attempt to lose weight.

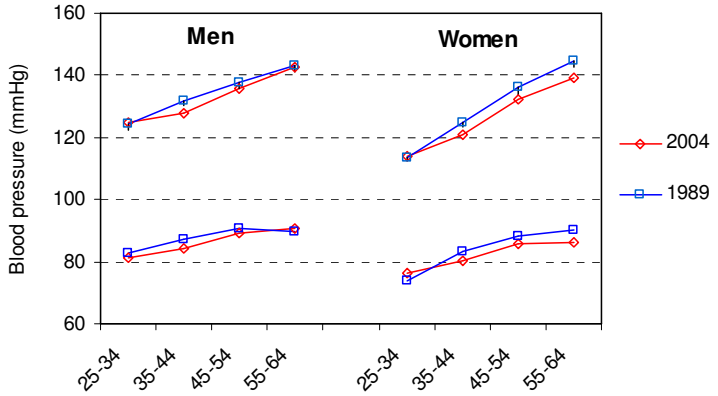
**Figure VII-7. Weight control by persons who think their weight is too high**




- This analysis is restricted to persons perceiving that their weight is too high (and does not take into account those overweight persons who do not perceive excess weight).
- More than two thirds report no attempt to lose weight or no sustained success if doing so.
- The figures emphasize the difficulty for overweight individuals to lose weight.

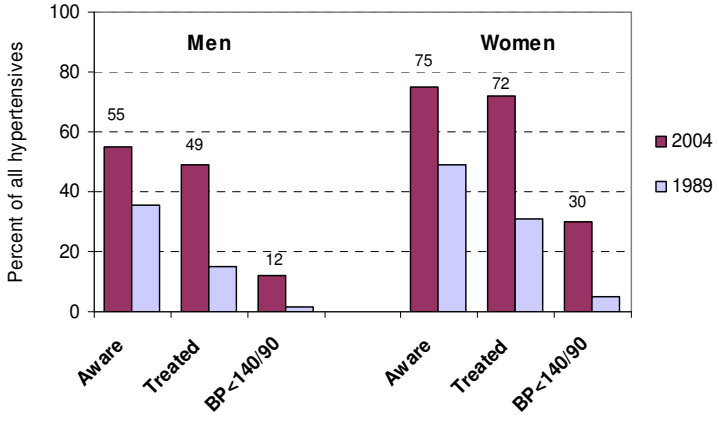
## VIII. BLOOD PRESSURE

**Figure VIII-1. Mean systolic and diastolic blood pressure, 1989 and 2004**



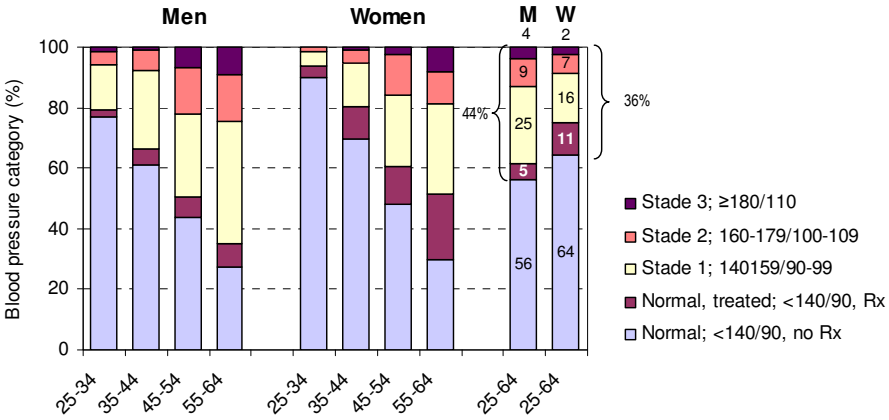

- As in most populations, blood pressure (BP) increases sharply with age.
- Similar to most other populations, BP is higher in men than in women in younger age categories while the reverse trend is observed after age 55-64.
- BP was slightly lower in 2004 than in 1989.
- This favorable secular trend in BP occurred despite larger prevalence of obesity in 2004 than in 1989 but is consistent with largely increased prevalence of persons treated for HBP in 2004 than 1989.

**Figure VIII-2. Awareness, treatment, and control among all persons with HBP**



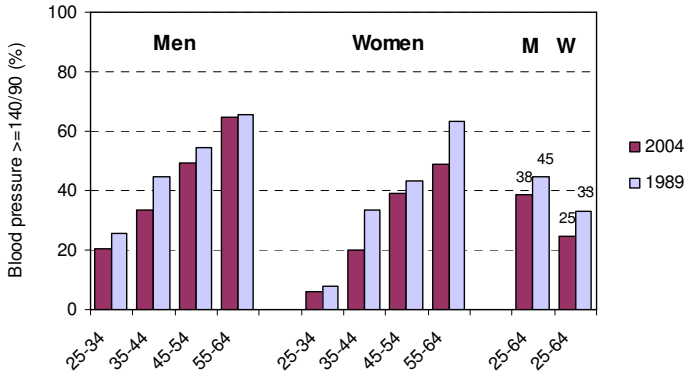

- There was a large increase, in 2004 vs. 1989, in the proportions aware of having HBP, treated for HBP, and with BP controlled to target.
- However, in 2004, as many as 45% of men 25% of women who have HBP were unaware of having HBP (“aware persons” are persons who had ever been told by a doctor that they had HBP).
- In 2004, almost all persons aware of having HBP were treated.
- Only 12% of men and 30% of men treated for HBP have their BP controlled to therapeutic target.
- HBP being the main cause of stroke, and stroke being the leading single cause of death in Seychelles, these results emphasize the need for screening programs to identify persons still unaware of being hypertensive and for strengthening treatment among hypertensive patients to lower BP to target and reduce complications of hypertension.

**Figure VIII-3. Prevalence of categories of blood pressure**



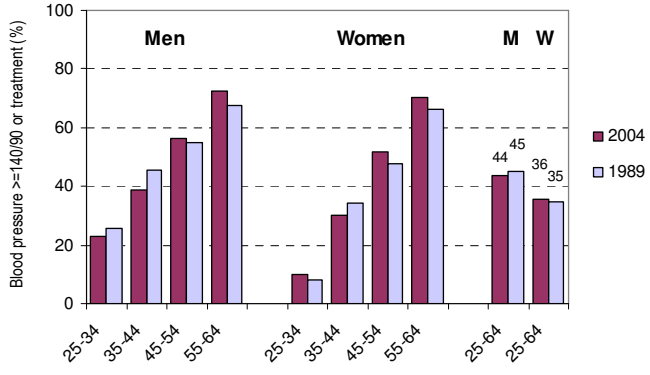

- The prevalence of high blood pressure (HBP) increases sharply with age in both men and women.
- A large proportion of the adult population has HBP (44% of men and 36% of women).
- As many as 20% of adults aged 45-64 have very high BP (≥160/100 mmHg).
- Among persons with HBP, only a small proportion is controlled (treated and BP <140/90).
- HBP is a main risk factor for CVD and other chronic diseases and the leading cause of stroke.
- The high prevalence of HBP in the population of Seychelles is consistent with the very high rates of stroke mortality in the country.

**Figure VIII-4. Prevalence of BP ≥140/90 in 1989 and 2004**



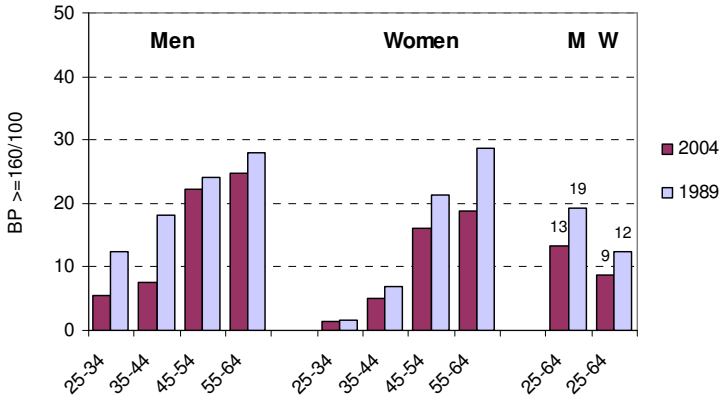

- The prevalence of persons with HBP (BP≥140/90 mmHg) has slightly decreased between 1989 and 2004.

**Figure VIII-5. Prevalence of hypertension in 1989 and 2004 (BP ≥140/90 or Rx)**



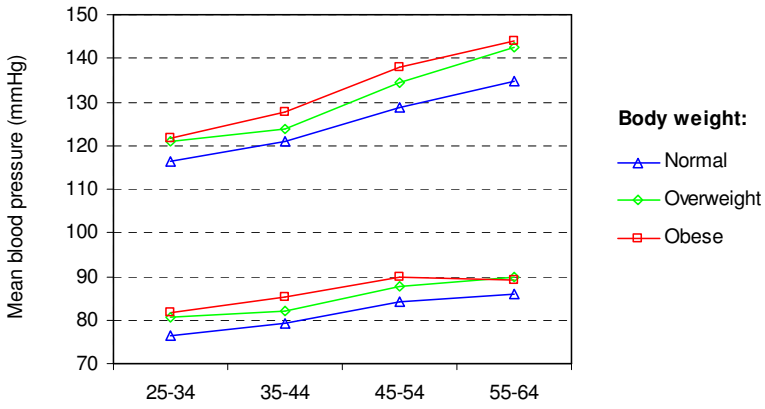
- The prevalence of hypertension (defined as BP ≥140/90 mmHg or current medication for hypertension) was higher in 2004 than in 1989 (except for young persons).
- This illustrates that the decrease in BP between 1989 and 2004 (but no decrease in the prevalence of hypertension in the interval) may partly relate to increased treatment in 2004 than 1989 (increased relative and absolute numbers of treated patients).
- From a population perspective, this illustrates the need to implement two-pronged strategies aimed at reducing BP: i) population strategies (e.g. salt reduction) to reduce BP in the entire population and reduce the number of new cases of HBP) and ii) strengthening health care (more treatment) to further improve BP control in hypertensive persons.

**Figure VIII-6. Prevalence of very high BP in 1989 and 2004 (≥160/100)**



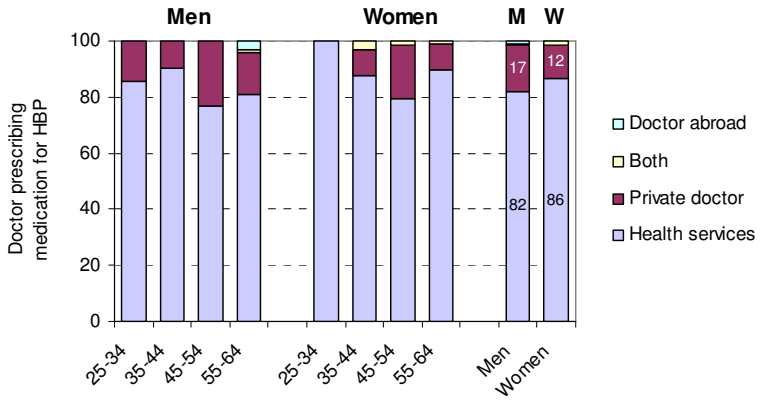

- Prevalence of very BP (≥160/100 mmHg, i.e. hypertension stage II) was lower in 2004 than in 1989.
- Lower prevalence in 2004 than 1989 suggests better better treatment in 2004 than in 1989.
- Most persons with stage II HBP will shift, upon treatment, into the category of persons with stage 1 hypertension (140-159/90-99), which is consistent with increased prevalence of persons with BP≥140/90 or treatment in 2004 than 1989.

**Figure VIII-7. Systolic and diastolic BP by age and body weight**



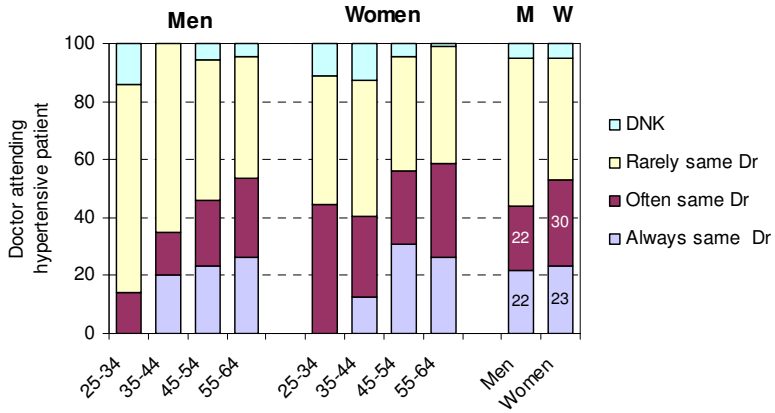

- At a same age, obese persons have mean systolic BP almost 10 mmHg higher than persons with normal weight.
- The difference for diastolic BP is proportionally similar.
- This emphasizes the importance of body weight control for BP control.

**Figure VIII-8. Heath care provider used by persons treated for HBP**



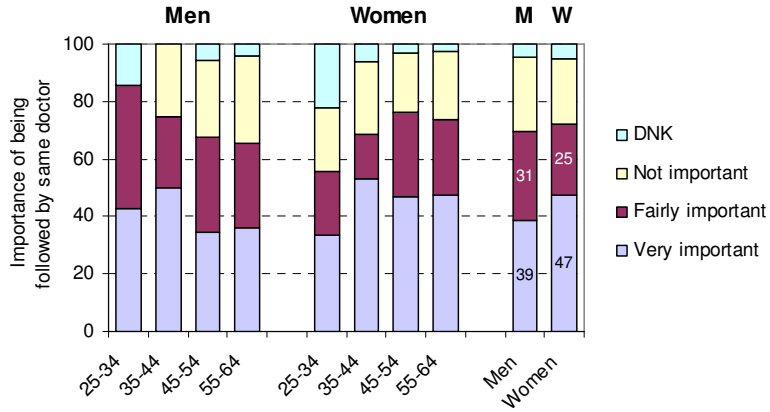

- Over 80% of persons in Seychelles seek health care from doctors in government facilities (national health system) where medical care and all medications are provided without free to all inhabitants of Seychelles.

**Figure VIII-9. Doctor seen at follow up visits for HBP**



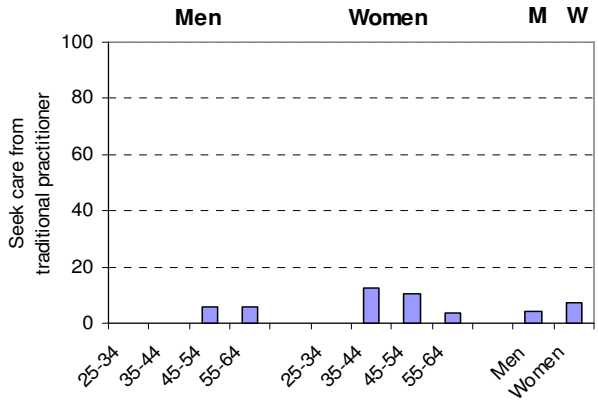

- Almost half of persons under treatment report that they often see a different doctor in subsequent visits.
- This issue should be considered for action as it is well demonstrated that follow up with same health professionals is an important aspect of long-term compliance to medication by chronic patients.

**Figure VIII-10. Importance of seeing same doctor at follow-up visits for HBP**



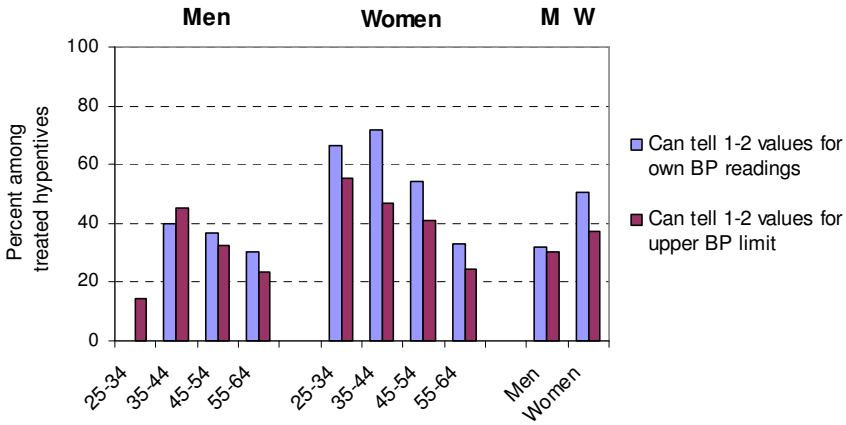

- Approximately 70-80% of male and female adults under antihypertensive treatment report that it is “fairly important” or “very important” to be followed up by a same doctor for antihypertensive treatment.

**Figure VIII-11. Use of traditional practitioners by persons treated for HBP**



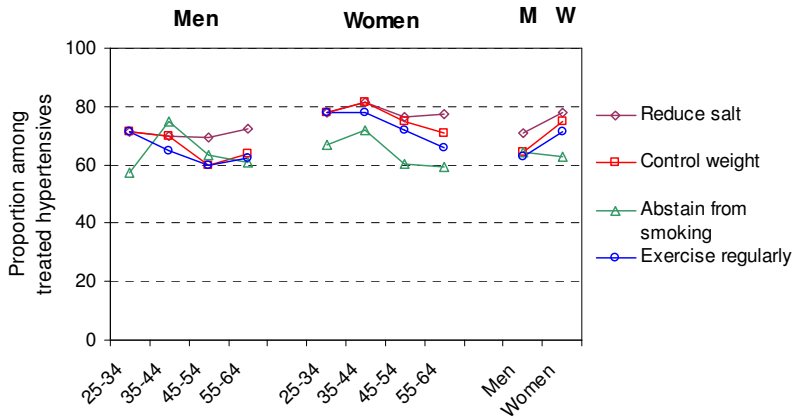

- Less than 10% of persons under antihypertensive treatment have sought care from traditional practitioners during the past 12 months.

**Figure VIII-12. Knowledge of own and normal BP values in persons treated for HBP**



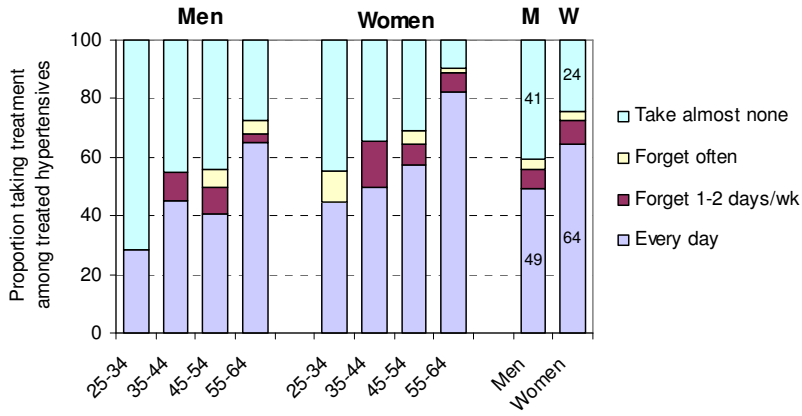

- Less than half of treated hypertensive persons know their own BP values or values for normal BP.
- This shows an important area of intervention since hypertensive patients would be adhere better to their medication if they could evaluate themselves the gap between their own values and target values.

**Figure VIII-13. Proportion of persons treated for HBP who were given lifestyle advice**



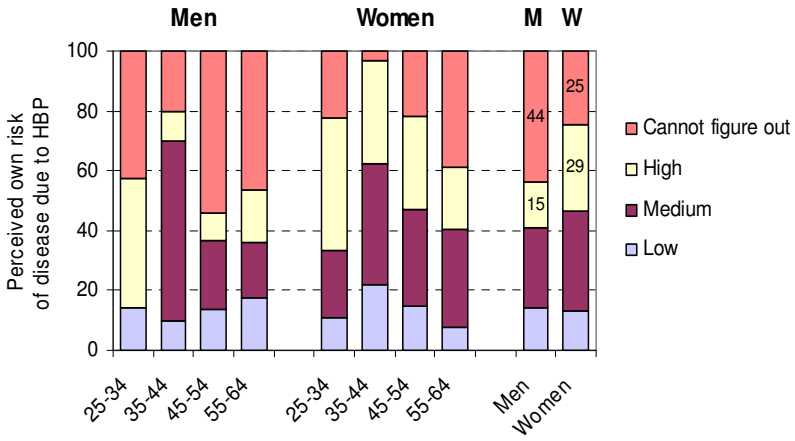
- More than 80% of persons under antihypertensive medication report having been advised by their doctor about main lifestyle measures to reduce BP.
- The proportions are similar for the four considered lifestyle factors.
- It cannot be excluded that these fairly high rates also reflect information gathered in the mass media as opposed to advice given by doctors or other health professionals.
- However, the data n the Figure do not inform on how patients translate knowledge into practice.

**Figure VIII-14. Reported compliance to medication in persons treated for HBP**



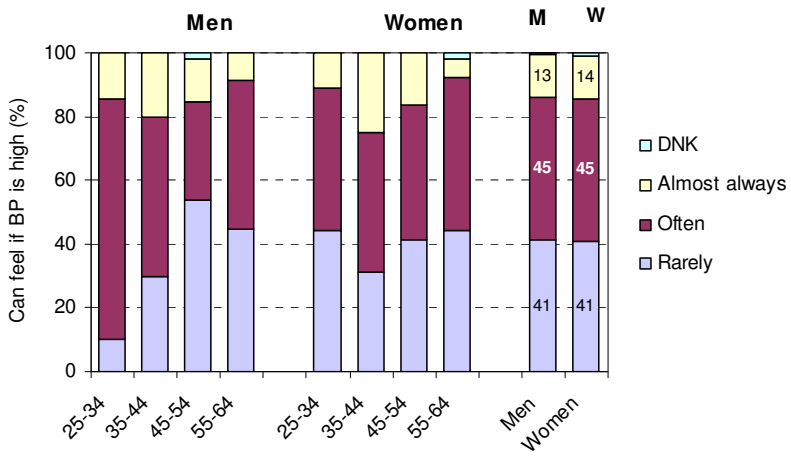

- Almost half of men and a quarter of women admit not taking the prescribed treatment for HBP.
- Non compliance may be underreported as questions were asked through a face-to-face interview with nurses.
- Good compliance with medication increased with age and was larger in women than in men.
- At age 55-64, good compliance reached 60-80% of men and women.
- Better compliance at older age may relate to a sense of increased vulnerability to disease among old vs. young persons.

**Figure VIII-15. Risk of complications perceived in persons treated for HBP**



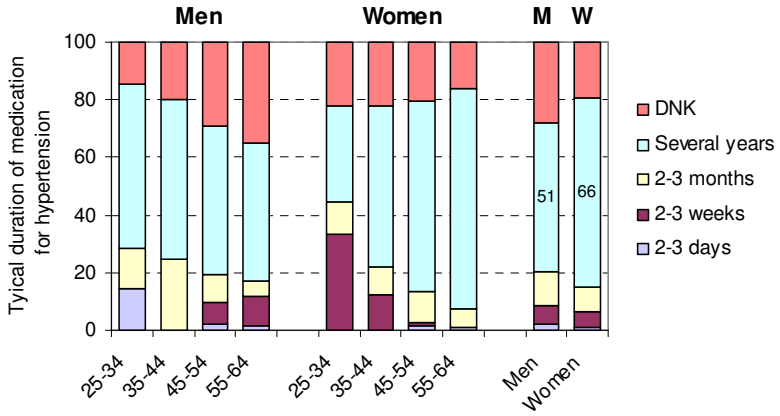

- Only a minority of persons under treatment for HBP perceive a substantial risk of complications related to HBP, such as stroke or heart attack.
- Limited perception of potential severe complications due to HBP may be a factor limiting compliance with treatment (both lifestyle and mediation)..

**Figure VIII-16. Perception of symptoms related to HBP in persons treated for HBP**




- Less than half of persons treated for HBP perceive that HBP does not cause symptoms most often.
- These figures emphasize the need for health education to hypertensive persons on the symptom-free nature of HBP to improve compliance to medication. Medication may indeed be stopped inappropriately by patients who do not feel symptoms and therefore believe that they do not or no longer have HBP.

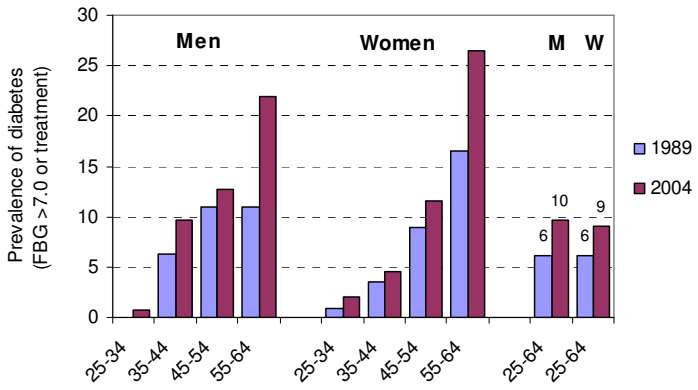
**Figure VIII-17. Duration of treatment for HBP perceived by persons treated for HBP**




- Approximately half of persons treated for HBP think that the duration of treatment for HBP would generally last for years.
- This emphasizes the need for more education (in the mass media and at health care level) to inform persons with HBP on the need for life-long treatment for HBP (i.e. that BP can be controlled, not cured) to improve compliance to treatment.

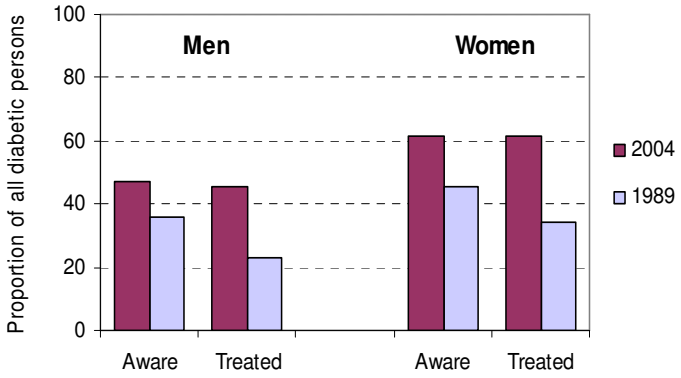
## IX. DIABETES

**Figure IX-1. Prevalence of diabetes in 1989 and 2004**



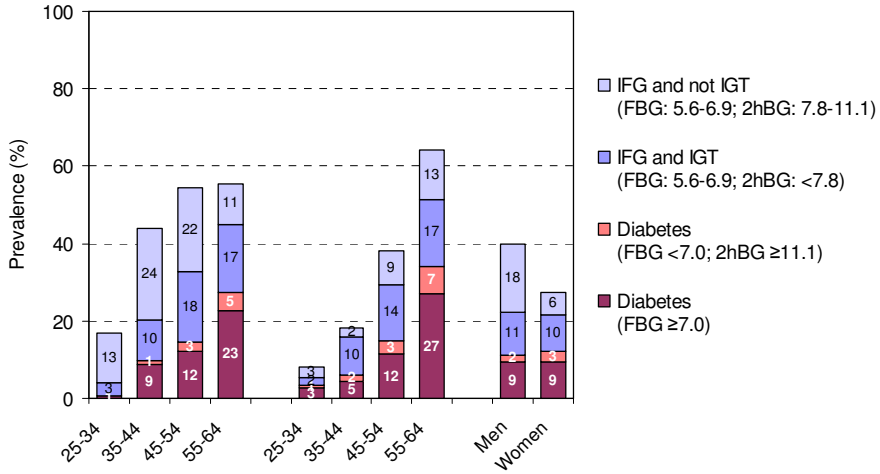

- Diagnosis of diabetes in this Figure is based on elevated fasting blood glucose (≥7.0 mmol/l) or history of anti-diabetic treatment (and not also on OGTT since OGTT was not performed in 1989).
- The prevalence of diabetes has increased substantially between 1989 and 2004.
- Increasing prevalence of diabetes is consistent with the largely increased prevalence of overweight in the interval in Seychelles (the so called “diabesity” epidemic).

**Figure IX-2. Proportion of diabetic persons who are aware of having diabetes**



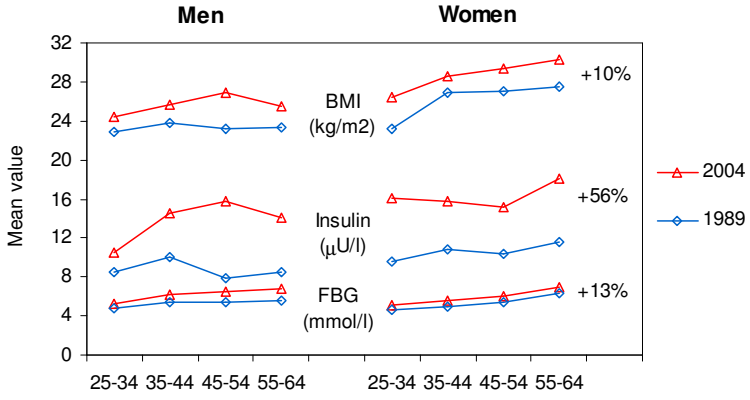

- In this analysis, diabetes is defined as FBG ≥7.0 mmol/l or being under antidiabetic treatment (not on OGTT). Analysis is restricted to age 35-64.
- Although still far from optimal, the proportion of persons in the population who aware of having diabetes has increased substantially between 1989 and 2004.
- This proportion is higher among women than men, possibly because women tend to be more health conscious than men and/or attend health care more often.
- Since diabetes goes for years without symptoms, most new diabetic persons can be identified only through opportunistic or systematic blood sugar screening.

**Figure IX-3. Prevalence of pre-diabetes and diabetes**



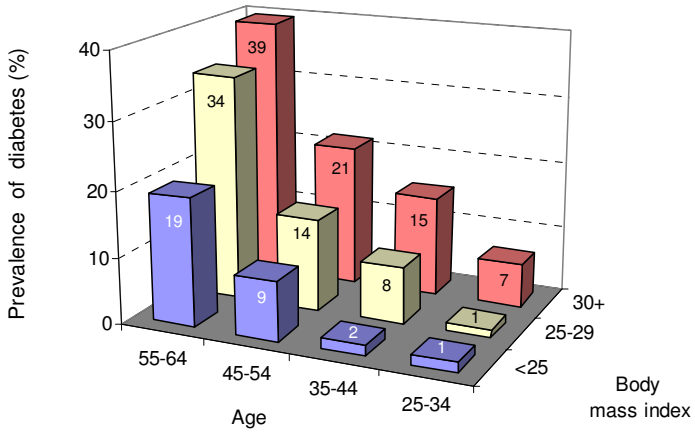

- Pre diabetes is defined as either impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT). These categories have been explicitly defined in the methods section of this report.
- At all ages, the prevalence of pre-diabetes is larger than the prevalence of diabetes.
- Hence approximately 30% of men and 16% of women have pre-diabetes n the population aged 25-64.
- It is unclear why the larger prevalence of pre-diabetes is larger in men than women aged 35-54.
- Based on the oral glucose tolerance test, a substantial number of cases of diabetes can be identified in persons with fasting blood glucose <7.0 mmol/l but who have post meal glucose (2hBG) ≥11.1 mmol/l, e.g. 5% of men and 8% of women at age 55-64.
- Assessment of pre-diabetes has important significance for at least 2 reasons. IGT is a pre-diabetic stage (a substantial number of persons with pre-diabetes will develop diabetes in subsequent years) and pre-diabetes itself is associated with increased risk of CVD and mortality.

**Figure IX-4. Mean levels of blood glucose, insulin, and BMI in 1989 and 2004**



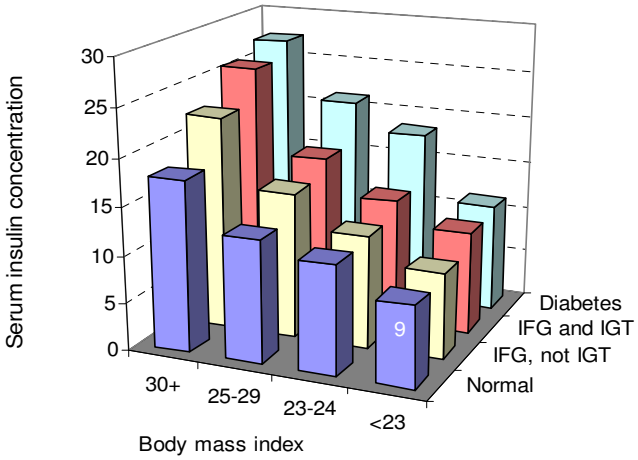

- The figure illustrates that body mass index, fasting serum insulin and fasting blood glucose have largely increased between 1989 and 2004 (analyses are adjusted for age).
- This observation is consistent with the physiological view that increase in body mass index in the population is followed by an increase in fasting serum insulin levels (i.e. increased insulin resistance) and, finally, an increase in fasting blood sugar (hence pre-diabetes and diabetes).

**Figure IX-5. Relation between diabetes, age and body mass index**




- Adjusted for age, the prevalence of diabetes is more than double in obese persons as compared to non overweight persons.
- This emphasizes the important role of overweight as a major cause of diabetes.

**Figure IX-6. Relation between serum insulin, BMI and glucose metabolism categories**



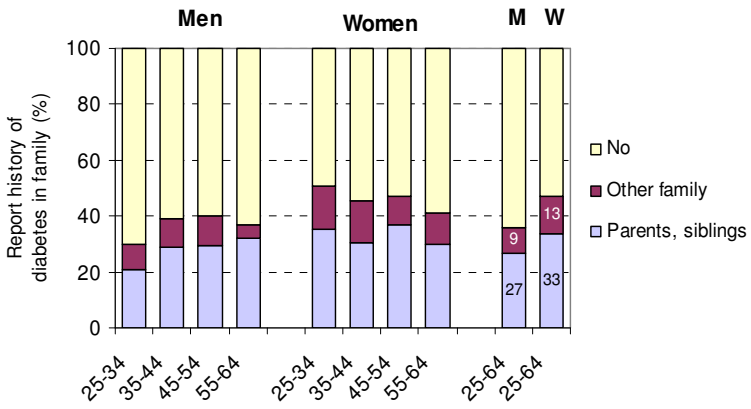

- It is known that diabetes type II is causally related to resistance to insulin (hence to fasting serum insulin levels) and insulin resistance is itself is causally related to excess adiposity. Most cases of diabetes type II are related to insulin resistance.
- The figure shows that fasting serum insulin is largely increased across both categories of BMI and categories of blood glucose impairment.
- This underlies the fact that obese persons, even if they are not yet diabetic, have high insulin resistance and are therefore highly likely to develop diabetes.

**Table IX-1. Population attributable fraction of diabetes due to overweight**

| | Men | | | Women | | | All | | |
|---|---|---|---|---|---|---|---|---|---|
| | Prevalence (%) | Odds ratio* | PAF (%) | Prevalence (%) | Odds ratio* | PAF (%) | Prevalence (%) | Odds ratio* | PAF (%) |
| Overweight (25-29 kg/m$^2$) | 37 (33-41) | 2.1 (1.9-2.2) | 26 (16-36) | 33 (30-37) | 2.6 (2.3-3.0) | 20 (12-26) | 35 (32-38) | 3.5 (3.2-3.8) | 23 (14-31) |
| Obesity ( ≥30 kg/m$^2$) | 15 (12-18) | 2.6 (2.4-2.9) | 17 (11-23) | 35 (32-29) | 4.5 (4.0-5.1) | 36 (25-45) | 25 (23-28) | 3.3 (2.0-5.5) | 26 (15-36) |
| Excess weight ( ≥25 kg/m$^2$) | 52 (48-56) | 2.2 (2.1-2.4) | 43 (29-55) | 68 (64-72) | 3.6 (3.2-4.1) | 56 (41-67) | 60 (57-63) | 2.6 (2.4-2.8) | 49 (35-61) |

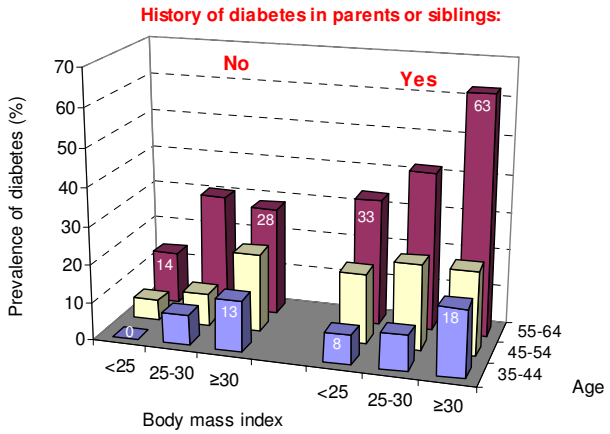
- The table shows that 49% of all cases of diabetes in the entire adult population are attributable to excess body weight (BMI ≥25 kg/m$^2$).
- This underlies that excess body weight is the main driving force of the epidemic of diabetes (hence the term of "diabesity").
- This further stresses that prevention of diabetes relies largely on prevention of overweight in a population.

**Figure IX-7. Prevalence of persons reporting history of diabetes in their family**




- Approximately 40% of persons in the population report a diabetes history in their family.
- Family history of diabetes is a known risk factor for diabetes.

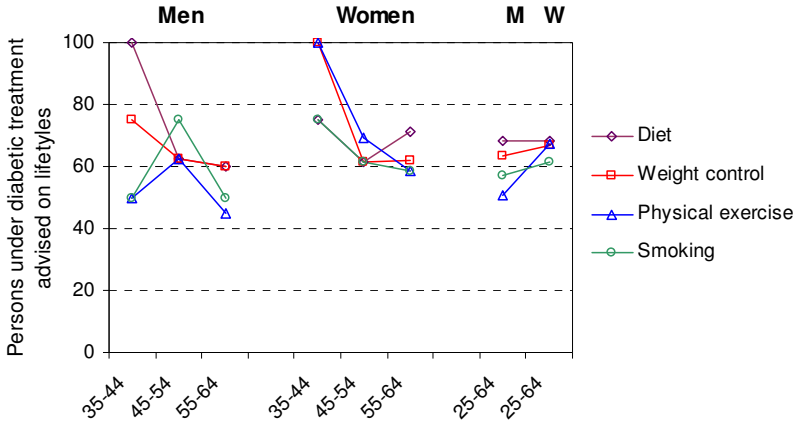
**Figure IX-8. Relation between diabetes, body weight, age and family history of diabetes**




- At same age and same body mass index, the prevalence of diabetes is 2-3 times higher in presence of a history of diabetes in the family.

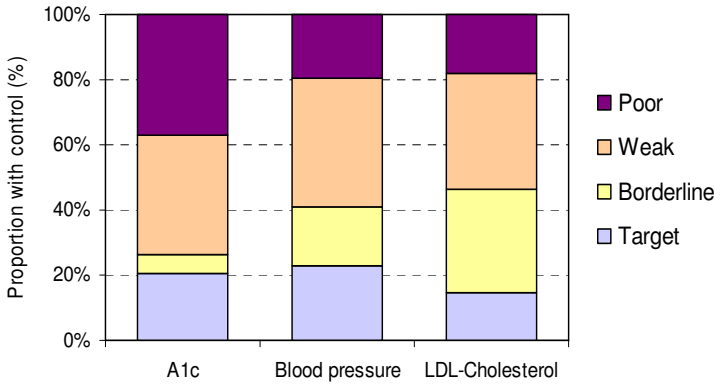
- This association underlies the relation between diabetes and genetic predisposition and/or common familial environment, and the potential usefulness of family history of diabetes as a factor to consider when screening for diabetes.

**Figure IX-9. Proportions of persons treated for diabetes who were given lifestyle advice**




- More than one third of diabetic persons who are under anti-diabetic treatment report that they were not advised about healthy lifestyles.
- While it cannot be known if these persons were actually not told about lifestyles by their doctors or nurses or if they did not recall such advice, this stresses the need to strengthen effective provision of non pharmacological treatment to diabetic treatment in order to help control diabetes and reduce complications.

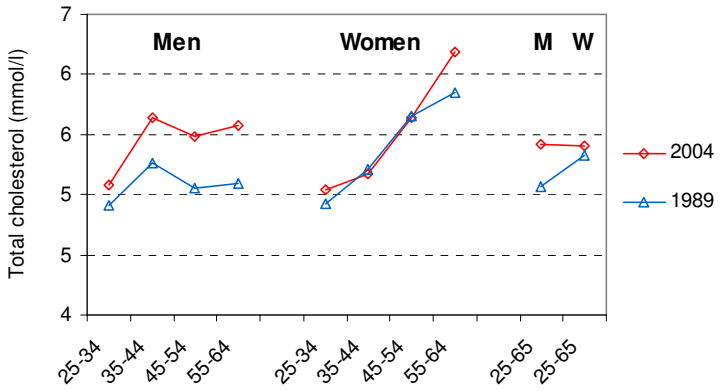
**Figure IX-10. Control of glycemia, BP and cholesterol in persons treated for diabetes**




- Less than a quarter of persons currently under treatment for diabetes have adequate cardiometabolic control, i.e. levels of blood glucose, blood pressure or cholesterol level below the recommended values.
- Control of blood sugar (as assessed by HbA1c), blood pressure, and blood lipids is central to the prevention of complications in persons with diabetes.
- Cut off values for control categories follow usual international recommendations: HbA1c: 10+; 8-9.9; 7-7.9; <7; LDL-cholesterol (mmol/l): 5+; 3.5-4.9; 2.6-3.4; <2.6; BP (mmHg): 160/100+; 140-159/90-99; 130-139/80-89; <130/80.

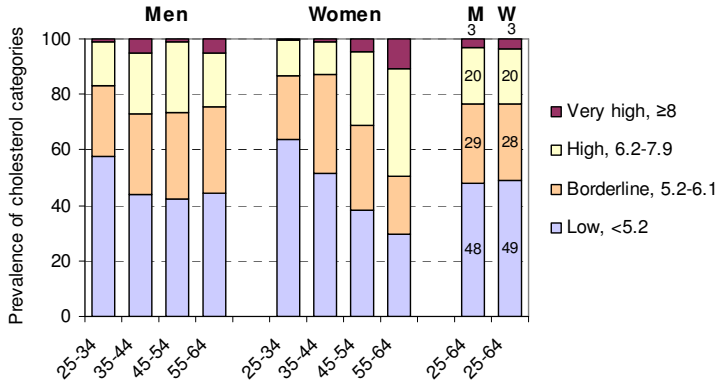
## X. BLOOD LIPIDS

### Figure X-1. Cholesterol blood levels in 1989 and 2004



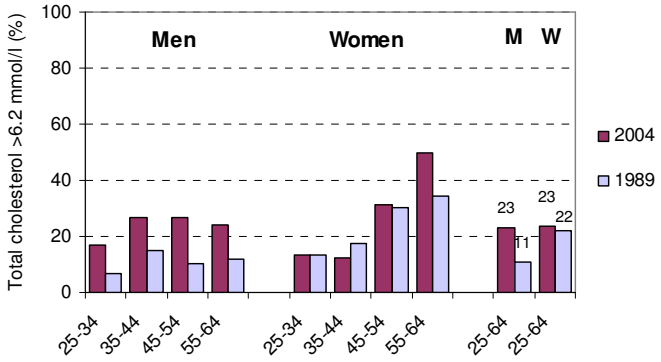

- Mean levels of blood cholesterol are fairly high by international standards.
- This may reflect a fairly high consumption of saturated fats (e.g. palm oil, fatty snacks, fried foods, etc).
- Total cholesterol does not increase with age in men but increases in women (consistent with raised blood cholesterol after menopause).
- Cholesterol was higher in 2004 than 1989 in men while levels did not change substantially in women.
- A larger increase in men than in women in the 15-year interval might partially relate to the larger relative increase in body weight in men or women.

### Figure X-2. Prevalence of categories of blood cholesterol



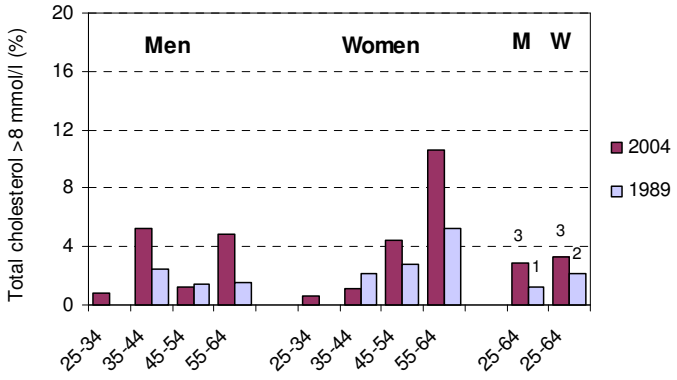

- Less than half of the adult population has total cholesterol in the favorable level (<5.2 mmol/l).
- A substantial proportion of persons (approximately 3% of the total adult population) have very high total cholesterol levels, which may warrant treatment irrespective of other risk factors.
- Approximately 20% of adults have total cholesterol levels in the high range (6.2-7.9 mmol/l), which warrants lifestyle intervention in all instances and treatment with medication in some cases, conditional to a person's total risk.

**Figure X-3. Prevalence of high blood cholesterol**



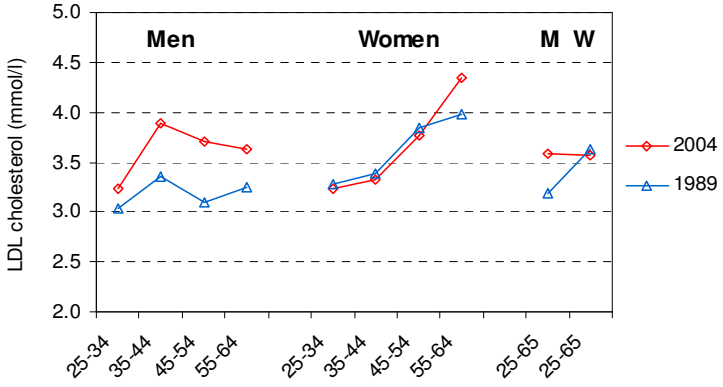

- The prevalence of high total cholesterol (≥6.2 mmol/l) increased between 1989 and 2004, particularly in men.
- Secular changes in total cholesterol levels are largely driven, generally, by the consumption of saturated fats (palm oil, meat, butter) and "trans" fatty acids (found in cookies, bakery, etc).
- Persons with high cholesterol levels should be given lifestyle advice in all instances and medication in selected cases (previous CVD, diabetes, high total CVD risk).

**Figure X-4. Prevalence of very high blood cholesterol**



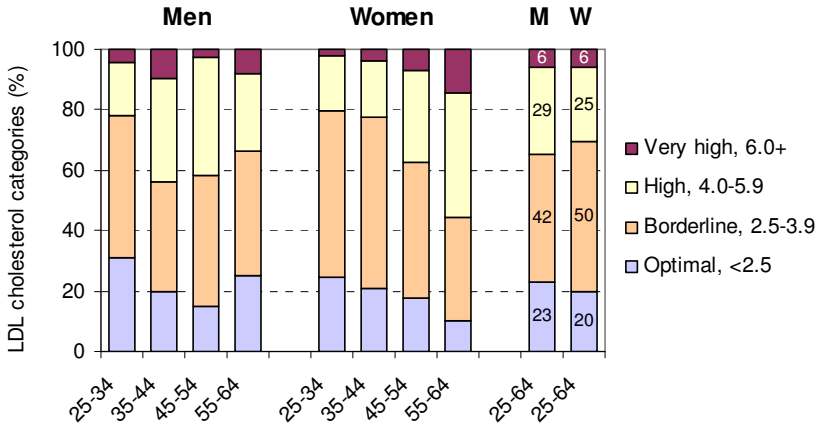

- The prevalence of very high total cholesterol generally increased between 1989 and 2004.
- Persons with such high levels (3% of 40'000 adults in Seychelles≈ 1200 persons) should generally be treated with medication.

**Figure X-5. Mean blood LDL-cholesterol**



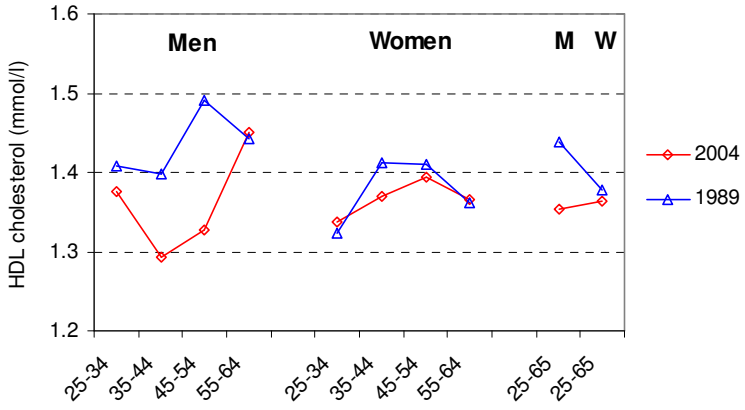
- LDL-cholesterol (the so called the “bad cholesterol”) is a major risk factor of CVD. The highest the level the highest the risk of atherosclerosis, myocardial infarction and other cardiovascular disease.
- LDL-cholesterol (in mmol/l) is calculated with the Friedewald formula (LDL-C=TC-HDLC-trigylceride/3.3).
- Mean levels in the population of Seychelles are fairly high in 2004.

**Figure X-6. Prevalence of categories of blood LDL-cholesterol**



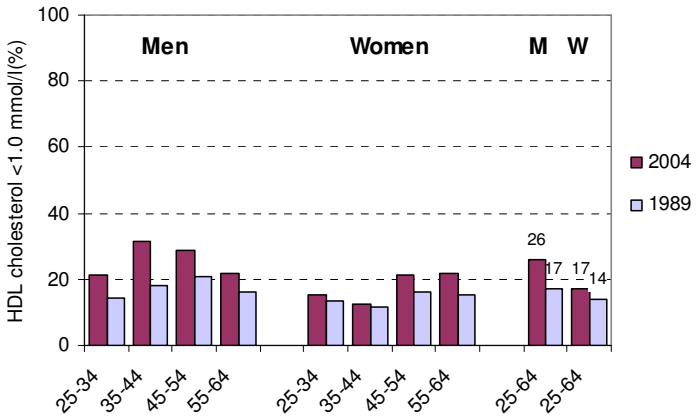

- Approximately one third of all adults aged 25-64 have high or very high LDL-cholesterol levels.
- These data indicate a high prevalence of a main cause of heart disease, particularly heart attack and subsequent heart failure.
- Interventions to reduce LDL-cholesterol (and total cholesterol) include decreased intake of saturated fats, reduce intake of “trans” fats, increasing intake of fibers (vegetable and fruits) and body weight control and, for selected persons, treatment with specific medications (e.g. statins).

**Figure X-7. Mean blood HDL-cholesterol**



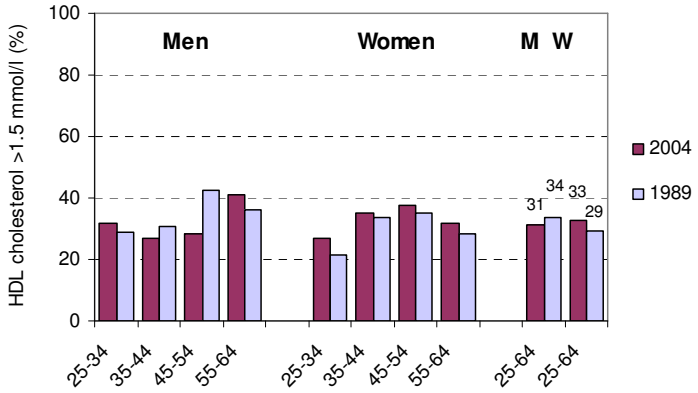

- HDL-cholesterol is also called the “good cholesterol”: the higher the blood levels of HDL-cholesterol the better. A high level of HDL-cholesterol is therefore a preventive factor of cardiovascular disease.
- Mean HDL-cholesterol levels in Seychelles are fairly favorable by international standards.
- HDL-cholesterol is increased by alcohol consumption and physical exercise and it is decreased by overweight and smoking.
- HDL-cholesterol is generally lower in men than in women. The lack of such a contrast in Seychelles may reflect higher consumption of alcohol in men than in women and larger prevalence of overweight in women than men (overweight decreases HDL-cholesterol and alcohol increases HDL-cholesterol – this effect of alcohol on HDL-cholesterol accounts for a large part of the favorable effect of moderate intake of alcohol on health, and particularly on CVD).

**Figure X-8. Prevalence of low blood HDL-cholesterol**



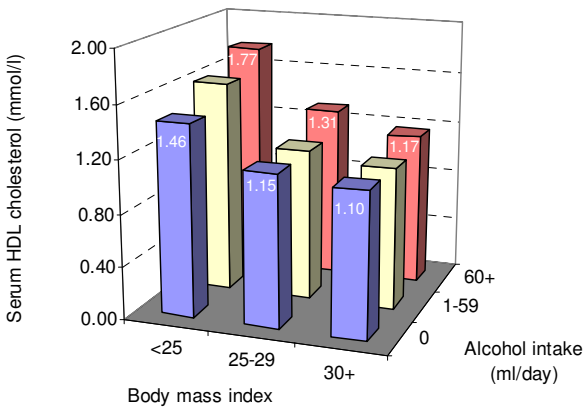

- Low HDL-cholesterol levels (women: <1.2; men: <1.0 mmol/l) represent a strong risk factor of CVD, particularly for heart attack.
- Approximately 20% of adults have such low HDL-cholesterol level.

**Figure X-9. Prevalence of high blood HDL-cholesterol**



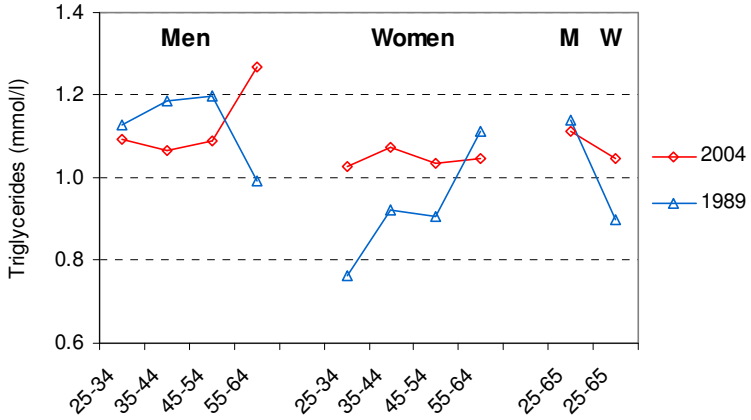

- High serum HDL-cholesterol (≥1.4 mmol/l) is an independent preventive factor for CVD.
- Approximately one third of the adult population has HDL-cholesterol in that favorable range.
- Factors that raise HDL-cholesterol include non smoking, low body weight, and alcohol intake.

**Figure X-10. Relationships between blood HDL-cholesterol, BMI and alcohol intake**



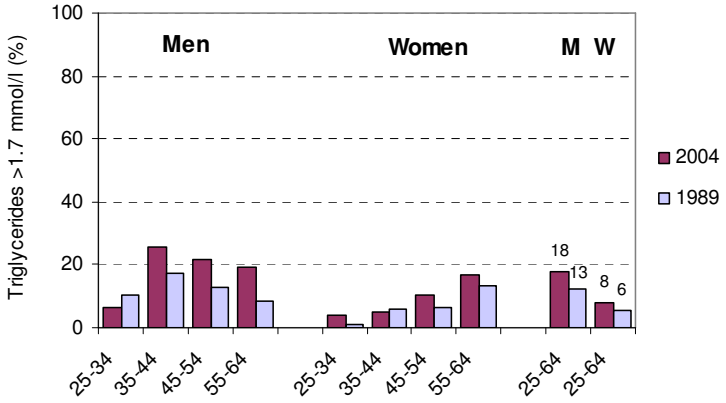

- HDL-cholesterol is higher in persons with low BMI and high alcohol intake.
- The preventive effect of moderate alcohol intake is largely related to its effect on HDL-cholesterol.

**Figure X-11. Mean blood triglycerides**



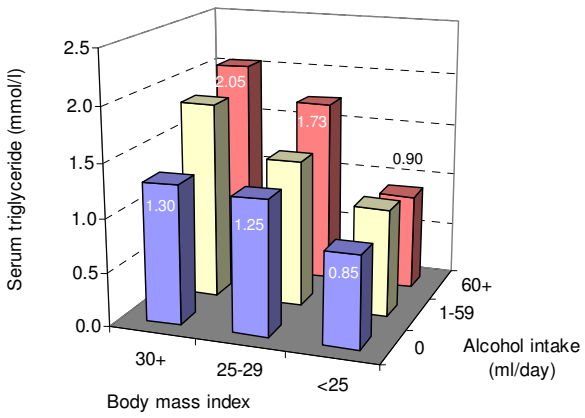

- Blood levels of triglycerides tend to be lower in women than in men.
- Blood level of triglycerides is a major component of the metabolic syndrome.

**Figure X-12. Prevalence of high blood triglycerides**



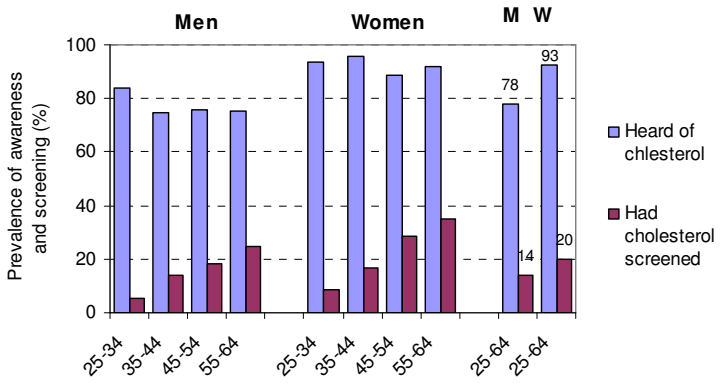

- High (fasting) blood levels of triglyceride (≥1.5 mmol/l) are found in less than 20% of persons.
- Slightly higher levels in 2004 than 1989 may relate to increased sugar consumption (e.g. soft drinks) or increased prevalence of overweight/diabetes in 2004 than 1989.
- Main factors associated with low triglyceride levels include low intake of alcohol and sugars (such as soft drinks), physical exercise and body weight control.

**Figure X-13. Relation between serum triglycerides, BMI and alcohol intake**



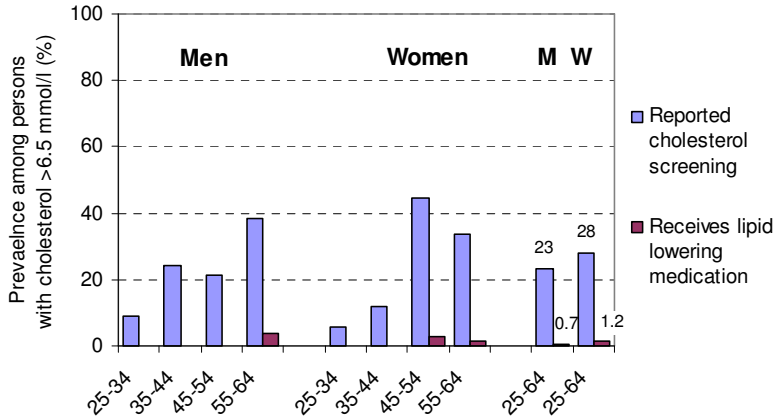

- As expected, mean serum triglyceride is associated with both alcohol intake and BMI (data in men).

**Figure X-14. Prevalence of awareness and screening related to cholesterol**




- A large majority of all adults have heard of cholesterol.
- This high level of awareness likely reflects active health education in the mass media during the past 15 years, including programs on nutrition and specific programs on cholesterol.
- The proportion of persons who had their blood cholesterol screened is still low.
- Recommendations (including guidelines for Seychelles) advise that all adults should be screened for high cholesterol, with a frequency that depends of the presence of other risk factors.

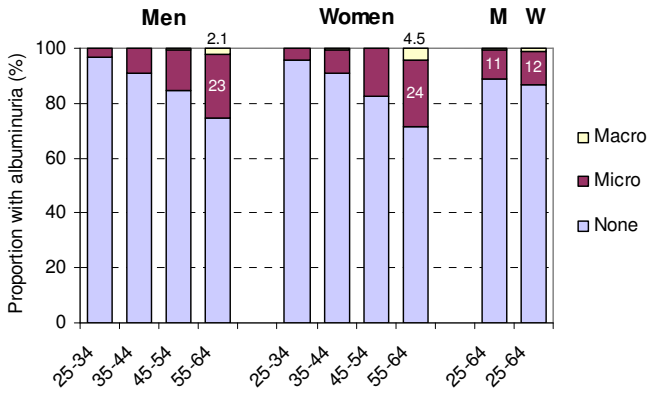
**Figure X-15. Proportions screened and treated among persons with high blood cholesterol**




- Among persons with high blood cholesterol (≥6.5 mmol/l), less than one third has been screened and could therefore possibly know about their condition.
- Only a few percents of persons with high cholesterol receive a lipid-lowering treatment.
- The very low proportion of persons under lipid-lowering treatment may relate to limited focus of doctors with regards to blood lipid disorders and reluctance for prescription in view of high cost of statins.
- High cholesterol is a main risk factor of CVD, particularly heart attack, and interventions to reduce cholesterol in the whole population should be given high priority.
- Such interventions would aim mainly at reducing intake of saturated fats or trans fats.
- Medications are very effective (statins can reduce blood cholesterol by 25-50%) and treatment should be considered for persons at high risk.

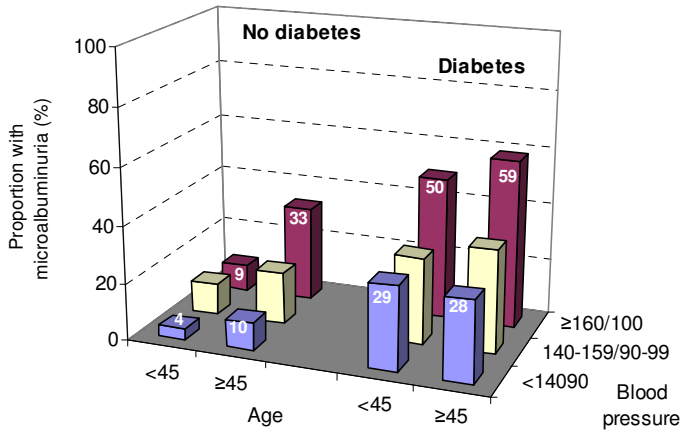
## XI. MICROALBUMINURIA AND RENAL FUNCTION

### Figure XI-1. Prevalence of microalbuminuria and macroalbuminuria



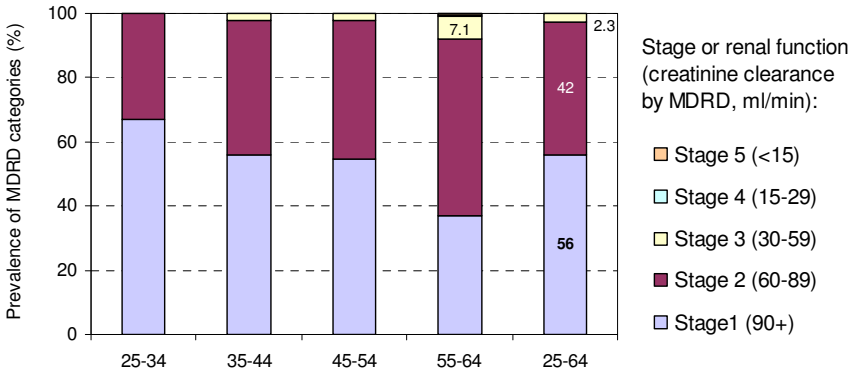

- Microalbuminuria is considered as a major independent risk factor for CVD and renal failure.
- The prevalence of microalbuminuria increases with age and is similar in men and in women.
- The high overall prevalence is consistent with high prevalence of diabetes and HBP in the population.

### Figure XI-2. Relation between microalbuminuria, age, BP and diabetes




- Adjusted for age, the prevalence of microalbuminuria is strongly associated with HBP and diabetes.
- Knowledge of microalbuminuria allows strengthening a patient's treatment.

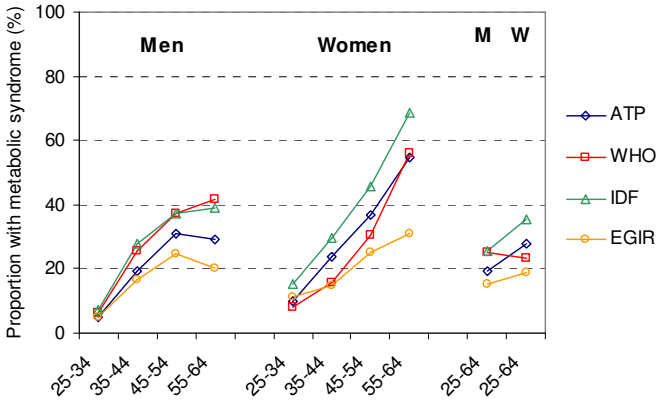
### Figure XI-3. Prevalence of impaired renal function




- Based on the MDRD formula, the prevalence of stages of renal failure increases with age.
- Renal failure of stage 3 or above is found in 7.5% of adults aged 55-64.

## XII. METABOLIC SYNDROME

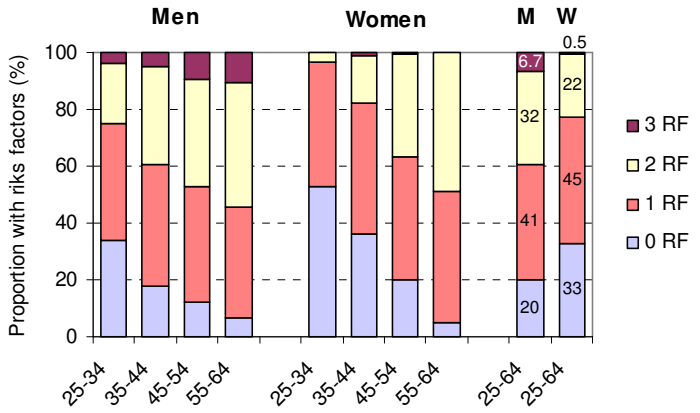
**Figure XII-1. Prevalence of metabolic syndrome according to various definitions**




- The metabolic syndrome consists of several cardiometabolic disorders including a combination (clustering) of increased waist (adiposity), high blood pressure, glucose metabolism disorders and several blood lipid disorders (HDL cholesterol and triglyceride). Several definition are available (ATP, WHO, IDF, EGIR) with slightly different definitions.
- The metabolic syndrome is a strong predictor of diabetes, CVD and overall mortality.
- The survey shows that the prevalence of the metabolic syndrome increases sharply with age.
- The prevalence of the metabolic syndrome is higher in women than in men at age 55 to 64 (which is likely partly related to the larger prevalence of overweight in women than in men).
- Overall, 20-30% of men and women have the metabolic syndrome (depending of the definition used).
- The high prevalence of the metabolic syndrome in the population emphasizes the need to screen for the syndrome and provide appropriate treatment (mainly advice to lose weight and exercise regularly) and to address its causes (overweight and sedentary habits) at a population level.

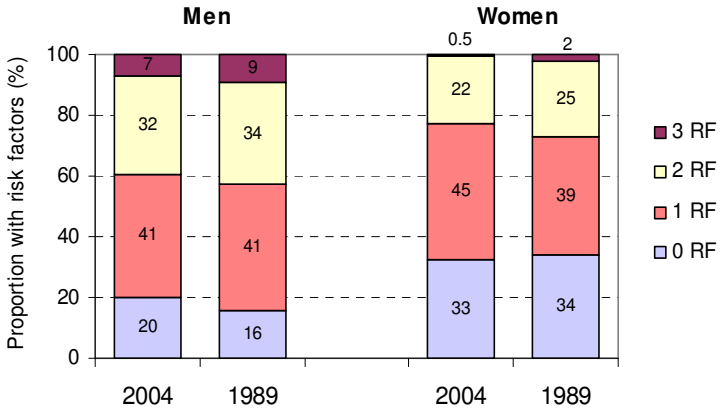
## XIII. COMBINATION OF RISK FACTORS

**Figure XIII-1. Prevalence of combinations of 3 main risk factors**



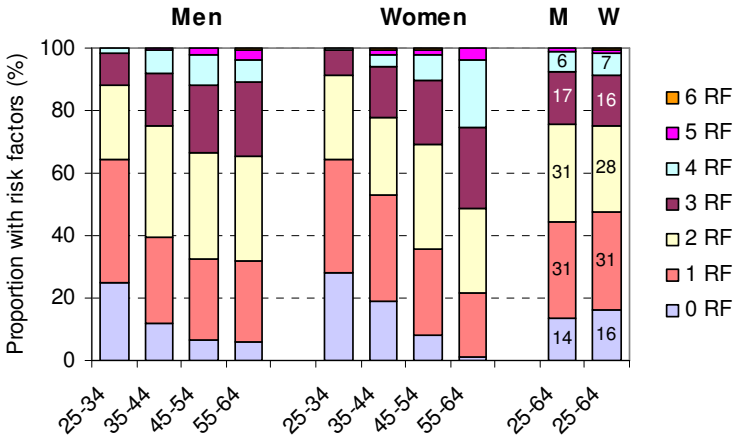

- The three considered cut off values are high BP (BP ≥140/90 mmHg or treatment), elevated blood total cholesterol (≥5.2 mmol/l), and current smoking.
- Only 20% of men and 33% of women aged 25-64 have no risk factor and are at low risk of CVD.
- The proportion of persons with 0 risk factors decreases sharply with age.
- Since most of the population has at least one risk factor for CVD, interventions to reduce risk factors should therefore target the entire population and not only those individuals with “high risk”.

**Figure XIII-2. Prevalence of combinations of 3 main risk factors in 1989 and 2004**



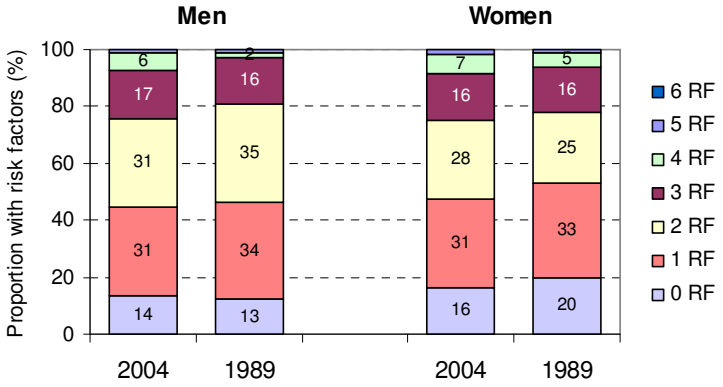

- The figure shows the prevalence of combinations of main risk factors in the population aged 25-65 using definitions of risk factors as for the figure above.
- Men have generally worse risk factor profiles than women: fewer men than women have no risk factor and more men than women have 2 or 3 risk factors.
- A gender difference in risk factors is consistent with higher CVD mortality in men than women in this age range (25-64). This relates partly to a much higher prevalence of smoking in men than women.
- Comparing data between 2004 and 1989, more men are at increased risk in 2004 vs. 1989 while slightly fewer women are within the highest risk categories (2-3 risk factors) in 2004 than 1989.
- The data show that there is a large potential for reducing risk factors in the population.

**Figure XIII-3. Prevalence of combinations of 6 major risk factors**




- The considered major risk factors are: BP ≥140/90 mmHg or treatment, cholesterol ≥5.2 mmol/l, current smoking, HDL-cholesterol <1.0 mmol/l (M)/1.2 mmol/l (W), body mass index ≥30 kg/m$^2$, and diabetes.
- Very few adults have no risk factors, particularly after age 45.
- More than 50% of persons aged 25-64 have at least 2 risk factors.
- This emphasizes the need for strategies to reduce risk factors targeting the entire population.

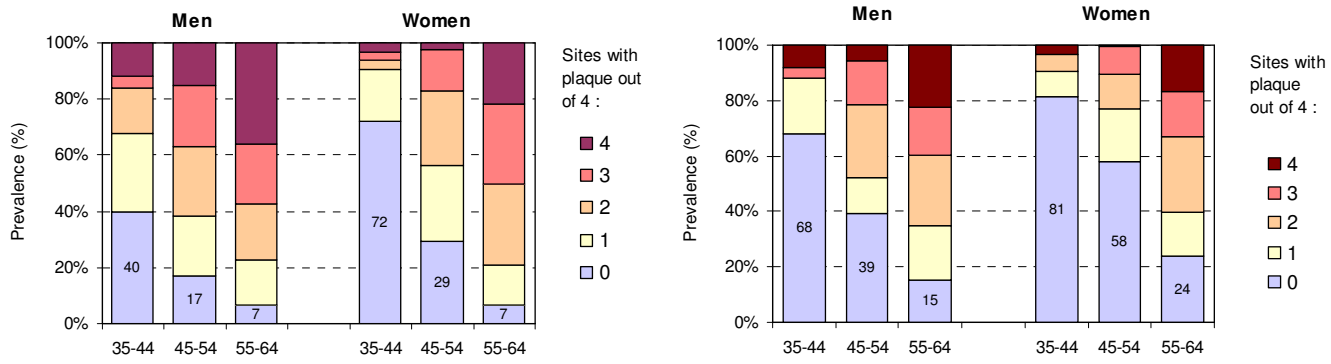
**Figure XIII-4. Prevalence of combinations of 6 major risk factors in 1989 and 2004**




- The figure shows the prevalence of combinations in the population aged 25-65 using definitions of risk factors as for figure above.
- More than 50% of men and women aged 25-64 have at least 2 risk factors.
- As many as 7-8% of men and women (hence ~4000 people in the population aged 25-64) had at least 4 risk factors and who are therefore at very high risk of CVD.
- Slightly more men than women had at least 2 risk factors in 2004 than in 1989 while slightly fewer women than men had at least 2 risk factors in 2004 vs. 1989.
- This emphasizes the need for strategies to reduce risk factors targeting the entire population as well as the need for intensified medical treatment in individuals at high risk.

## XIV. ULTRASOUND-ASSESSED PERIPHERAL ATHEROSCLEROSIS

**Figure XIV-1**. Prevalence of persons with plaques in the carotid or femoral arteries




- The plaque score ranges from 0 (no plaque on both left and right carotid and femoral arteries) to 4 (at least one plaque on each of the considered 4 artery sites).
- A plaque is defined as an increase of the intima-media thickness (IMT) ≥1.2 mm (left panel) or ≥1.5 mm (right panel).
- The presence of plaques equates subclinical CVD since atherosclerosis plaques are largely irreversible alterations of the arteries ("artery thickening") that are causally related to subsequent stroke or heart attack.
- The figures show that the prevalence of plaques is higher in men than in women (at least up to age 55-64, before menopause) and increases with age.
- The prevalence of plaques in the population is high, which is consistent with high levels of risk factors (hypertension, smoking, high blood cholesterol, diabetes) and high stroke and ischemic heart disease mortality rates (as reported in vital statistics).

**Table XIV-1. Prevalence of aneurysm of the abdominal aorta**

| | Men n=151 | | Women n=178 | | Total n=329 | |
|---|---|---|---|---|---|---|
| | % | 95%CI | % | 95%CI | % | 95%CI |
| Aneurysm | 0.7 | 0-2.0 | 0 | | 0.3 | 0-0.9 |
| Ectasia | 2.0 | 0-4.2 | 0.6 | 0-1.7 | 1.2 | 0-2.4 |
| Either | 2.7 | 0.1-5.2 | 0.6 | 0-1.7 | 1.5 | 0.2-2.8 |

- The prevalence of aneurysm of the abdominal aorta (AAA) is low, which is consistent with the general recommendation for screening AAA in persons older than 65 (or younger if they are at high risk).

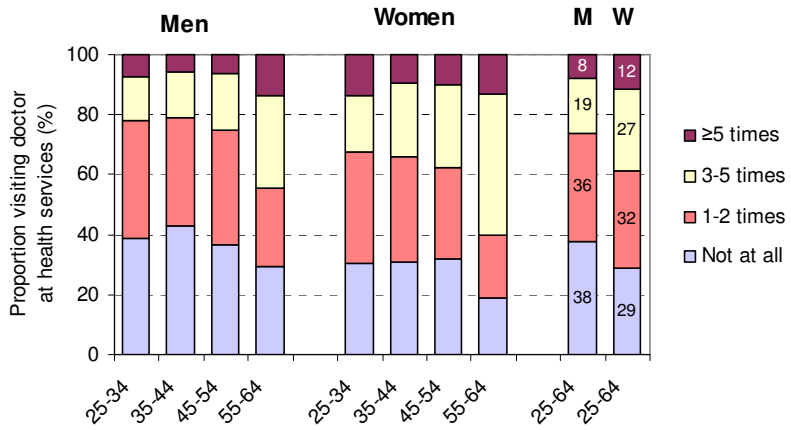
**Table XIV-2. Mean values of intima-media thickness by sex and age**

| | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|
| | Carotid | | Femoral | | Carotid | | Femoral | |
| | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| 45-49 | 712 | 18 | 953 | 70 | 679 | 8 | 678 | 33 |
| 50-59 | 726 | 13 | 1172 | 109 | 736 | 20 | 829 | 68 |
| 55-59 | 760 | 19 | 1143 | 89 | 799 | 29 | 937 | 47 |
| 60-65 | 793 | 16 | 1415 | 129 | 880 | 32 | 1257 | |

- The table provides reference data for IMT in the general population of Seychelles.
- Thickened IMT is both an evidence of sub-clinical CVD and a strong predictor of subsequent stroke, heart attack or other CVD outcome.

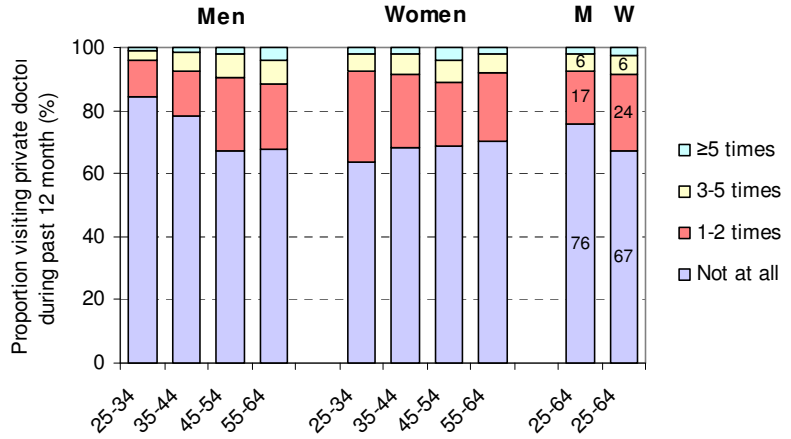
## XV. USE OF HEALTH SERVICES

**Figure XV-1. Prevalence of visits to a government health center during past 12 months**



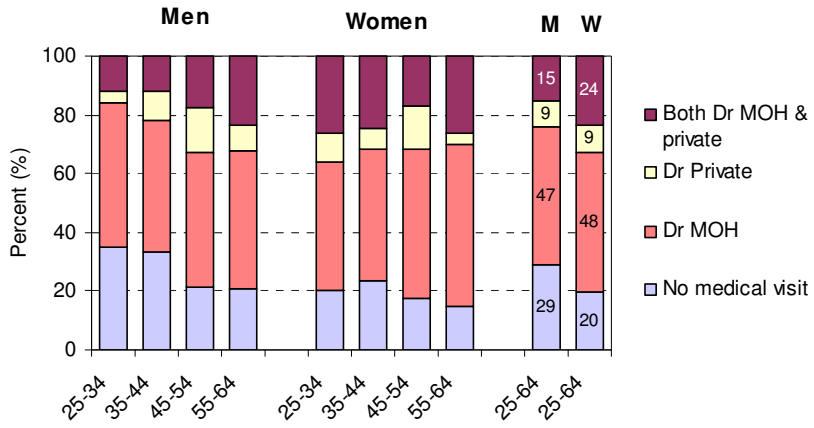

- More than 60% of men and 70% of women visited a doctor in a government heath center during the past 12 months.
- This implies excellent occasions for opportunistic screening for risk factors of chronic disease (HBP, diabetes, blood lipids) and for health promotion (smoking, physical exercise, nutrition, overweight).

**Figure XV-2. Prevalence of visits to private doctor during past 12 months**




- Two thirds of persons aged 25-64 years have not visited a private doctor during the past 12 months.

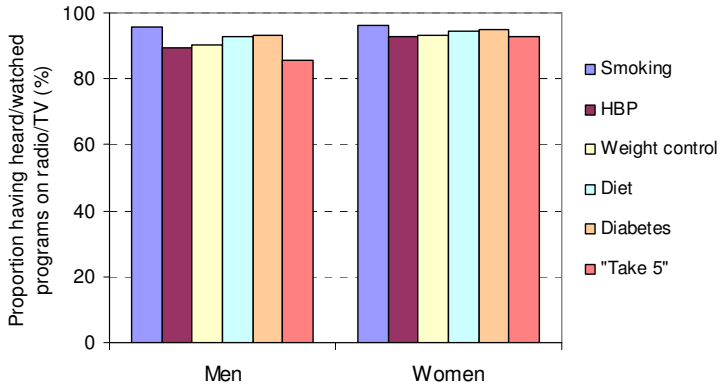
**Figure XV-3. Prevalence of categories of health care use during past 12 months**




- 29% of men and 20% of women did not attend any health care provider during the past 12 months.
- Only 9% of men and women attended a private doctor only during the past 12 months.
- Around 50% of persons attended public health care only during the past 12 months.
- 62% of men and 72% of women attended both government and private health care providers.
- The figure indicates that nearly three quarters of adults attended a government health care provider during a 12-month period.
- These frequent contacts of most adults with health care providers provide good conditions for opportunistic screening of chronic conditions (BP, glucose, blood lipids, etc) and for provision of health promotion (e.g. Advice on healthy lifestyles and nutrition).

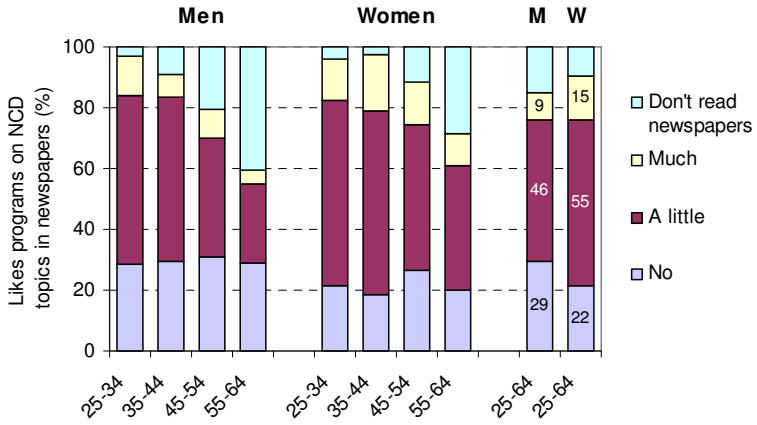
## XVI. INDICTORS RELATED TO HEALTH PROMOTION DELIVERY

**Figure XVI-1. Exposure to programs on selected lifestyles on radio/TV**



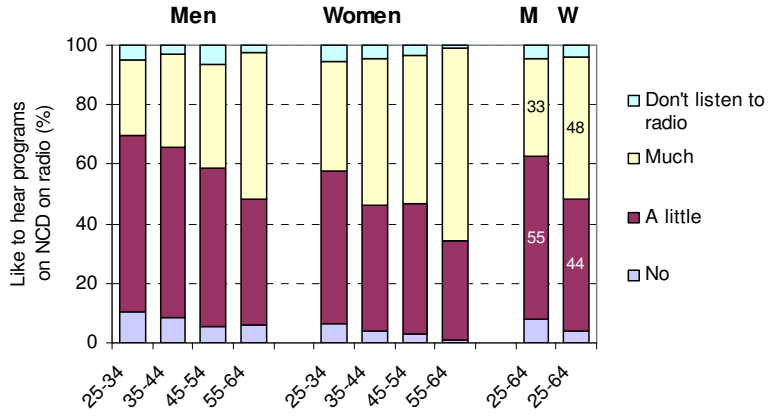

- Almost all adults report having heard programs on TV/radio on lifestyles related to NCD (in Seychelles most of these programs have been produced by the Ministry of Health, particularly the Unit for Prevention and Control of Cardiovascular Disease and the Nutrition Unit).
- Good recall of such programs is no surprise since such programs appear often (e.g. monthly).

**Figure XVI-2. Interest for CD-related health education programs in newspapers**



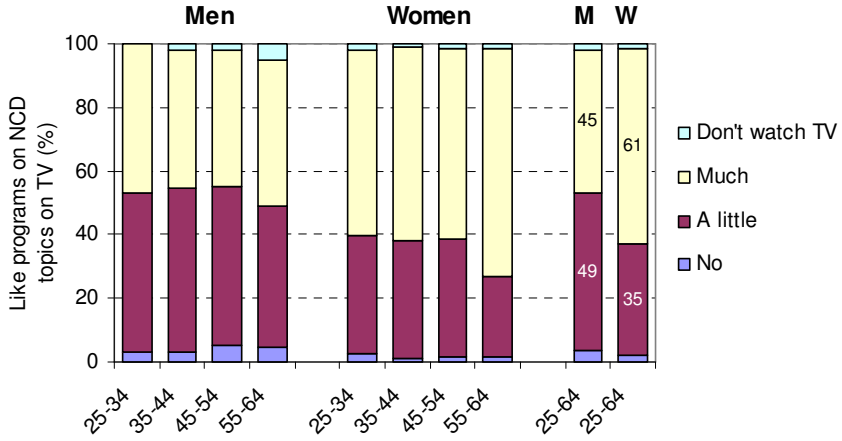

- A majority of persons report no or little interest for health programs in newspapers.
- This suggests a need for a more attractive presentation (but this may need large resources, e.g. use of color in newspaper) and/or targeting other mass media for such programs (e.g. radio).

**Figure XVI-3. Interest for NCD-related health education programs on the radio**



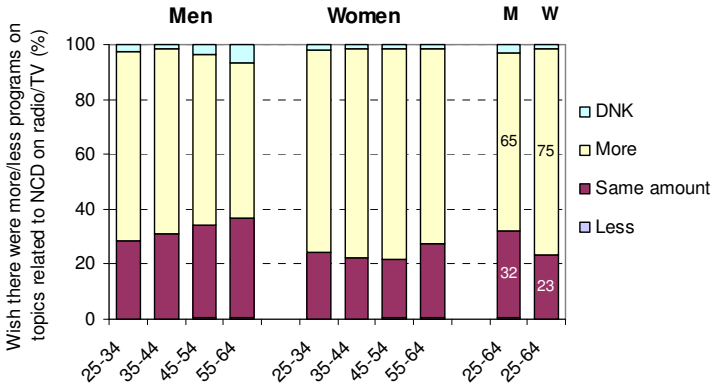

- 33% of men and 48% of women report much interest for programs on NCD (tobacco, BP, diabetes, weight control, nutrition).
- Less than 10% report no interest.
- This indicates that these radio programs may have some impact on a large proportion of the population.

**Figure XVI-4. Interest for NCD-related health education programs on TV**




- 45% of men and 61% of women report much interest for programs on TV related to NCD (tobacco, BP, diabetes, weight control, nutrition).
- 49% of men and 36% of women report little interest while less than 3 % report no interest.
- Programs on TV gather slightly best rating than programs on the radio, but this small difference must be weighted against the considerably higher resources needed to produce TV than radio programs.
- Also, TV programs are by nature shorter and it remains to be seen which of the longer, more in-depth programs on the radio or shorter programs on TV have best impact.

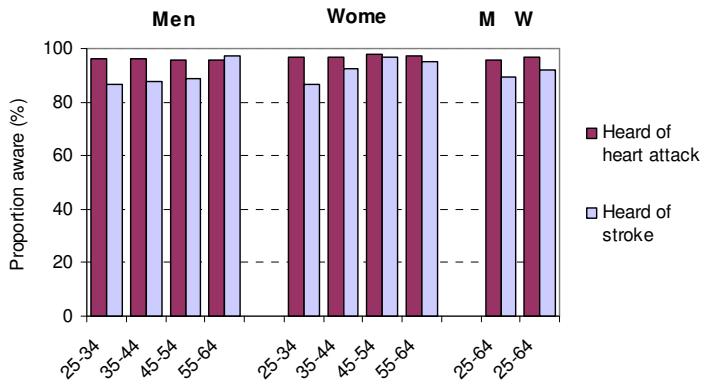
**Figure XVI-5. Interest in having more education programs on NCD on radio/TV**




- Approximately two thirds of adults wish to have more programs related to NCD on radio/TV.
- This indicates a need for producing more of such health-related programs.
- However it should be realized that the gap between interest and fatigue of the audience with regards to programs on healthy lifestyles can be small (fatigue related to repletion of same simple messages, particularly if programs cannot rely on very sophisticated presentations in view of limited resources).

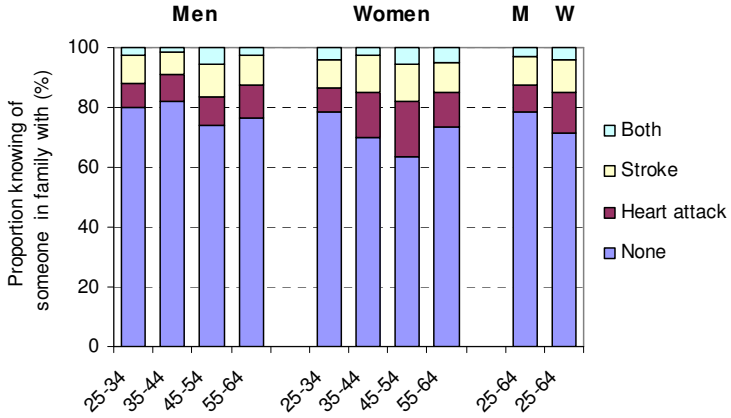
## XVII. KNOWLEDGE, ATTITUDES AND PRACTICE ON CVD AND RELATED FACTORS

### Figure XVII-1. Prevalence of persons aware of heart attack or stroke



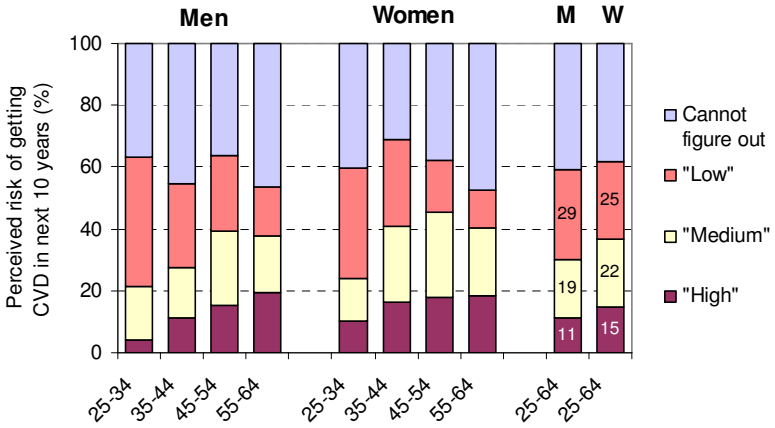

- Almost all adults have heard of stroke and heart attack.
- Excellent levels of these indicators are no surprise as stroke and heart attack are leading causes of deaths in Seychelles and there have been many health education programs on these diseases in the local mass media.

### Figure XVII-2. Prevalence of persons who know family members who have CVD



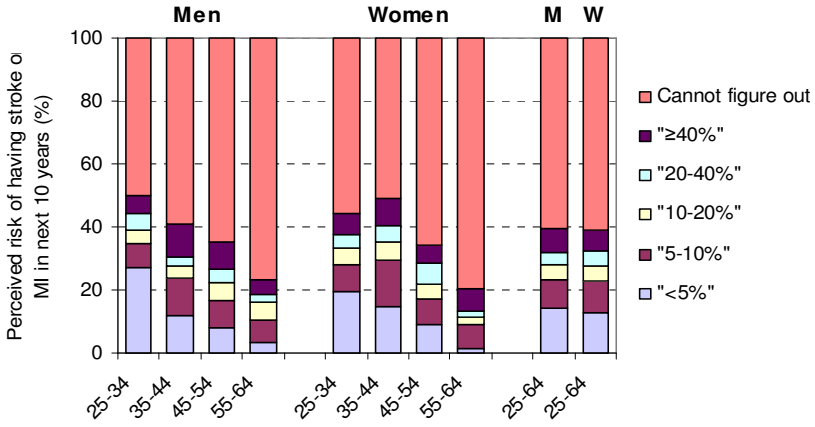

- More than 20% of adults know someone in their family who have or had a stroke or heart attack.
- This echoes that stroke and heart attacks are leading causes of morbidity and mortality.

### Figure XVII-3. Perceived risk of having a stroke or a heart attack in next 10 years



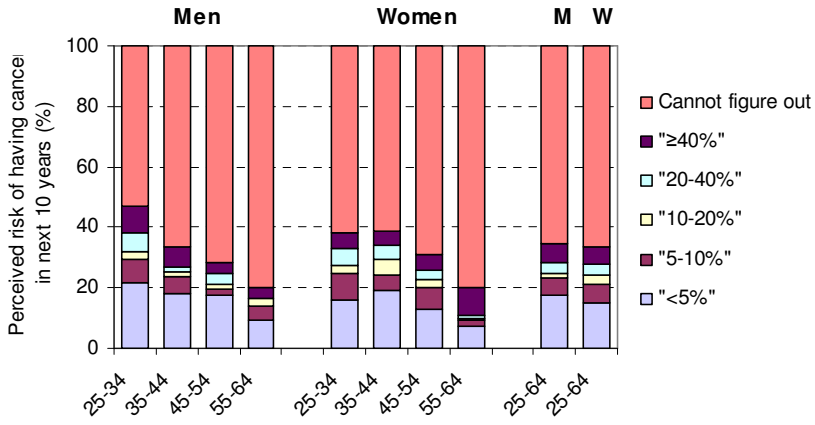
- Almost 40% of people cannot figure out whether they are at risk for having a CVD within next 10 years.
- This emphasizes that more health education should be carried out to improve knowledge of the public and patients with regards to the strong relationship between lifestyles and occurrence of CVD.
- This highlights the need for intensified health education programs through the mass media and at the occasion of visits to medical centers.
- In particular, a goal of health education should be that everyone knows his/her own values for blood pressure, blood cholesterol, and blood sugar as well as the approximate normal values for such major risk factors (so everyone can appreciate the deviation between his/her own values and desirable targets).

**Figure XVII-4. Perceived risk of having a stroke or heart attack in next 10 years**



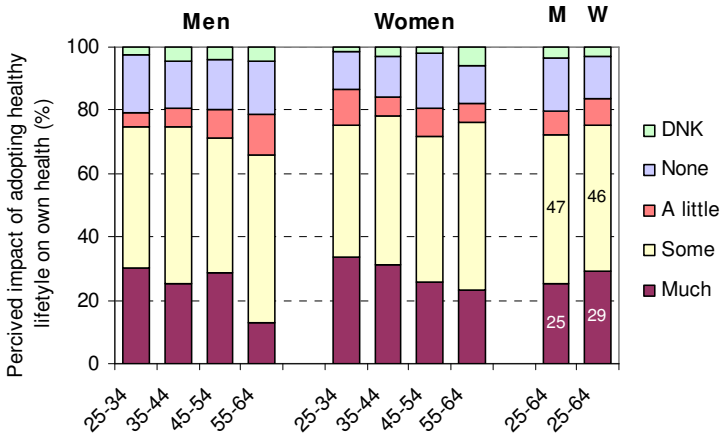

- Less than 40% of adults can figure out their own risk of having CVD in a medium-term future.
- It can be reemphasized that good perception of one's own risk is an important factor for individuals to act upon prevention (e.g. perceived susceptibility of getting a disease is a key driving force for adopting an appropriate behavior).
- This highlights the need for intensified health education through mass media education programs and at the occasion of visits to medical centers.

**Figure XVII-5. Perceived risk of having cancer in next 10 years**



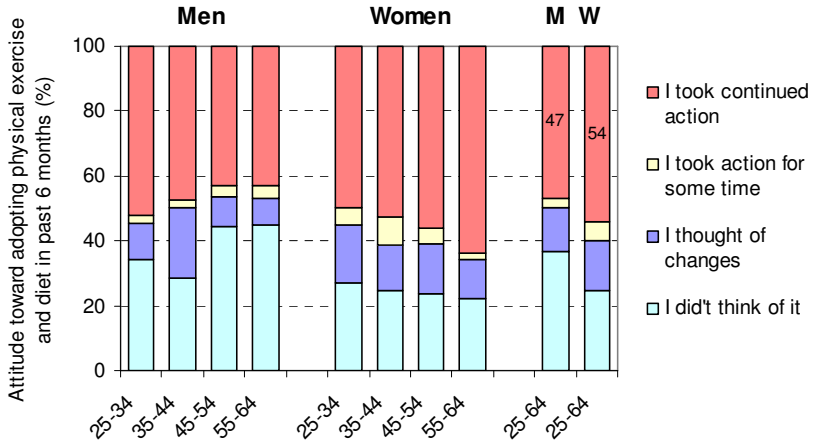

- Even lower proportions of persons can figure out their own risk of having cancer in medium term future.
- This may relate to the facts that there as been less health education programs on cancer and that cancer (except for some types) has largely lower potential for prevention and control than CVD.
- This highlights the need for intensified health education through mass media education programs and at the occasion of visits to medical centers.

**Figure XVII-6. Perceived impact of healthy lifestyle on one's own health**



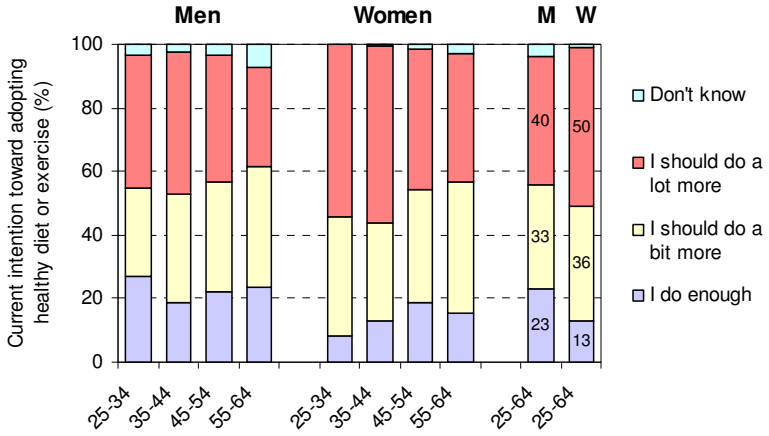

- Less than 30% of adults believe that adoption of healthy lifestyles has much impact on one's own health.
- Healthy lifestyles have a large potential for prevention of CVD and it is well established that up to 80% of CVD occurrence in the middle age range could be prevented or delayed by adopting healthy lifestyles.
- This highlights the need for intensified health education through the mass media and at the occasion of visits to medical centers.

**Figure XVII-7. Action taken to adopt healthy diet and physical exercise during past 6 months**




- Nearly one half of persons report to have adopted continued action with regards to nutrition and regular physical exercise during past 6 months and another 20% thought about it.
- While these findings do not necessarily indicate that respondents actually did take action, this suggests that a majority of people are aware of the need to act upon their own lifestyles.

**Figure XVII-8. Current intention on adopting healthy diet and physical exercise**




- Approximately 50% of adults recognize they should do much more about adopting health lifestyles while approximately 30% other adults think that they should only do a bit more.
- These findings show that a large majority of adults have good awareness on the need to adopt healthy lifestyles.
- When trying to further build on the fairly good level of awareness and attitudes of the public towards adopting healthy lifestyles, one should recognize the critical role of an enabling environment.
- Clearly, individual action is likely to largely depend on the presence of a concomitant enabling environment.
- This emphasizes the need for both i) health education programs targeting individuals and ii) a strong policy framework to foster an enabling environment, so that individuals can initiate and sustain healthy behaviors.

## SUMMARY OF MAIN FINDINGS AND CHALLENGES FOR PUBLIC HEALTH

### 1. High prevalence of smoking among men and low prevalence among women

**Context and findings**
- Smoking is the leading single cause of premature mortality worldwide, mainly due to cardiovascular disease and cancer.
- The prevalence of smoking is high in men (31%) but still fairly low in women (4%) in Seychelles.
- Data from other studies (GYTS 2002) have shown a high prevalence of smoking among adolescents in Seychelles.

**Challenges**
- To reduce smoking among men and maintain low prevalence of smoking among women.
- To prevent smoking uptake among children and adolescents.
- To further implement tobacco control measures, including continued health education, ban on advertisement, high taxes on tobacco products, ban on smoking in enclosed public and work places.
- To implement tobacco control legislation and other provisions requested by good public health practice and by the Framework Convention on Tobacco Control.
- To sustain a quit smoking clinic (inclusive with nicotine replacement therapy).

### 2. Low consumption of fruit and vegetables

**Context and findings**
- High consumption of fruit and vegetables is associated with reduced heart disease and cancer, through various mechanisms, including through reduction of blood pressure, blood cholesterol and diabetes.
- Very few persons consume at least 5 portions of fruit and vegetables per day in Seychelles.

**Challenges**
- To sustain health education on the significance and benefits of a healthy diet (i.e. less calories, less fats, less salt, more fruit and vegetables)
- To implement a broad array of public health measures to shape an environment that facilitates the adoption of a healthy diet
- This includes proper labeling of the content of foods (calories, salt, saturated fats, etc), trade incentive/disincentives to encourage/discourage healthy/unhealthy foods, measures to increase local production of fruits and vegetables, development of standards and mechanisms to promote healthy meals in schools and restaurants, etc.

### 3. High prevalence of heavy drinking and/or binge drinking in men

**Context and findings**
- High prevalence of excess alcohol drinking, particularly binge drinking, particularly among men
- Excess alcohol drinking, particularly binge drinking, is an important cause of premature mortality and other problems (e.g. social) but it must also be acknowledged that moderate alcohol drinking is not detrimental to health.

**Challenges**
- To sustain health education programs targeting children (e.g. schools) and adults (e.g. mass media) on the significance of moderate alcohol drinking (zero drinking while driving) and the need to avoid excess drinking and binge drinking.
- Implementation of regulatory measures against excess drinking where and when it can be done, e.g. drunk driving.

### 4. Fairly low prevalence of regular physical activity

**Context and findings**
- Regular physical activity is associated with reduced rates of heart disease and cancer, through various mechanisms, including reduced levels of blood pressure, blood cholesterol and diabetes.
- Substantial proportions of the population in Seychelles do not report regular physical activity.

**Challenges**

- To sustain health education targeting children (e.g. schools) and adults (e.g. mass media) on the significance and benefits of regular physical activity, include the need for having at least 30 minutes of sustained physical activity on no less than 5 days per week and if possible on all days of the week.
- To further develop public facilities for practicing leisure exercise.
- To further develop an enabling environment that promotes physical activity: lightened sidewalks, incentives to use public transports, development of bus lanes, incentives to use bikes including cycling lanes, disincentives to use private cars, etc.

**5. High and increasing prevalence of excess body weight**

**Context and findings**

- Overweight is a major public health problem due to the strong association with high blood pressure, blood lipid disorders, diabetes, CVD, other chronic diseases, and total morbidity and mortality.
- Because of high frequency and severe complications of obesity (particularly diabetes), the high prevalence of overweight is a major public health problem worldwide.
- In Seychelles, almost 60% of the adult population aged 25-64 is overweight and 25% is obese.
- This prevalence has dramatically increased during the past 15 years.

**Challenges**

- Weight control measures include interventions (as mentioned above) for improving dietary habits and increasing regular physical activity in the entire population.
- Action limited to the individual level is unlikely to be effective unless there is an enabling environment (e.g. easy and affordable access to healthy foods, environment that promotes physical activity such as bus or cycling lanes, nutrition policy, etc).
- Weight reduction measures at individual level have limited efficacy (treatment, advice), which further emphasizes the need for comprehensive population-wide strategies.

**6. High prevalence of high blood pressure and persistence of wrong beliefs**

**Context and findings**

- High blood pressure is the leading cause of stroke and a main risk factor for other chronic diseases (heart failure, renal disease, etc).
- Findings in Seychelles show a very high prevalence of high blood pressure (44% in men and 36% in women aged 25-64).
- Indicators of blood pressure control have improved between 1989 and 2004 but BP control is still far from optimal.
- Large proportions of adults with hypertension still have some wrong beliefs (such as “hypertension is painful” or “treatment can be taken for short periods”).

**Challenges**

- Interventions to reduce hypertension include public health measures (targeting the entire population) and high risk approaches (targeting persons with high blood pressure or at otherwise high risk).
- Public health measures aim at reducing risk factors of hypertension in the population: e.g. low salt intake, avoidance of excess alcohol intake, maintenance of lean body weight, regular physical activity.
- Health education should aim at ensuring that everyone knows the chronic nature of hypertension (in particular that it does not cause symptoms most often and that is should be controlled with medication taken for several years).
- Heath education should also aim at ensuring that everyone knows his/her own BP values as well as normal cut-off values.
- High risk approaches aim at improving detection and treatment of persons with hypertension.
- This includes further training to health professionals so that they are better equipped to provide improved treatment based on comprehensive risk assessment.
- In order to improve compliance to treatment, several measures should be strengthened: ensuring that follow up of patients is done as much as possible by same doctors over time; making available bi-therapy or tri-therapy medication in single combination pills; ensuring that self measurement devices can be sought in commercial outlets (to allow patients to buy such devices and self-assess their own BP); etc.
- Guidelines for hypertension exist in Seychelles (46) and refreshing sessions for health professionals should be organized more often.

**7. High and increasing prevalence of diabetes and limited control of treated persons**

**Context and findings**
- Diabetes is a major health problem worldwide due to its strong association with high blood pressure, blood lipid disorders, CVD, other chronic diseases, and total morbidity and mortality.
- The prevalence of diabetes has largely increased between 1989 and 2004 in Seychelles.
- More than 50% of cases of diabetes can be attributed to excess weight in Seychelles, consistent with findings in other populations.
- In 2004, as many as 12% of all adults aged 25-64 years have diabetes and 18% have pre-diabetes.
- Findings in diabetic persons under treatment show low control of blood sugar, blood pressure and blood lipids, hence a high risk of complications.

**Challenges**
- Interventions to reduce diabetes should include public health measures to prevent the occurrence of diabetes at the first place while high risk approaches should aim at reducing complications in patients who already have diabetes.
- Public health measures aim at reducing risk factors of diabetes, particularly overweight (as overweight may account for more than 50% of all cases of diabetes in the population), sedentary habits and healthy nutrition.
- Health education should aim at ensuring that everyone knows the importance of maintaining a lean body weight and adopting a healthy nutrition (particularly with respect of reducing calorie intake in case of overweight).
- High risk approaches aim at improving screening (early detection) and control of diabetic patients.
- This includes further training to health professionals.
- An important issue is to achieve better compliance to medication and it should be addressed by ensuring that patients are followed by same doctors; promoting the availability of self-measurement glucometers in commercial outlets (to allow patients to buy such devices and self-assess their blood sugar); etc.
- Emphasis for doctors and health professionals should be to use an integrated approach to improve lifestyles factors (not only nutrition) and treat all concomitant risk factors (and not only blood sugar).
- Guidelines for diabetes exist in Seychelles (47) and refreshing sessions for health professionals should be organized more often.

**8. High prevalence and limited awareness of high blood cholesterol**

**Context and findings**
- Elevated blood cholesterol is the leading risk factor for heart attack, stroke and other CVD.
- Blood cholesterol (especially LDL-cholesterol) is largely related to saturated fats intake.
- Half of the population has raised blood cholesterol (>5.2 mmol/l) and a fifth has high levels (≥6.5 mmol/l).
- Only a few persons know their own cholesterol levels.

**Challenges**
- Health education to the public and to the patients should aim at ensuring that everyone knows his/her own blood cholesterol value and the normal value.
- Health education to the public and to the patients should aim at ensuring that everyone limits the amount of saturated fats in his/her diet in all cases, and the amount of calories in case of overweight.
- Public health measures should aim at reducing the intake of saturated fats in the population through appropriate policy, e.g. through measures outlined under section on fruits /vegetables.
- High risk approaches aim at improving detection and treatment of persons with high blood cholesterol.
- This includes further training to health professionals, including with regards to awareness of the guidelines for treatment of high blood cholesterol, which exist in Seychelles (48).
- Whenever needed, treatment should include lifestyle intervention and medications based on a total risk.

**10. High prevalence of combined risk factors: need for comprehensive action**

**Context**
- The risk of chronic diseases depends directly of the total risk of a person, i.e. the total number of risk factors of that person.
- At a population level, the proportion of persons with one or more risk factors for NCD predicts the total burden of chronic diseases.

**Challenges**
- The high prevalence of persons with one or multiple risk factors in the population of Seychelles emphasizes the need for intensified and integrated strategies at both population level and among high risk persons.
- From population perspective, the low prevalence of persons with no risk factor emphasizes that interventions must aim at reducing risk factors in the entire population.
- This underlies the need for health policy and programs at all levels (educational, fiscal, economical, environmental, etc).

**11. High prevalence of peripheral atherosclerosis**

**Context and findings**
- The prevalence of peripheral atherosclerosis in a population reflects sub-clinical CVD and parallels the total burden of CVD in that population.
- The high prevalence of plaques in carotid and femoral arteries found in this survey is consistent reflects with the high incidence of stroke and myocardial infarction in the population.

**Challenges**
- This further emphasizes the need to take bold action to reduce risk factors in the entire population and in high risk persons.

**12. High utilization of health services**

**Context and findings**
- More than 60% of all the population aged 25-64 attend a health service provider at least once per year.

**Challenges**
- This large exposure of the population to health care providers gives good occasions for opportunistic screening of NCD and risk factors.
- Opportunistic screening should target BP, body weight and height, smoking, fruit and vegetables intake and, depending on particular risk factors, measurement of blood sugar and blood cholesterol.
- The frequency of such screening depends on other risk factors of a patient and recommendations of guidelines for risk factors in Seychelles (46-48)

**13. Perceived performance of health education programs on the mass media**

**Context and findings**
- A majority of person express interest in health education programs, although a substantial proportion of persons find them of only little use.

**Challenges**
- Health education programs could be further developed in amount and quality.

**14. Good awareness on chronic diseases but low perception of self efficacy**

**Context and findings**
- Most people reported good awareness on stroke and heart disease.
- However, a large proportion of the population does not perceive substantial risk for chronic diseases for themselves neither recognizes the important role of healthy lifestyles for preventing or delaying the occurrence of chronic diseases.

**Challenges**
- Health promotion programs should further strengthen knowledge on NCD and the important role of health lifestyles as a powerful means to prevent NCD.
- In addition to raising awareness of diseases, health promotion programs should also aim at building skills in the public in order that everyone can take appropriate action with regards to lifestyles.
- In particular, heath education programs should aim at ensure that anyone knows his/her own values of body weight, blood pressure, blood sugar and blood lipids as well as normal values for these factors and the ability to appreciate the gap between own values and desired values.
- This emphasizes the need that health promotion targeting the public (e.g. health education in the mass media) or patients (health center level) should aim at improving not only knowledge but also self efficacy and empowerment.

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# APPENDICES

## APPENDIX I: Letter sent to eligible participants

- The letter actually sent was translated in Creole.
- Address, personalized greetings and date were generated using “merge” function.

**MINISTRY OF HEALTH**
Mont Fleuri, P.O. Box 52, Seychelles
Tel: (248) 388000, Fax: (248) 224792

Please address all correspondence to the Principal Secretary

«SexM» «Fname» «Lname» ( - «Mlname») «DateSend»
«Address1»
«Address2»
«District»

Dear «SexM» «Lname»,

We invite you to participate in a national study of cardiovascular disease and diabetes conducted by the Ministry of Health in collaboration with the World Health Organization and the University of Lausanne in Switzerland.

Your name has been selected randomly from a list (census 2002) of all Seychellois of same age and sex.

Participants will be examined by a team of specialists and nurses. Investigations will include questions on lifestyle and diet, clinical measurements such as blood pressure, and various tests to assess blood cholesterol, diabetes and the function of your kidneys. None of the examinations is painful and the whole examination will last at least 1-2 hours. All information collected will remain strictly confidential. Participants will remain free to decline any particular question or test at all times.

Tests will be analyzed immediately and you will be advised accordingly when you attend the study.

We will provide a certificate to cover for absence from work and reimburse bus fares upon request. You will receive a **voucher from SMB worth SR50** as a mark of appreciation for your participation.

We invite you to attend the study on **«DATECONV1», between 7:30 and 10:30 am, at the old outpatient clinic building (1st floor)**, opposite to the yellow roof building at Victoria Hospital.

If you are unable to report on this date, please call us on 388000 ext. 8082 (office hours) or 575300 (any time) to arrange for another appointment. You can also contact us by email (cardio@email.sc).

When you attend, it is very important that you are **STRICTLY FASTING SINCE MIDNIGHT**. Several tests will give meaningless results if you are not fasting. Practically, you should not take any food or drinks since midnight (hence strictly no breakfast). However, you can drink pure water (or tea without any sugar) as much as you wish at all times. Snacks will be available at the survey center.

Please bring along **ALL MEDICATIONS** you may take (or the prescriptions).

The study will give you a great opportunity to have a detailed cardiovascular check-up (several of the tests done for the study are not available yet in Seychelles). You will also help the Ministry of Health in its efforts to further improve health care and programs to prevent and treat cardiovascular disease.

Your participation to the study is very important and will be much appreciated.

Sincerely,

Unit for Prevention and Control of Cardiovascular Disease
**For: PRINCIPAL SECRETARY**

## APPENDIX II: Consent form

- No participants refused to sign the consent form.

### Form konsantman (Kreol)

Mon dakor pou partisip dan sa Letid pou maladi kardiovaskiler (Seychelles Heart Study 2004) dapre lobzektif ek metod ki'n ganny mansyonnen dan let lenvitasyon ki monn gannyen, lir, e konpran. Mon konpran ki mon totalman lib pou partisip dan sa letid e pou refiz nenport parti ladan. An partikilye, monn ganny enformen ki tou lenformasyon ki pou ganny kolekte pou reste strikteman konfidansyel e pou ganny servi selman pou lobzektif sa letid. E partikilyerman, non partisipan pa pou ganny mete lo okenn esantinyon, rapor, papye medikal oubyen rezilta.

Mon dakor pour ki mon disan i ganny zenetikman analize, enkli idantifikasyon tou 'genes' si sa bann analiz i relye avek maladi kardyovaskiler. Mon compran ki sa bann analiz pou ganny fer dan en fason anonim et ki partisipan pa pou ganny zot resilta pour genetic. Mon dakor ki serten tes i pou kapab ganny fer dan laboratwar liniversite oubyen konpannye ki fer latizan e ki mon pa pou reklanm okenn benefis lo rezilta ek dekouvert ki kapab ganny fer.

### Consent form (English)

I agree to participate to the Seychelles Heart Study 2004 along the objectives and modalities stated in the invitation letter that I have received, read, and understood. I understand that I am fully free to participate to this study and that I can decline any part of it. In particular, I am informed that all information collected will remain strictly confidential and be used only for the purposes of this study. In particular, the names of the participants will not appear in any sample, results or report.

I agree that my blood sample can be used for genetic analyses of conditions related to cardiovascular disease, including whole genome scanning, provided analyses pertain to conditions related to cardiovascular disease. I understand and agree that all genetic analyses will be conducted in a strictly anonymous manner and participants will not be informed on their own results for these genetic analyses (only overall results will be communicated). I agree that some analyses can be performed in laboratories of universities or pharmaceutical companies and that participants will not claim benefit for any patent, discovery or invention that could result from these analyses (it is understood that patents cannot apply to individual samples).

Date: Signature:

## APPENDIX III: Questionnaire

- The table of questions below is a condensed version of the questionnaire actually used, for the sake of concision.
- The questionnaire that was actually used was translated in Creole.
- The questionnaires was administered to participants by senior nurses online on laptop using a data entry software (Esurvey 2.0) developed specifically for the survey.
- The survey software displayed one question and all its possible answers in one screen, one question at a time.
- Questions derived from the WHO STEPS questionnaire are indicated.

***The following introduction was read to all participants (in Creole):***

*Premyerman, mon woule asir ou ki tou repons ki ou pe al donn isi pou reste toutafe konfidansyel.*

*Apar pour rezilta ki ou pou gannyen ozordi (tel ki kolesterol ek disik dan disan), tou lanaliz pou ganny fer avek database ki napa okenn non participan.*

*Nou pou demann ou limero telefon akoz i posib ki nou pou kontakte pli tar enn de dimoun ki ti ava kapab benefisie avek en tretman spesyal pour sa bann kondisyon tel ki dyabet ou kolesterol.*

*Osi, nou rapel ou ki ou annan tou drwa pou refize reponn enn ou lot kestyon.*

*Finalman, nou pa la pour ziz okenn keksoz, me plito pou gannyen en bon lenformasyon lo sitiasyon maladi kardyovaskiler dan Sesel.*

*Alor nou pe demann ou pou reponn kestyon dan en fason pli zis ki posib, pour nou kapab ganny, a la fen sa letid, en lenformasyon ki ava permet nou donn pli bon servis lasante dan bann prosen lannen.*

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 1 | I10 | Last nname | Lastnname | Last name | |
| 2 | I11 | First name | Firstname | First name | |
| 3 | C1 | Sex | Sex -from MISD database | 1: male; 2: female | |
| 4 | C3 | Age | Age - from MISD database | Age | |
| 5 | C5 | Eth | Ethnic group, predominantly - assessed by UPCCD officer | 1: African; 2; Mixed; 3: White; 4: Indian; 5: Chinese | |
| 6 | I5 | DatConv1 | Date convocation - from MISD database | DatConv | |
| 7 | I1 | Dist | District - from MISD database | Dist | |
| 8 | | MPD | MPD - from MISD database | 1: Mahe; 2: Praslin or La Digue | |
| 9 | | Subject ID | Subject ID - from MISD database | Subject ID | |
| 10 | I4 | Interviewer | Interviewer-computer | 1: JW; 2: BW | |
| 11 | I8v | I01 | In which language do you want to answer the questions | 1: creole; 2: english; 3: french | |
| 12 | I7 | I02 | Do you agree with the consent form and sign it | 1: yes; 2: yes with reservation | |
| 13 | I12-I13 | I04 | It is possible that we contact you later in relation to treatment or results for conditions such as diabetes or cholesterol. Can you give us a phone number at home (NA if no phone, name of other person if phone from someone else) | text | |
| 14 | | I05 | Do you have any other phone numbers such as a mobile phone or other phone (NA if not available) - followed by 1st BP measurement | text | |
| 15 | | I06 | Did you participate in previous surveys of CVD that were done in 1989 and 1994 | 1: none; 2: 1989; 3: 1994; 4: both | |
| 16 | C6 | S01 | Which higher school level did you reach | 1: no school; 2: some primary; 3: full primary; 4: some secondary; 5: full secondary (including NYS); 6: basic post secondary (politeknik); 7: univ, specialized school | |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 17 | C8v2 | S02 | How many children do you have | nb kids | |
| 18 | C8v1 | S03 | How many people are staying in your house, including you | nb people/home | |
| 19 | C7v1 | S04 | Which category better corresponds to your job situation during the past 12 months | 1: working; 2: housewife/houseman; 3: student; 4: not working but able to work; 5: unable to work; 6: pensioned | |
| 20 | C7v2 | S05 | Which work do you do currently (it you are not working now, what was your last job) | text | |
| 21 | C7v3 | S06 | Job category (filled by interviewer) | 1: professional; 2: qualified non-manual (teacher); 3: semiqualified non-manual (clerk); 4:qualified manual (trained mechanic); 5: semiqualified manual (some training); 6: nonqualified (laborer); 7: other (student) | |
| 22 | C9v1 | S07 | Can you tell me your monthly salary. For those uncomfortable with the q: in which of the following categories does you salary fall | 1: <1000; 2: 1000-2000; 3: 2001-3000; 4: 3001-5000; 5: 5001-10000; 6: >10000 | |
| 23 | C9v2 | S08 | Over the last year, can you tell me the approximate earnings of your household (account for salary of Mr, Mrs, children, etc) (Note: many people would report what is given to head of family to contribute to small bills (electricity, telephone) and food but do not account for large part of their salary) | 1: <1000; 2: 1000-2000; 3: 2001-3000; 4: 3001-5000; 5: 5001-10000; 6: 10001-15000; 7: >15000 | |
| 24 | S1a | T02 | Do you currently smoke cigarettes, cigars or pipe? | 1: yes; 2: no | No: T10 |
| 25 | S1b | T03 | Do you smoke cigarettes every day | 1: yes; 2: no | No: T10 |
| 26 | S2a | T04 | How old were you when you started smoking cigarettes every day | age | |
| 27 | S3cigmanufactu | T05 | On average, how many cigarettes do you smoke per day | nb cig/d | |
| 28 | | T06 | Do you smoke every day cigarettes that you roll, or cigars or pipe | 1: yes; 2: no | No: T13 |
| 29 | S3v-cigrolled | T07 | Do you smoke every day cigarettes that you roll | 1: yes; 2: no | |
| 30 | S3v-pipe | T08 | Do you smoke pipe every day | 1: yes; 2: no | |
| 31 | S3v-cigars | T09 | Do you smoke every day cigars | 1: yes; 2: no | |
| 32 | S4 | T10 | In the past, did you smoke cigarettes every day at some time | 1: yes; 2: no | No: T13 |
| 33 | S5a | T11 | How old were you when you stopped smoking | age | |
| 34 | S5b | T12 | How old were approximately you when you started smoking every day | age | |
| 35 | S6ab | T13 | Did you ever chew tobacco | 1: never; 2: in the past, not now; 3: currently, not every day; 4: currently, every day | |
| 36 | D1a | N02 | In 1 typical week, on how many days do you eat fruit on average (fresh, can, frozen, card) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 37 | D1b | N03 | On one of those days, how many servings ("portion") of fruit do you eat | nb servings | |
| 38 | D2a | N04 | In 1 typical week, on how many days do you eat vegetables (legim) on average (card) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 39 | D2b | N05 | On one of those days, how many servings of vegetables do you eat | nb servings | |
| 40 | | N06 | In 1 w, on how many days do you eat "gro manze" on average (think of breadfruit, cassava, sweet potato, cooked banana) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 41 | | N07 | In 1 w, on how many days do you eat cereals, on average, such as cornflakes, hotmeal, weetabics, others | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 42 | | N08 | In 1 w, on how many days do you eat rice on average | 1: every day, twice; 2: everyday once; 3: 5-6 d/w; 4: 3-4 d/w; 5: 1-2 d/w; 6: <1 d/w | |
| 43 | | N09 | In 1 w, on how many days do you eat salad on average, think of water crest, tomato, carrots, cabbage, cucumber, 'patol', 'margoz', and others | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 44 | | N10 | In 1 w, on how many days do you eat cheese on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 45 | | N11 | In 1 w, on how many days do you drink milk on average (not accounting for milk in tea/coffee) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 46 | | N12 | In 1 w, on how many days do you eat fish on average, fresh or in can | 1: every day, twice; 2: everyday once; 3: 5-6 d/w; 4: 3-4 d/w; 5: 1-2 d/w; 6: <1 d/w | |
| 47 | | N13 | In 1 w, on how many days do you eat poultry on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 48 | | N14 | In 1 w, on how many days do you eat meat on average (not accounting for chicken, bacon, sausage, corned beef) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 49 | | N15 | In 1 w, on how many days do you eat sausage, bacon, corned beef, ham, luncheon meat, on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 50 | | N16 | In 1 w, on how many days do you eat salted snacks such as gato piman, samosa, banana chips, cassava chips, potato chips, breadfruit chips, peanuts, pizza, 'pate' (baked meat) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 51 | | N17 | In 1 w, on how many days do you eat sweet snacks such as chocolate, biscuits, ice-cake, ice-cream, sweets, cakes, etc | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 52 | | N18 | Did you take vitamins pills in the past 4 weeks | 1: none: 2: 2-3 times; 3: every day | N: N20 |
| 53 | | N19 | Which vitamin | type | |
| 54 | D3v | N20 | Which type of oil or fat do you use most often for frying | 1: turkey; 2: vegetable; 3: olive; 4; margarin; 5 butter; 6:other; 7: any | |
| 55 | D3v | N21 | Which type of oil or fat do you use most often for cooking, but not for frying | 1: turkey; 2: vegetable; 3: olive; 4; margarin; 5 butter; 6:other; 7: any | |
| 56 | | N22 | Do you use butter of margarin to spread on butter | 1: nothing; 2: butter; 3: margarin; 4: other; 5: any | |
| 57 | | N23 | In 1 w, on how many days do you drink tea on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 58 | | N24 | In such days, how many cups of tea do you drink per day on average | nb cups/d | |
| 59 | | N25 | In 1 w, on how many days do you drink coffee on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 60 | | N26 | In such days, how many cups of coffee do you drink per day on average | nb cups/d | |
| 61 | | N27 | In 1 w, on how many days do you drink lemonade/soft drinks on average (do not count soda, fruit juice, or plain water) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 62 | | N28 | In such days, how many bottles or glasses of lemonade/soft drink do you drink per day on average | nb cups-bottles/d | |
| 63 | | N29 | In 1 w, on how many days do you drink juice in packet ("juice dan pake") on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 64 | | N30 | In such days, how many small packets or glasses of juice you drink per day on average | nb cups-bottles/d | |
| 65 | | N31 | In 1 w, on how many days do you drink fresh juice on average | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 66 | | N32 | In 1 w, on how many days do you drink water on average (soda, bottles, tap water, etc) | 1: everyday; 2: 5-6 d/w; 3: 3-4 d/w; 4: 1-2 d/w; 5: <1 d/w | |
| 67 | | N33 | In such days, how many glasses of water do you drink per day on average | glasses of water/day (1 bottle 5 dl=2 glasses) | |
| 68 | A1a | O02 | Did you ever drink alcohol beverages such as bear, wine, spirit or others at any time in your life | 1: yes; 2: no | No: E1 |
| 69 | A1b | O03 | Did you drink bear, wine, spirit or other alcohol beverages during in the past 12 months | 1: yes; 2: no | No: E1 |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 70 | A2 | O04 | On average, how often do you drink at least one drink per day | 1: 5d+/w (daily); 2: 1-3d/w (weekly); 3: 1-3d/m (monthly); 4: less than monthly; 5 never (t03=no) (added in dta; jun05): 5: not on past year; 6 never | |
| 71 | A3v1 | O05 | On average, how many drinks do you have on a week day (mon-thursday), think of any type of alcohol drinks | nb drink/weekday (if oh at least monthly) | |
| 72 | A3v2 | O06 | On average, how many drinks do you have on Friday | nb drink/Friday (oh at least monthly) | |
| 73 | A3v3 | O07 | On average, how many drinks do you have on Saturday | nb drink/Saturday (oh at least monthly) | |
| 74 | A3v4 | O08 | On average, how many drinks do you have on Sunday | nb drink/Sunday (oh at least monthly) | |
| 75 | | O09 | On special occasions such as celebrations, pay days, end of the month, etc, how many drinks can you drink in one day? | nb drink/special day (oh at least monthly) | |
| 76 | | O10 | Now, think of your alcohol consumption in a whole week, weekdays + week ends. How many bottles of beer (not guiness) do you drink in 1 week, on average | nb bottles beer/w | |
| 77 | | O11 | How many bottles of guinness (not another beer) do you drink in 1 week, on average | nb bottles guinness/w | |
| 78 | | O12 | How many bottles of wine do you drink in 1 week, on average | nb glasses wine/w (1bottle=5 glasses) | |
| 79 | | O13 | How many pegs of spirit (whisky, takamaka, rhum, liker) do you drink in 1 week, on average | nb pegs spirit/w | |
| 80 | | O14 | Do you drink baka, kalu or lapire at times? | 1: yes; 2: no | No: O18 |
| 81 | | O15 | How many bottles of baka do you drink in 1 week, on average | nb bottles (1.5l) baka/w | |
| 82 | | O16 | How many bottles of kalou do you drink in 1 week, on average | nb bottles (1.5l) kalou/w | |
| 83 | | O17 | How many bottles of lapire do you drink in 1 week, on average | nb bottles (1.5l) lapire/w | |
| 84 | A5 | O18 | In the past 12 months, which was the largest amount of drinks you had on one single day counting all types of standard drinks altogether | nb drinks/day | |
| 85 | A6v | O19 | In a typical month (4 wks), on how many days do you drink more than 5 (men) 4 (women) standard drinks per day, on average (card) | nb days /month | |
| 86 | P1-v | E03 | *We will now speak of physical exercise. Think first of PA during work time, which also includes house work. Do not count for PA during lunch time.* Do you walk or do any physical exercise (PA) for >10 min at a time during your working time, or, are you most often sitting or standing | 1: yes PA for >10 min; 2: not PA for >10 min | No: E12 |
| 87 | P2 | E05 | *I will ask you Q on PA that is either vigorous or moderate during your working time. Let's start with PA that is vigorous during your working time.* Does your work (also at home) involve vigorous ("for") PA for at least 10 min at a time, such as lifting heavy weights, digging, construction, etc, | 1: yes; 2: no | No: E9 |
| 88 | P3a | E06 | In a typical week (7d), on how many days do you do vigorous PA as part of your work for >10 min at a time | nb days/w | |
| 89 | P3b | E07 | How much time do you spend doing vigorous PA as part of your work in such a typical day | nb min/day | |
| 90 | P4 | E09 | *Now think of PA that is moderate during working time such as walking, lifting light weights, etc.* Does your work (also at home) involve moderate-intensity PA for at least 10 min at a time, such as walking, lifting light weights, etc (not counting for vigorous PA nor walking to go to/from your work place) | 1: yes; 2: no | No: E12 |
| 91 | P5a | E10 | In a typical week (7d), on how many days do you do such moderate-intensity PA for >10 min at a time as part of your work | nb days/w | |
| 92 | P5b | E11 | How much time do you spend doing moderate-intensity PA on such a typical day | nb min/d | |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 93 | P6 | E12 | How long is your typical work day | hours/day | |
| 94 | P7 | E14 | *Now i will ask you how long you walk to and from places, not accounting for walking during working time.* Do you walk for more than 10 min continuously to get to/from places like workplace, church, shops, during workdays and weekdays (not accounting for walking during work time | 1: yes; 2: no | No: E17 |
| 95 | P8a | E15 | In a typical week, on how many days do you walk continuously for at least 10 min to get to and from places (not counting for walking during working time) | nb days/w | |
| 96 | P8b | E16 | How much time do you spend walking to/from places on such a typical day (not accounting for walking during working hours) | nb min/d | |
| 97 | P9 | E18 | *Next Q are on PA during leisure time. Think of activities you do for fun, recreation, fitness or sport. Do not include PA during work or walking to get to/from places that we have already discussed.* In your leisure time, do you do vigorous or moderate-intensity PA lasting at least 10 min at a time (think of PA such as walking for exercise, sport, swimming, dancing, but do not include walking to go to places nor PA during working time) | 1: yes; 2: no | No: E27 |
| 98 | P10 | E20 | *I will start with Q on heavy activities during leisure time, such as cycling, weight lifting, running and then i will ask you Q on moderate-intensity activities such as walking for exercise, gardening , swimming, dancing*. In your leisure time, do you do any vigorous PA for at least 10 min at a time, such as cycling, running, sport such as football, weight lifting or similar intense sports, etc | 1: yes; 2: no | No: E23 |
| 99 | P11a | E21 | In a typical week (7d), on how many days do you do vigorous PA as part of your leisure time | nb days/w | |
| 100 | P11b | E22 | How much time do you spend doing such vigorous PA during your leisure time on a typical day | nb min/d | |
| 101 | P12 | E24 | Now i will ask you Q on moderate PA during your leisure time. In your leisure time, do you do moderate-intensity PA for at least 10 min at a time, such as brisk walking, swimming, dancing, gardening, etc | 1: yes; 2: no | N: E27 |
| 102 | P13a | E25 | In a typical week (7d),on how many days do you do such moderate-intensity PA during your leisure time | nb days/w | |
| 103 | P13b | E26 | How much time do you spend doing such moderate-intensity PA during your leisure time on such a typical day | nb min/d | |
| 104 | | E28 | *Next Q are on sedentary activities.* On average, how much time do you spend watching TV, videos or films during weekdays | 1: <1h/d; 2: 1-2 h/d; 3: 3-4 h/d; 4: 5 h+/d; 6: dont watch tv/videos | |
| 105 | | E29 | On average, how long do you watch TV or videos during weekend days | 1: <1h/d; 2: 1-2 h/d; 3: 3-4 h/d; 4: 5 h+/d; 6: dont watch tv/videos | |
| 106 | | E30 | Do you use a computer at home | 1: yes; 2: no | No: E33 |
| 107 | | E31 | On a week day, how long do you use a computer at home | 1: <10 min/d; 2: 10-30 min; 3: 30-60 min; 4: 1-2 h/d; 5: >2h/d | |
| 108 | | E32 | On a day of the week end, how long do you use a computer at home | 1: <10 min/d; 2: 10-30 min; 3: 30-60 min; 4: 1-2 h/d; 5: >2h/d | |
| 109 | | E33 | How long do you have to walk between your house and the next bus stop | 1: <5min; 2: 5-10min; 3: 10-15min; 4: 15-30min; 5: 30+ min | |
| 110 | | E34 | Does anyone in your household have a car or a pickup | 1: no; 2: in the family; 3: my own | |
| 111 | | B02 | Did you ever heard of HBP or hypertension (tansyon) | 1: y; 2: n | No: D1 |
| 112 | H1 | B03 | When was the last time you had your BP checked by a health officer | 1: <12m; 2: 1-5yr; 3: >5yr; 4: dnk | |
| 113 | H2v | B04 | Were you told by a dr or a health officer that you have elevated BP or hypertension ("tansyon") | 1: yes; 2: no | No: B20 |
| 114 | | B05 | How many years ago were you first told that you had HBP | 1: <12 m; 2: 1-5yr; 3: 5-10yrs; 4: >10 years; 5: dnk | |
| 115 | H3a-M15 | B06 | Are you receiving a treatment for HBP | 1: y; 2: n | No: B11 |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 116 | | B07 | Which medication | 1: diuretic not lasix; 2: bb; 3: ccb; 4: acei/arb; 5: methyldopa; 6: other; 7: did not bring list | |
| 117 | | B08 | If other medication, which other medication | | |
| 118 | | B08lasix | Lasix | 1: yes | |
| 119 | | B08aspirin | Aspirin | 1: yes | |
| 120 | | B09 | Who prescribed the medication | 1: clinic/hospital dr; 2: dr private; 3: both; 4 dr abroad | |
| 121 | | B10 | It is very difficult to take pills every day. On average how frequently did you take your medication | 1: i take my pills every day; 2: i forgot on 1-2 days in a week, on average; 3: i forgot often to take my pills; 4: I took none or almost none | |
| 122 | H3bv | B11 | Were you advised to limit salt | 1: y; 2: n | |
| 123 | H3c | B12 | Were you advised to lose weight or control weight | 1: y; 2: n | |
| 124 | H3d | B13 | Were you advised to stop/refrain of smoking | 1: y; 2: n | |
| 125 | H3e | B14 | Were you advised to start or increase physical exercise | 1: y; 2: n | |
| 126 | H4 | B15 | In the past 12 m, did you consult an 'erbalis' or traditional practioner to treat your BP | 1: y; 2: n | No: B18 |
| 127 | H5 | B16 | Are you taking any traditional medicine or lafresisan for your BP | 1: y; 2: n | No: B18 |
| 128 | | B17 | Which 'lafresisan' are you taking | Text | |
| 129 | | B18 | During the past 12 m, when you checked your BP, did you see the same dr ? | 1: always or almost; 2: often; 3: rarely | |
| 130 | | B19 | When you have your BP checked in a health center, do you think it is important for you to see the same dr | 1: very important; 2: fairly important; 3: not important | |
| 131 | | B20yn | Can tell at least one value of own BP | 1: some value; 2: DNK | |
| 131 | | B20 | Can you tell me one or two of your BP readings | text, DNK=0 | |
| 132 | | B21yn | Can tell some value for normal BP | 1: some value; 2: DNK | |
| 132 | | B21 | In your opinion, can you tell me one or two numbers for upper limits for normal BP | text, DNK=0 | |
| 133 | | B22 | How do you consider your risk of getting a disease that is due to your BP (Ki manyer ou vwar risk lo ou lasante akoz nivo ou tansyon) | 1: low/ba; 2: medium/mwayen; 3: high/o; 4: i cannot figure out | |
| 134 | | B23 | In general, do you think that someone can feel when BP is high | 1: rarely; 2: often; 3: always or almost always | |
| 135 | | B24 | In general, for how long someone who has high BP should take pills to reduce BP | 1: 2-3d; 2: 2-3 w: 3: 2-3m: 4: several years; 5: DNK | |
| 136 | | D01 | Have you ever heard of diabetes of high blood sugar | 1: yes; 2: no | No: D15 |
| 137 | H6 | D02 | Did you check your blood sugar in the past 12 months | 1: yes; 2: no; 3 dnk | |
| 138 | H7 | D03 | Have you ever been told by a dr or health worker that you had diabetes | 1: yes; 0: no | No: D14 |
| 139 | | D04 | How many years ago were you first told that you had diabetes | 1: <12m; 2: 1-5yrs; 3: 5-10; 4: >10yr | |
| 139.1 | | D05yn | Treatment for diabetes | 1:yes 0:no | |
| 140 | H8ab | D05 | Are you currently taking any of the following treatment | 1: Glibenclamide; 2: Metformin; 3: Insulin; 4: other; 5: none; 6: dnk/did not bring list medic | |
| 141 | H8c | D07 | Did you receive advice for your diet | 1: yes; 2: no | |
| 142 | H8d | D08 | Did you get advice to reduce or control your weight | 1: yes; 2: no | |
| 143 | H8f | D09 | Did you receive advice to start or increase physical exercise | 1: yes; 2: no | |
| 144 | H8e | D10 | Did you receive advice to refrain from smoking | 1: yes; 2: no | |
| 145 | H9 | D11 | During the past 12 months, did you see an 'erbalis' or traditional healer for your diabetes | 1: yes; 2: no | |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 146 | H10 | D12 | Are you taking any "lafresisan" or traditional treatment for your diabetes | 1: yes; 2: no | No: D14 |
| 147 | | D13 | Which lafresisan | text | |
| 148 | | D14 | Do you know someone in your family who has diabetes | 1: none; 2: parents & siblings; 3: other family (uncles, aunties, cousins) | |
| 149 | | D15 | People from Indian origin tend to have diabetes more often. Do you have parents of Indian descent? | 1: parent/grandparent; 2: family beyond grandparents; 3: no | |
| 150 | | L01 | Have you heard of blood cholesterol | 1: yes; 2: no | No: M3 |
| 151 | | L02 | Have you ever checked your cholesterol | 1: yes; 2: no; 3: dnk | |
| 152 | | L03 | Did a dr tell you that you had high blood cholesterol | 1: yes; 2: no | No: L5 |
| 153 | | L04 | Did a dr prescribe pills to reduce your blood cholesterol | 1: never; 2: yes in the past but i do not take it now; 3: yes and i take it now | |
| 154 | | L05 | Does someone in your family have high blood cholesterol. Followed by 2nd BP check | 1: yes; 2: no | |
| 155 | | W01 | Let s talk now on body weight. Do you think your weight is too high, good ('bon'), or too little | 1: largely too high; 2: a little too high; 3: good ('bon'); 4: too low | 3/4: P01 |
| 156 | | W02 | Do you take concrete measures to control your weight, currently | 1: no, i don't think about my w; 2: i think about some measures but i haven't taken action yet; 3: i am taking action now but i have not lost weight yet; 4: i took measures and i have lost w; 5: i took measures and lost weight but i regained w | |
| 157 | | W03 | In the past, did you already take action to decrease weight | 1: not really; 2: yes i tried but i did not succeed; 3: yes i lost weight but i regained it; 4: yes i lost w and i maintained the w loss | |
| 158 | | P01 | Let's talk now on general issues. How often did you go to the dr in a health center during the past 12 months (excluding private dr) | 1: 0; 2: 1-2; 3: 3-5; 4: >5times/year | |
| 159 | | P02 | How often did you go to a private dr during the past 12 months | 1: 0; 2: 1-2; 3: 3-5; 4: >5times/year | |
| 160 | | P03 | Before you came to this study, had you heard of the Unit for Prevention and Control of CVD | 1: yes; 2: no | |
| 161 | | P04 | In the past 12 months, did you hear a program on radio or see a program on TV on smoking | 1: yes; 2: no | |
| 162 | | P05 | In the past 12 months, did you hear a program on radio or see a program on TV on high blood pressure | 1: yes; 2: no | |
| 163 | | P06 | In the past 12 months, did you hear a program on radio or see a program on TV on weight control | 1: yes; 2: no | |
| 164 | | P07 | In the past 12 months, did you hear a program on radio or see a program on TV on diet | 1: yes; 2: no | |
| 165 | | P08 | In the past 12 months, did you hear a program on radio or see a program on TV on diabetes | 1: yes; 2: no | |
| 166 | | P09 | Do you think there should be less, same amount, or more programs on topics such as BP, diabetes, weight control, tobacco, nutrition, cardiovascular diseases on radio or TV | 1: less; 2: same amount; 3: more | |
| 167 | | P10 | Did you hear of the 'give me 5' campaign | 1: yes; 2: no | |
| 168 | | P11 | Can you tell me which was the main message of the GM5 campaign | 1: says "eat at least 5 veg/fruit" or "more fruit/veg"; 2: other | |
| 169 | | P12 | Do you like to read papers in the newspaper on CVD, HBP, diabetes, tobacco, weight control, nutrition, etc | 1: no; 2: a little; 3: much; 4: i dont read newspapers | |
| 170 | | P13 | Do you like to listen to programs on the radio on CVD, HBP, diabetes, tobacco, weight control, nutrition, etc | 1: no; 2: a little; 3: much; 4: i dont listen to radio | |
| 171 | | P14 | Do you like to watch programs on tv on CVD, HBP, diabetes, tobacco, weight control, nutrition, etc | 1: no; 2: a little; 3: much; 4: i dont watch tv | |

| # | STEPS | ID | Questions | Answers | Filters |
|---|---|---|---|---|---|
| 172 | | P15 | Did you already heard on heart attack | 1: yes; 2: no | |
| 173 | | P16 | Did you already heard on stroke | 1: yes; 2: no | |
| 174 | | P17 | Do you know of someone in your family or friends who got a stroke | 1: no; 2: family; 3: friends | |
| 175 | | P18 | Do you know of someone in your family or friends who got a heart attack | 1: no; 2: family; 3: friends | |
| 176 | | P19 | In your opinion, how do you see your risk of getting a heart attack or a stroke in the next 10 years (Dan ou lopinyon, mannyer ou vwar ou risk pour ou ganny en latak leker oubyen latak laservel dan sa prosen 10 lannen) | 1: risk is high (o, fasil); 2: risk is medium (moyen, pa trop fasil); 3: risk is low (ba, ou pa kwar ou pou ganny en latak); 4: cannot figure out | |
| 177 | | P20 | In your opinion, how do you see your risk of getting a heart attack or stroke in the next 10 years | 1: <5%; 2: 5-10%; 3:10-20%; 4: 20-40%; 5: 40+%; 6: cannot figure out | |
| 178 | | P21 | In your opinion, how do you see your risk of getting a cancer in the next 10 years | 1: <5%; 2: 5-10%; 3:10-20%; 4: 20-40%; 5: 40+%; 6: cannot figure out | |
| 179 | | P22 | Do you think that your lifestyle and diet can have an impact on your health later | 1: much; 2: some; 3: a little; 4: none | |
| 180 | | P23 | What best describe your attitude and action regarding physical activity such as taking regular PA or having a balanced diet during the past 6 months | 1: i didn't think of it; 2: i thought of changes but i didn't take action; 3: i took action but i did not sustain it; 4: i took action and i still continue | |
| 181 | | P24 | Do you think you should do more for the health of your heart in relation to your lifestyle and diet | 1: i do enough; 2: i should do a bit more; 3: i should do a lot more | |
| 182 | | P25 | Do you think smoking should be banned in enclosed public places such as restaurants, discotheques, inside casinos, etc | 1: yes; 2: no; 3: dnk | |
| 183 | | P26 | Do you think smoking should be banned in enclosed work places that are attended by several workers (Followed by BP3. | 1: yes; 2: no; 3: dnk | |
| 184 | M12a | M01 | hgsys2 | mm | |
| 185 | M12b | M02 | hgdia2 | mm | |
| 186 | M13a | M03 | hgsys3 | mm | |
| 187 | M13b | M04 | hgdia3 | mm | |
| 188 | M14a | M05 | hgsys4 | mm | |
| 189 | M14b | M06 | hgdia4 | mm | |
| 190 | M7 | M07 | Waist | cm | |
| 191 | M8 | M08 | Hip | cm | |
| 192 | | M09 | CO (only for smokers) | ppm | |

## APPENDIX IV: Form for recording clinical measurements and point-of-care laboratory results

- This form was filled by the several persons who saw participants secretary (name, age, etc, first and last BP measurements), interviewers (questionnaire and physical measurements), laboratory technician (blood collection, analyses of certain parameters with point of care analyzers, oral glucose tolerance test if required), and ultrasonographer (ultrasound of arteries).

**ID:** **Lname:** **Fname:** **Age:** **Date:**

BP automatic 1, arrival $_{1}$Officer: $_{2}$Time: $_{3}$Value: /

BP automatic 2, departure $_{4}$Officer: $_{5}$Time: $_{6}$Value: /

BP automatic 3, departure $_{7}$Officer: $_{8}$Time: $_{9}$Value: /

$_{12}$Omron impedance:

**Laboratory, Cholestec**

$_{20}$Officer: $_{21}$Time: $_{21a}$Batch:

$_{22}$Fast: Full, Some, Not $_{23}$What food:

$_{24}$Aware diabetes: Y / N $_{25}$Rx diabetes: Y / N: $_{26}$Rx chol Y / N:

$_{27}$FGlucose: $_{28}$Tot chol: $_{29}$HDL-C: $_{30}$Trig:

if FG ≥7.0 or 2hG ≥ 11.1 $_{31}$HbA1c: $_{32}$Officer:

if FG=5.6-6.9 or if [FG=7.0-11.0] & NawD $_{33}$Officer: $_{34}$Time: $_{35}$2-hr Gluc:

Repeat FG $_{36}$Date: $_{37}$Time: $_{38}$Officer: $_{39}$FGluc:

if [FG ≥7.0 or 2hG ≥11.1 ] & NawD or if FG <7.0 & AwD & no Rx

**Laboratory, urine** **$_{40}$Officer:** **$_{41}$Time:**

Status: $_{42}$Micro alb: $_{43}$Creat: $_{44}$Ratio:

(if ratio +) DSA 2000 $_{45}$Micro alb: $_{46}$Creat: $_{47}$Ratio:

**Interview**

$_{50}$Officer:

$_{51}$Smoking (non, ex, current-cig/d):

$_{52}$History of HBP: Y / N $_{53}$Treatment for HBP: Y / N

$_{54}$History of diabetes: Y / N $_{55}$Treatment of diabetes: Y / N

$_{56}$Weight (kg): $_{57}$Height (cm): Calc. max W:

**Ultrasound**

Plaque: $_{60}$CD: $_{61}$CG: $_{62}$FD: $_{63}$FG:

$_{64}$Aorta aneurysm:

## APPENDIX V: Results of Seychelles Heart Study 2004, by age and sex

Standard errors for all estimates can be obtained upon request.

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| **Socio-economic status** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Highest education level** | | | | | | | | | | | | | | |
| No school | % | 0.0 | 0.0 | 4.4 | 16.7 | | 0.0 | 1.1 | 3.9 | 12.7 | | 3.9 | 3.4 | 3.6 |
| Some primary | % | 0.0 | 6.0 | 13.9 | 35.3 | | 1.3 | 0.0 | 12.2 | 34.8 | | 10.9 | 9.1 | 10.0 |
| Full primary | % | 0.0 | 6.0 | 16.5 | 19.3 | | 0.0 | 5.1 | 18.8 | 21.6 | | 8.7 | 9.5 | 9.1 |
| Some secondary | % | 12.7 | 36.6 | 39.9 | 19.3 | | 13.4 | 30.7 | 41.4 | 17.7 | | 26.8 | 25.5 | 26.2 |
| Full secondary | % | 34.1 | 21.6 | 7.6 | 3.3 | | 37.6 | 30.7 | 6.6 | 6.6 | | 19.2 | 23.2 | 21.2 |
| Basic post secondary (e.g. polytechnic) | % | 47.6 | 20.9 | 8.9 | 2.0 | | 40.3 | 29.0 | 12.7 | 6.1 | | 23.4 | 24.9 | 24.1 |
| Advanced post secondary (e.g. university) | % | 5.6 | 9.0 | 8.9 | 4.0 | | 7.4 | 3.4 | 4.4 | 0.6 | | 7.0 | 4.4 | 5.7 |
| | | | | | | | | | | | | | | |
| **Number persons living in household (incl. respondent)** | | | | | | | | | | | | | | |
| 1-2 | % | 10.3 | 11.9 | 20.3 | 22.7 | | 14.1 | 6.3 | 14.9 | 26.0 | | 15.2 | 14.1 | 14.6 |
| 3-4 | % | 43.7 | 44.8 | 41.8 | 32.7 | | 38.3 | 48.9 | 39.8 | 32.0 | | 41.7 | 40.5 | 41.1 |
| 5-6 | % | 31.0 | 32.1 | 32.3 | 28.7 | | 26.2 | 30.1 | 27.6 | 25.4 | | 31.2 | 27.5 | 29.3 |
| 7-9 | % | 10.3 | 9.0 | 5.1 | 14.0 | | 17.5 | 12.5 | 12.7 | 13.3 | | 9.3 | 14.3 | 11.8 |
| 10+ | % | 4.8 | 2.2 | 0.6 | 2.0 | | 4.0 | 2.3 | 5.0 | 3.3 | | 2.6 | 3.6 | 3.1 |
| | | | | | | | | | | | | | | |
| **Job (current or last)** | | | | | | | | | | | | | | |
| Professional | % | 4.8 | 8.2 | 10.8 | 5.3 | | 3.4 | 4.0 | 6.1 | 1.7 | | 7.2 | 3.9 | 5.6 |
| Non-manual, qualified | % | 12.7 | 6.0 | 7.6 | 6.0 | | 15.4 | 17.1 | 14.4 | 8.3 | | 8.5 | 14.4 | 11.5 |
| Non-manual, non qualified | % | 10.3 | 8.2 | 10.8 | 6.7 | | 42.3 | 28.4 | 18.2 | 11.1 | | 9.2 | 27.5 | 18.4 |
| Manual, qualified | % | 21.4 | 22.4 | 14.6 | 9.3 | | 0.0 | 2.3 | 0.0 | 2.2 | | 18.1 | 1.0 | 9.5 |
| Manual, semi qualified | % | 27.8 | 31.3 | 33.5 | 30.7 | | 6.0 | 10.2 | 8.8 | 5.5 | | 30.6 | 7.8 | 19.2 |
| Manual, non qualified | % | 23.0 | 23.9 | 22.8 | 42.0 | | 32.9 | 38.1 | 52.5 | 71.3 | | 26.4 | 45.4 | 35.9 |
| | | | | | | | | | | | | | | |
| **Job situation in past 12 months** | | | | | | | | | | | | | | |
| Student | % | 0.8 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.3 | 0.0 | 0.1 |
| Working | % | 90.5 | 91.0 | 92.4 | 69.3 | | 83.2 | 89.8 | 80.1 | 55.3 | | 87.5 | 79.6 | 83.6 |
| Housewife/man | % | 0.0 | 0.0 | 0.0 | 0.0 | | 6.0 | 4.0 | 7.2 | 20.4 | | 0.0 | 8.2 | 4.1 |
| Not working but able to work | % | 6.4 | 6.0 | 5.7 | 8.7 | | 7.4 | 5.1 | 9.4 | 3.9 | | 6.5 | 6.6 | 6.6 |
| Not working but unable to work | % | 2.4 | 3.0 | 1.9 | 14.7 | | 3.4 | 1.1 | 3.3 | 7.7 | | 4.5 | 3.5 | 4.0 |
| Pensioned | % | 0.0 | 0.0 | 0.0 | 7.3 | | 0.0 | 0.0 | 0.0 | 12.7 | | 1.2 | 2.1 | 1.7 |
| | | | | | | | | | | | | | | |
| **Monthly salary (Seychelles rupees)** | | | | | | | | | | | | | | |
| <1000 | % | 4.8 | 5.2 | 7.7 | 18.0 | | 12.8 | 10.3 | 18.4 | 29.8 | | 7.8 | 16.3 | 12.0 |
| 1000-1999 | % | 6.4 | 8.2 | 8.3 | 24.7 | | 18.1 | 21.3 | 23.5 | 34.3 | | 10.5 | 22.9 | 16.7 |
| 2000-2999 | % | 48.0 | 38.8 | 26.3 | 26.7 | | 41.6 | 40.8 | 30.7 | 24.2 | | 36.8 | 35.9 | 36.4 |
| 3000-4999 | % | 32.8 | 31.3 | 37.8 | 20.0 | | 20.1 | 23.0 | 17.9 | 7.3 | | 31.4 | 18.3 | 24.8 |
| 5000-9999 | % | 8.0 | 13.4 | 11.5 | 6.0 | | 6.7 | 3.5 | 7.3 | 3.4 | | 10.0 | 5.4 | 7.7 |
| 10000+ | % | 0.0 | 3.0 | 8.3 | 4.7 | | 0.7 | 1.2 | 2.2 | 1.1 | | 3.6 | 1.2 | 2.4 |
| | | | | | | | | | | | | | | |
| **Tobacco** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Cigarette smoking** | | | | | | | | | | | | | | |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| Never smoker | % | 50.0 | 51.5 | 45.9 | 30.7 | | 91.3 | 91.5 | 90.1 | 81.1 | | 46.2 | 89.3 | 67.8 |
| Ex smoker | % | 7.1 | 9.0 | 18.5 | 36.7 | | 2.0 | 2.3 | 4.4 | 15.0 | | 15.3 | 4.8 | 10.1 |
| Occasional | % | 12.7 | 7.5 | 4.5 | 3.3 | | 2.7 | 2.3 | 1.7 | 0.6 | | 7.7 | 2.0 | 4.9 |
| Daily | % | 30.2 | 32.1 | 31.2 | 29.3 | | 4.0 | 4.0 | 3.9 | 3.3 | | 30.8 | 3.9 | 17.3 |
| | | | | | | | | | | | | | | |
| **Daily cigar, rolled cig, pipe** | % | 0.0 | 0.0 | 0.0 | 1.3 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.2 | 0.0 | 0.1 |
| **Daily chewing** | % | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 1.1 | | 0.0 | 0.2 | 0.1 |
| | | | | | | | | | | | | | | |
| **Among cigarette smokers** | | | | | | | | | | | | | | |
| Age start | mean | 19.0 | 20.4 | 17.8 | 19.1 | | 19.8 | 21.1 | 22.9 | 20.2 | | 19.2 | 21.0 | 19.4 |
| Cigarettes per day | mean | 9.4 | 9.4 | 13.1 | 11.3 | | 8.8 | 7.6 | 6.9 | 9.3 | | 10.6 | 8.1 | 10.3 |
| | | | | | | | | | | | | | | |
| **Nutrition** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Fruit intake** | mean | 0.6 | 0.7 | 0.7 | 0.6 | | 0.6 | 0.6 | 0.6 | 0.6 | | 0.7 | 0.6 | 0.6 |
| Everyday | % | 42.1 | 37.3 | 39.9 | 35.6 | | 50.3 | 49.4 | 49.2 | 46.4 | | 39.1 | 49.2 | 44.1 |
| 5-6 days/w | % | 8.7 | 7.5 | 7.6 | 6.0 | | 10.7 | 7.4 | 6.6 | 5.5 | | 7.7 | 8.0 | 7.8 |
| 3-4 days/w | % | 19.8 | 24.6 | 17.7 | 21.5 | | 18.8 | 17.1 | 19.3 | 22.7 | | 21.0 | 19.1 | 20.0 |
| 1-2 days/w | % | 19.1 | 17.2 | 20.3 | 24.2 | | 14.1 | 19.3 | 17.7 | 19.3 | | 19.7 | 17.3 | 18.5 |
| <1 day/w | % | 10.3 | 13.4 | 14.6 | 12.8 | | 6.0 | 6.8 | 7.2 | 6.1 | | 12.6 | 6.5 | 9.6 |
| | | | | | | | | | | | | | | |
| **Vegetables (legumes) per week** | mean | 1.9 | 2.0 | 1.8 | 1.6 | | 2.1 | 2.1 | 2.1 | 1.8 | | 1.9 | 2.0 | 2.0 |
| Everyday | % | 66.7 | 65.7 | 54.4 | 49.0 | | 71.8 | 75.0 | 76.8 | 65.8 | | 60.6 | 72.9 | 66.7 |
| 5-6 days/w | % | 11.9 | 14.9 | 17.1 | 10.7 | | 7.4 | 9.1 | 6.6 | 7.2 | | 13.8 | 7.7 | 10.7 |
| 3-4 days/w | % | 11.9 | 12.7 | 12.7 | 21.5 | | 12.1 | 9.1 | 11.1 | 16.6 | | 13.9 | 11.8 | 12.8 |
| 1-2 days/w | % | 8.7 | 6.7 | 15.8 | 15.4 | | 5.4 | 5.1 | 5.5 | 10.5 | | 11.0 | 6.2 | 8.6 |
| <1 day/w | % | 0.8 | 0.0 | 0.0 | 3.4 | | 3.4 | 1.7 | 0.0 | 0.0 | | 0.8 | 1.5 | 1.2 |
| | | | | | | | | | | | | | | |
| **Portions of fruit/vegetable per day** | | | | | | | | | | | | | | |
| Portions per day | mean | 2.6 | 2.7 | 2.5 | 2.2 | | 2.7 | 2.7 | 2.8 | 2.5 | | 2.5 | 2.7 | 2.6 |
| ≤1 per day | % | 16.0 | 16.4 | 26.5 | 32.8 | | 15.1 | 18.3 | 13.8 | 27.2 | | 21.3 | 17.8 | 19.5 |
| 2 per day | % | 49.6 | 42.2 | 38.8 | 43.3 | | 45.3 | 47.3 | 43.7 | 43.4 | | 44.0 | 45.2 | 44.6 |
| 3 per day | % | 26.1 | 25.0 | 21.1 | 18.7 | | 25.9 | 21.9 | 28.2 | 19.7 | | 23.4 | 24.2 | 23.8 |
| 4 per day | % | 8.4 | 12.5 | 8.8 | 5.2 | | 10.8 | 7.7 | 10.3 | 6.4 | | 9.2 | 9.1 | 9.1 |
| ≥5 per day | % | 0.0 | 3.9 | 4.8 | 0.0 | | 2.9 | 4.7 | 4.0 | 3.5 | | 2.2 | 3.8 | 3.0 |
| | | | | | | | | | | | | | | |
| **Body weight** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Body mass index** | | | | | | | | | | | | | | |
| BMI | mean | 24.4 | 25.7 | 26.8 | 25.6 | | 26.4 | 28.6 | 29.4 | 30.3 | | 25.5 | 28.3 | 26.9 |
| BMI <18.5 | % | 5.6 | 5.2 | 2.5 | 4.7 | | 6.0 | 2.3 | 2.8 | 0.6 | | 4.6 | 3.3 | 4.0 |
| BMI 18.5-24 | % | 53.2 | 39.6 | 34.2 | 44.7 | | 38.9 | 30.1 | 21.0 | 16.0 | | 43.5 | 28.4 | 36.0 |
| BMI 25-29 | % | 31.8 | 40.3 | 40.5 | 36.0 | | 32.2 | 30.1 | 36.5 | 35.4 | | 36.9 | 33.2 | 35.0 |
| BMI 30-39 | % | 9.5 | 14.9 | 20.3 | 12.7 | | 20.8 | 31.8 | 34.3 | 43.1 | | 14.1 | 30.8 | 22.4 |
| BMI ≥40 | % | 0.0 | 0.0 | 2.5 | 2.0 | | 2.0 | 5.7 | 5.5 | 5.0 | | 0.9 | 4.4 | 2.6 |
| BMI ≥25 | % | 41.3 | 55.2 | 63.3 | 50.7 | | 55.0 | 67.6 | 76.2 | 83.4 | | 51.9 | 68.3 | 60.1 |
| BMI ≥30 | % | 9.5 | 14.9 | 22.8 | 14.7 | | 22.8 | 37.5 | 39.8 | 48.1 | | 15.0 | 35.2 | 25.1 |
| | | | | | | | | | | | | | | |
| **Waist** | | | | | | | | | | | | | | |
| Mean waist | cm | 83.8 | 89.6 | 93.5 | 92.3 | | 83.9 | 89.8 | 93.7 | 98.1 | | 89.1 | 90.3 | 89.7 |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| | | | | | | | | | | | | | | |
| **Physical activity (PA)** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Type PA as part of work** | | | | | | | | | | | | | | |
| None (<10 min at a time) | % | 41.6 | 38.2 | 31.9 | 38.1 | | 51.4 | 37.6 | 26.6 | 20.8 | | 37.8 | 36.7 | 37.2 |
| Moderate intensity only | % | 32.8 | 26.7 | 35.7 | 38.8 | | 45.3 | 59.0 | 66.7 | 76.9 | | 32.8 | 59.3 | 46.0 |
| Vigorous intensity only | % | 8.8 | 9.9 | 10.2 | 4.8 | | 0.7 | 0.6 | 0.6 | 0.0 | | 8.8 | 0.5 | 4.7 |
| Vigorous and moderate intensity | % | 16.8 | 25.2 | 22.3 | 18.4 | | 2.7 | 2.9 | 6.2 | 2.3 | | 20.7 | 3.5 | 12.1 |
| | | | | | | | | | | | | | | |
| **Amount PA at work per day** | | | | | | | | | | | | | | |
| <10 min at at time | % | 42.1 | 39.6 | 32.3 | 38.9 | | 51.7 | 38.6 | 28.2 | 23.9 | | 38.6 | 37.9 | 38.2 |
| 1-59 min/day | % | 23.0 | 19.4 | 26.0 | 22.2 | | 18.1 | 18.8 | 16.0 | 26.1 | | 22.5 | 19.2 | 20.8 |
| 60-119 min/day | % | 13.5 | 11.2 | 14.6 | 14.8 | | 14.1 | 14.8 | 21.0 | 18.3 | | 13.3 | 16.6 | 15.0 |
| 120-239 min/day | % | 9.5 | 12.7 | 17.1 | 10.1 | | 12.1 | 20.5 | 27.1 | 24.4 | | 12.3 | 20.0 | 16.1 |
| 240+ min/day | % | 11.9 | 17.2 | 10.1 | 14.1 | | 4.0 | 7.4 | 7.7 | 7.2 | | 13.3 | 6.4 | 9.9 |
| | | | | | | | | | | | | | | |
| **Walking (not at work)** | | | | | | | | | | | | | | |
| <10 min at a time | % | 39.7 | 47.0 | 50.6 | 32.2 | | 27.5 | 25.6 | 32.6 | 33.9 | | 43.0 | 29.2 | 36.1 |
| 1-29 min/day | % | 19.1 | 18.7 | 15.2 | 20.8 | | 25.5 | 25.0 | 23.8 | 18.9 | | 18.3 | 23.8 | 21.1 |
| 30-59 min/day | % | 28.6 | 18.7 | 18.4 | 30.9 | | 32.9 | 34.7 | 27.6 | 33.3 | | 23.8 | 32.2 | 28.0 |
| 60+ min/day | % | 12.7 | 15.7 | 15.8 | 16.1 | | 14.1 | 14.8 | 16.0 | 13.9 | | 14.8 | 14.7 | 14.8 |
| | | | | | | | | | | | | | | |
| **Type PA at leisure time** | | | | | | | | | | | | | | |
| None (<10 min at a time) | % | 42.9 | 59.0 | 67.7 | 73.2 | | 52.4 | 58.5 | 59.7 | 70.6 | | 58.3 | 58.9 | 58.6 |
| Moderate intensity | % | 19.2 | 19.6 | 21.5 | 22.8 | | 36.2 | 36.9 | 38.1 | 28.3 | | 20.5 | 35.6 | 28.0 |
| Vigorous intensity only | % | 27.2 | 16.5 | 5.7 | 2.7 | | 7.4 | 4.0 | 0.6 | 1.1 | | 15.0 | 3.8 | 9.4 |
| Moderate and vigorous intensity | % | 11.2 | 5.3 | 5.1 | 1.3 | | 4.0 | 0.6 | 1.7 | 0.0 | | 6.4 | 1.8 | 4.1 |
| | | | | | | | | | | | | | | |
| **Amount PA at leisure time** | | | | | | | | | | | | | | |
| Minutes per day | | | | | | | | | | | | | | |
| <10 min at a time | % | 42.9 | 59.0 | 67.7 | 73.2 | | 52.4 | 58.5 | 59.7 | 70.6 | | 58.3 | 58.9 | 58.6 |
| 1-29 min/day | % | 25.4 | 17.9 | 18.4 | 10.7 | | 31.5 | 33.0 | 29.8 | 13.9 | | 19.2 | 28.6 | 23.9 |
| 30-59 min/day | % | 15.9 | 16.4 | 10.8 | 9.4 | | 9.4 | 6.8 | 6.1 | 11.1 | | 13.7 | 8.2 | 11.0 |
| 60+ min/day | % | 15.9 | 6.7 | 3.2 | 6.7 | | 6.7 | 1.7 | 4.4 | 4.4 | | 8.8 | 4.4 | 6.6 |
| | | | | | | | | | | | | | | |
| **Sedentary** (PA <10 min at work& leisure & <30 min walk/d) | | | | | | | | | | | | | | |
| Proportion | % | 14.3 | 18.7 | 15.8 | 24.0 | | 20.8 | 13.1 | 10.5 | 13.3 | | 17.5 | 15.0 | 16.2 |
| | | | | | | | | | | | | | | |
| **Blood pressure** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **BP** | | | | | | | | | | | | | | |
| Systolic BP | mean | 124.6 | 127.8 | 135.6 | 142.7 | | 113.9 | 120.9 | 132.3 | 139.1 | | 131.1 | 124.4 | 127.8 |
| Diastolic BP | mean | 81.3 | 84.1 | 89.2 | 90.6 | | 76.4 | 80.2 | 85.5 | 86.4 | | 85.5 | 81.3 | 83.4 |
| <140/90, no Rx | % | 77.0 | 61.2 | 43.7 | 27.3 | | 89.9 | 69.9 | 48.1 | 29.8 | | 56.4 | 64.4 | 60.4 |
| <140/90, Rx | % | 2.4 | 5.2 | 7.0 | 8.0 | | 4.0 | 10.2 | 12.7 | 21.6 | | 5.2 | 10.7 | 8.0 |
| 140-159/90-99 | % | 15.1 | 26.1 | 27.2 | 40.0 | | 4.7 | 14.8 | 23.2 | 29.8 | | 25.2 | 16.1 | 20.7 |
| 160-179/100-109 | % | 4.0 | 6.7 | 15.2 | 15.3 | | 1.3 | 4.0 | 13.8 | 10.5 | | 9.3 | 6.5 | 7.9 |
| ≥180/110 | % | 1.6 | 0.8 | 7.0 | 9.3 | | 0.0 | 1.1 | 2.2 | 8.3 | | 3.9 | 2.2 | 3.1 |
| | | | | | | | | | | | | | | |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| BP ≥140/90 | % | 20.6 | 33.6 | 49.4 | 64.7 | | 6.0 | 19.9 | 39.2 | 48.6 | | 38.4 | 24.9 | 31.6 |
| BP ≥140/90 or Rx | % | 23.0 | 38.8 | 56.3 | 72.7 | | 10.1 | 30.1 | 51.9 | 70.2 | | 43.6 | 35.6 | 39.6 |
| BP ≥160/100 | % | 5.6 | 7.5 | 22.2 | 24.7 | | 1.3 | 5.1 | 16.0 | 18.8 | | 13.2 | 8.8 | 11.0 |
| | | | | | | | | | | | | | | |
| ***Among persons with hypertension (BP≥140/90 or treatment)*** | | | | | | | | | | | | | | |
| Aware | % | 31.0 | 48.1 | 64.0 | 65.4 | | 60.0 | 66.0 | 76.6 | 84.3 | | 54.9 | 75.2 | 64.0 |
| Treated | % | 24.1 | 38.5 | 58.4 | 63.3 | | 60.0 | 60.4 | 72.3 | 83.5 | | 49.1 | 72.1 | 59.4 |
| Controlled, BP<140/90 | % | 10.34 | 13.46 | 12.36 | 11.01 | | 40 | 33.96 | 24.47 | 30.71 | | 11.91 | 30.19 | 20.13 |
| | | | | | | | | | | | | | | |
| ***Among persons under antihypertensive medication (all next questions on HBP)*** | | | | | | | | | | | | | | |
| **How often do you take your medication** | | | | | | | | | | | | | | |
| Every day | % | 28.6 | 45.0 | 40.4 | 65.2 | | 44.4 | 50.0 | 57.4 | 82.1 | | 49.4 | 64.4 | 57.6 |
| Forget 1-2 days/wk | % | 0.0 | 10.0 | 9.6 | 2.9 | | 0.0 | 15.6 | 7.4 | 6.6 | | 6.5 | 8.2 | 7.4 |
| Forget often | % | 0.0 | 0.0 | 5.8 | 4.4 | | 11.1 | 0.0 | 4.4 | 1.9 | | 3.7 | 3.1 | 3.3 |
| Take almost none | | 71.4 | 45.0 | 44.2 | 27.5 | | 44.4 | 34.4 | 30.9 | 9.4 | | 40.5 | 24.3 | 31.7 |
| | | | | | | | | | | | | | | |
| **Who prescribed the medication your are taking** | | | | | | | | | | | | | | |
| Health services | % | 85.7 | 90.0 | 76.9 | 81.2 | | 100.0 | 87.5 | 79.4 | 89.6 | | 81.8 | 86.5 | 84.3 |
| Private doctor | % | 14.3 | 10.0 | 23.1 | 14.5 | | 0.0 | 9.4 | 19.1 | 9.4 | | 16.7 | 12.0 | 14.1 |
| Both | % | 0.0 | 0.0 | 0.0 | 1.5 | | 0.0 | 3.1 | 1.5 | 0.9 | | 0.5 | 1.5 | 1.1 |
| Doctor abroad | % | 0.0 | 0.0 | 0.0 | 2.9 | | 0.0 | 0.0 | 0.0 | 0.0 | | 1.1 | 0.0 | 0.5 |
| | | | | | | | | | | | | | | |
| **Were you advised to:** | | | | | | | | | | | | | | |
| Reduce salt | % | 71.4 | 70.0 | 69.2 | 72.5 | | 77.8 | 81.3 | 76.5 | 77.4 | | 70.7 | 77.9 | 74.6 |
| Control weight | % | 71.4 | 70.0 | 59.6 | 63.8 | | 77.8 | 81.3 | 75.0 | 70.8 | | 64.1 | 74.8 | 70.0 |
| Abstain from smoking | % | 57.1 | 75.0 | 63.5 | 60.9 | | 66.7 | 71.9 | 60.3 | 59.4 | | 64.3 | 62.7 | 63.4 |
| Exercise regularly | % | 71.4 | 65.0 | 59.6 | 62.3 | | 77.8 | 78.1 | 72.1 | 66.0 | | 62.6 | 71.4 | 67.4 |
| | | | | | | | | | | | | | | |
| **Consulted a traditional practitioner on past 12 months** | % | 0.0 | 0.0 | 5.8 | 5.8 | | 0.0 | 12.5 | 10.3 | 3.8 | | 4.2 | 7.5 | 6.0 |
| If yes:% taking traditional medicine | % | | | | | | | | | | | 66.7 | 60.0 | 62.9 |
| | | | | | | | | | | | | | | |
| **Dr seen for BP during past 12 months** | | | | | | | | | | | | | | |
| Always same Dr | % | 0.0 | 20.0 | 23.1 | 26.1 | | 0.0 | 12.5 | 30.9 | 26.4 | | 21.7 | 23.2 | 22.5 |
| Often same Dr | % | 14.3 | 15.0 | 23.1 | 27.5 | | 44.4 | 28.1 | 25.0 | 32.1 | | 22.4 | 29.8 | 26.4 |
| Rarely same Dr | % | 71.4 | 65.0 | 48.1 | 42.0 | | 44.4 | 46.9 | 39.7 | 40.6 | | 51.1 | 41.8 | 46.0 |
| DNK | % | 14.3 | 0.0 | 5.8 | 4.4 | | 11.1 | 12.5 | 4.4 | 0.9 | | 4.8 | 5.2 | 5.0 |
| | | | | | | | | | | | | | | |
| **Importance of being followed by doctor for BP** | | | | | | | | | | | | | | |
| Very important | % | 42.9 | 50.0 | 34.6 | 36.2 | | 33.3 | 53.1 | 47.1 | 47.2 | | 38.9 | 47.3 | 43.5 |
| Fairly important | % | 42.9 | 25.0 | 32.7 | 29.0 | | 22.2 | 15.6 | 29.4 | 26.4 | | 30.7 | 25.0 | 27.6 |
| Not important | % | 0.0 | 25.0 | 26.9 | 30.4 | | 22.2 | 25.0 | 20.6 | 23.6 | | 25.6 | 22.7 | 24.0 |
| DNK | % | 14.3 | 0.0 | 5.8 | 4.4 | | 22.2 | 6.3 | 2.9 | 2.8 | | 4.8 | 5.0 | 4.9 |
| | | | | | | | | | | | | | | |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| **Can tell 1-2 numbers for own BP readings** | | | | | | | | | | | | | | |
| Any number given | % | 0.0 | 40.0 | 36.5 | 30.4 | | 66.7 | 71.9 | 54.4 | 33.0 | | 32.0 | 50.6 | 42.1 |
| | | | | | | | | | | | | | | |
| **Can tell 1-2 numbers for upper BP limit** | | | | | | | | | | | | | | |
| Any number given | % | 14.3 | 45.0 | 32.7 | 23.2 | | 55.6 | 46.9 | 41.2 | 24.5 | | 30.1 | 37.0 | 33.9 |
| | | | | | | | | | | | | | | |
| **Perceived risk of disease due to BP** | | | | | | | | | | | | | | |
| Low | % | 14.3 | 10.0 | 13.5 | 17.4 | | 11.1 | 21.9 | 14.7 | 7.6 | | 14.3 | 13.1 | 13.6 |
| Medium | % | 0.0 | 60.0 | 23.1 | 18.8 | | 22.2 | 40.6 | 32.4 | 33.0 | | 26.9 | 33.5 | 30.5 |
| High | % | 42.9 | 10.0 | 9.6 | 17.4 | | 44.4 | 34.4 | 30.9 | 20.8 | | 15.3 | 28.7 | 22.6 |
| Cannot figure out | % | 42.9 | 20.0 | 53.9 | 46.4 | | 22.2 | 3.1 | 22.1 | 38.7 | | 43.6 | 24.7 | 33.3 |
| | | | | | | | | | | | | | | |
| **Can a person feel when BP is high** | | | | | | | | | | | | | | |
| Rarely | % | 0.0 | 30.0 | 53.9 | 44.9 | | 44.4 | 31.3 | 41.2 | 44.3 | | 41.5 | 40.7 | 41.0 |
| Often | % | 85.7 | 50.0 | 30.8 | 46.4 | | 44.4 | 43.8 | 42.7 | 48.1 | | 44.8 | 45.1 | 44.9 |
| Almost always | % | 14.3 | 20.0 | 13.5 | 8.7 | | 11.1 | 25.0 | 16.2 | 5.7 | | 13.1 | 13.5 | 13.3 |
| DNK | % | 0.0 | 0.0 | 1.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 1.9 | | 0.7 | 0.7 | 0.7 |
| | | | | | | | | | | | | | | |
| **What is the usual duration for BP treatment** | | | | | | | | | | | | | | |
| 2-3 days | % | 14.3 | 0.0 | 1.9 | 1.5 | | 0.0 | 0.0 | 1.5 | 0.9 | | 2.4 | 0.9 | 1.6 |
| 2-3 weeks | % | 0.0 | 0.0 | 7.7 | 10.1 | | 33.3 | 12.5 | 1.5 | 0.0 | | 6.5 | 5.5 | 5.9 |
| 2-3 months | % | 14.3 | 25.0 | 9.6 | 5.8 | | 11.1 | 9.4 | 10.3 | 6.6 | | 11.6 | 8.8 | 10.1 |
| Several years | % | 57.1 | 55.0 | 51.9 | 47.8 | | 33.3 | 56.3 | 66.2 | 76.4 | | 51.5 | 65.7 | 59.2 |
| DNK | % | 14.3 | 20.0 | 28.9 | 34.8 | | 22.2 | 21.9 | 20.6 | 16.0 | | 28.1 | 19.2 | 23.3 |
| | | | | | | | | | | | | | | |
| **Diabetes** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Glucose metabolism** | | | | | | | | | | | | | | |
| Glucose | mean | 5.2 | 6.1 | 6.4 | 6.8 | | 5.1 | 5.5 | 6.0 | 7.0 | | 6.0 | 5.7 | 5.9 |
| Insulin | mean | 10.6 | 14.6 | 15.8 | 14.1 | | 16.1 | 15.7 | 15.2 | 18.1 | | 13.5 | 16.1 | 14.8 |
| Diabetes (FBG≥7.0 or Rx) | % | 0.8 | 9.7 | 12.7 | 22.0 | | 2.0 | 4.6 | 11.6 | 26.5 | | 9.6 | 9.1 | 9.4 |
| Diabetes (FBG≥7, 2hG≥11.1, or Rx) | % | 0.8 | 9.7 | 14.6 | 27.3 | | 3.4 | 6.3 | 14.9 | 34.3 | | 11.0 | 12.1 | 11.5 |
| FBG <7.0 and treatment | % | 0.0 | 0.0 | 1.3 | 1.3 | | 0.7 | 0.0 | 2.2 | 2.8 | | 0.5 | 1.2 | 0.9 |
| | | | | | | | | | | | | | | |
| Imapaired fasting glucose (IFG) | | 16.0 | 35.1 | 42.4 | 32.9 | | 5.4 | 13.6 | 26.5 | 37.0 | | 30.4 | 18.0 | 24.2 |
| IFG & Normal Glucose Tolerance | | 12.8 | 23.9 | 21.5 | 10.7 | | 2.7 | 2.3 | 8.8 | 12.7 | | 17.6 | 5.7 | 11.6 |
| IFG & Imapaired glucose tolerance | | 3.2 | 10.5 | 18.4 | 17.5 | | 2.0 | 9.7 | 14.4 | 17.1 | | 11.2 | 9.6 | 10.4 |
| IFG & diabetes (2hG>11.1) | | 0.0 | 0.8 | 2.5 | 4.7 | | 0.7 | 1.7 | 3.3 | 7.2 | | 1.6 | 2.7 | 2.1 |
| | | | | | | | | | | | | | | |
| **History of diabetes in family** | | | | | | | | | | | | | | |
| Parents, siblings | | 20.6 | 29.1 | 29.2 | 32.0 | | 35.4 | 30.3 | 37.0 | 30.2 | | 26.9 | 33.5 | 30.2 |
| Other family | | 9.5 | 9.7 | 11.0 | 4.8 | | 15.7 | 15.4 | 9.9 | 11.2 | | 9.1 | 13.5 | 11.3 |
| No | | 69.8 | 61.2 | 59.7 | 63.3 | | 49.0 | 54.3 | 53.0 | 58.7 | | 64.0 | 53.1 | 58.5 |
| | | | | | | | | | | | | | | |
| **Indian descent in family** | | | | | | | | | | | | | | |
| Parents, grandparents | | 8.7 | 10.5 | 13.6 | 12.2 | | 11.6 | 10.9 | 13.3 | 9.0 | | 10.9 | 11.3 | 11.1 |
| Beyond grandparents | | 14.3 | 6.7 | 6.5 | 6.8 | | 11.6 | 9.7 | 12.2 | 10.7 | | 9.1 | 11.0 | 10.1 |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| No | | 77.0 | 82.8 | 79.9 | 81.0 | | 76.9 | 79.4 | 74.6 | 80.3 | | 80.0 | 77.6 | 78.8 |
| | | | | | | | | | | | | | | |
| ***Awareness among persons with diabetes (FBG≥7 or Rx) & age ≥35 yrs*** | | | | | | | | | | | | | | |
| Aware | % | | 30.8 | 45.0 | 60.6 | | | 50.0 | 61.9 | 64.6 | | 47.1 | 61.5 | 53.9 |
| Treated | % | | 30.8 | 40.0 | 60.6 | | | 50.0 | 61.9 | 64.6 | | 45.5 | 61.5 | 53.1 |
| | | | | | | | | | | | | | | |
| ***Control among persons treated for diabetes and aged ≥35*** | | | | | | | | | | | | | | |
| Received advise on diet | % | | 100 | 62.5 | 60.0 | | | 75.0 | 61.5 | 71.4 | | 68.5 | 68.5 | 68.5 |
| Received advise on weight control | % | | 75.0 | 62.5 | 60.0 | | | 100 | 61.5 | 62.1 | | 63.6 | 66.7 | 65.3 |
| Received advise on physical exercise | % | | 50.0 | 62.5 | 45.0 | | | 100 | 69.2 | 58.6 | | 50.8 | 67.4 | 59.8 |
| Received advise on smoking | % | | 50.0 | 75.0 | 50.0 | | | 75.0 | 61.5 | 58.6 | | 56.9 | 61.7 | 59.5 |
| | | | | | | | | | | | | | | |
| HbA1c | | | 9.0 | 9.2 | 9.0 | | | 10.9 | 8.2 | 9..82 | | 9.0 | 9.4 | 9.2 |
| FBG <8 mmol/l | % | | 15.4 | 30.0 | 18.2 | | | 37.5 | 38.1 | 33.3 | | 21.1 | 35.5 | 27.9 |
| FBG >10 mmol/l | % | | 61.5 | 70.0 | 57.6 | | | 50.0 | 33.3 | 47.9 | | 62.6 | 43.6 | 53.6 |
| BP <140/90 mmHg | % | | 53.9 | 35.0 | 15.2 | | | 37.5 | 47.6 | 41.7 | | 32.6 | 43.0 | 37.5 |
| Chol <5.2mmol/l | % | | 23.1 | 45.0 | 27.3 | | | 25.0 | 28.6 | 27.1 | | 31.6 | 27.3 | 29.5 |
| | | | | | | | | | | | | | | |
| **Blood lipids** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Total cholesterol (mmol/l)** | mean | 5.1 | 5.7 | 5.5 | 5.6 | | 5.0 | 5.2 | 5.6 | 6.2 | | 5.4 | 5.4 | 5.4 |
| <5.2 mmol/l | % | 57.7 | 44.0 | 42.4 | 44.4 | | 63.8 | 51.7 | 38.3 | 29.6 | | 48.0 | 48.7 | 48.4 |
| ≥5.2 mmol/l | % | 42.3 | 56.0 | 57.6 | 55.6 | | 36.2 | 48.3 | 61.7 | 70.4 | | 52.0 | 51.3 | 51.6 |
| ≥6.2 mmol/l | % | 17.1 | 26.9 | 26.6 | 24.3 | | 13.4 | 12.5 | 31.1 | 49.7 | | 23.3 | 23.4 | 23.3 |
| ≥6.5 mmol/l | % | 8.9 | 21.6 | 20.9 | 18.1 | | 11.4 | 9.7 | 21.1 | 41.3 | | 16.9 | 18.2 | 17.5 |
| ≥8 mmol/l | % | 0.8 | 5.2 | 1.3 | 4.9 | | 0.7 | 1.1 | 4.4 | 10.6 | | 2.8 | 3.3 | 3.1 |
| | | | | | | | | | | | | | | |
| **HDL-cholesterol (mmol/l)** | mean | 1.4 | 1.3 | 1.4 | 1.5 | | 1.3 | 1.4 | 1.4 | 1.4 | | 1.4 | 1.4 | 1.4 |
| ≤1.0 mmol/l | % | 21.1 | 31.3 | 28.5 | 21.5 | | 15.4 | 12.5 | 21.1 | 21.8 | | 25.8 | 17.0 | 21.4 |
| ≤1.2 mmol/l | % | 41.5 | 50.0 | 48.1 | 38.2 | | 41.6 | 34.7 | 32.8 | 40.8 | | 44.9 | 37.5 | 41.2 |
| ≥1.5 mmol/l | % | 31.7 | 26.9 | 28.5 | 41.0 | | 26.9 | 35.2 | 37.8 | 31.8 | | 31.1 | 32.6 | 31.9 |
| | | | | | | | | | | | | | | |
| **LDL-cholesterol(mmol/l)** | mean | 3.3 | 3.8 | 3.6 | 3.6 | | 3.3 | 3.4 | 3.7 | 4.3 | | 3.5 | 3.6 | 3.6 |
| <2.5 mmol/l | % | 22.1 | 16.5 | 14.1 | 20.6 | | 20.8 | 15.4 | 12.3 | 8.4 | | 18.4 | 15.3 | 16.8 |
| 2.5-3.9 mmol/l | % | 55.7 | 45.1 | 49.4 | 47.5 | | 57.1 | 58.3 | 51.4 | 36.0 | | 49.9 | 52.6 | 51.2 |
| 4.0-5.9 mmol/l | % | 19.7 | 33.1 | 35.3 | 27.7 | | 19.5 | 24.6 | 30.7 | 44.4 | | 28.5 | 27.7 | 28.1 |
| ≥6 mmol/l | % | 2.5 | 5.3 | 1.3 | 4.3 | | 2.7 | 1.7 | 5.6 | 11.2 | | 3.3 | 4.5 | 3.9 |
| | | | | | | | | | | | | | | |
| **Ratio total/HDL cholesterol** | mean | 4.1 | 5.0 | 4.8 | 4.6 | | 4.0 | 4.1 | 4.5 | 5.1 | | 4.7 | 4.4 | 4.5 |
| TC/HDL ≥5 | % | 26.8 | 40.3 | 37.3 | 28.5 | | 19.5 | 19.3 | 27.8 | 42.5 | | 33.4 | 25.2 | 29.3 |
| | | | | | | | | | | | | | | |
| **Triglycerides** | mean | 1.1 | 1.1 | 1.1 | 1.3 | | 1.0 | 1.1 | 1.0 | 1.0 | | 1.1 | 1.0 | 1.1 |
| ≥1.7 mmol/l | % | 6.5 | 25.4 | 21.5 | 19.4 | | 4.0 | 5.1 | 10.6 | 16.8 | | 17.6 | 8.0 | 12.7 |
| | | | | | | | | | | | | | | |
| **Apolipoproteins** | | | | | | | | | | | | | | |
| ApoA | mean | 1.5 | 1.5 | 1.6 | 1.7 | | 1.5 | 1.5 | 1.6 | 1.6 | | 1.5 | 1.5 | 1.5 |
| ApoB | mean | 1.0 | 1.1 | 1.1 | 1.1 | | 1.0 | 1.0 | 1.1 | 1.2 | | 1.1 | 1.0 | 1.1 |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| | | | | | | | | | | | | | | |
| **Awarenes, control related to cholesterol** | | | | | | | | | | | | | | |
| Heard of chlesterol | % | 84.1 | 74.6 | 76.0 | 75.2 | | 93.3 | 95.5 | 88.9 | 92.2 | | 78.1 | 92.7 | 85.4 |
| Had cholesterol checked | % | 5.6 | 14.2 | 18.4 | 24.8 | | 8.7 | 16.5 | 28.3 | 35.2 | | 14.2 | 19.9 | 17.1 |
| | | | | | | | | | | | | | | |
| ***Among persons with cholesterol ≥6.5 mol/l*** | | | | | | | | | | | | | | |
| Reported cholesterol check | % | 9.1 | 24.1 | 21.2 | 38.5 | | 5.9 | 11.8 | 44.7 | 33.8 | | 23.3 | 27.9 | 25.7 |
| Receives lipid lowering medication | % | 0 | 0 | 0 | 3.9 | | 0 | 0 | 2.6 | 1.4 | | 0.7 | 1.2 | 1.0 |
| | | | | | | | | | | | | | | |
| **Microalbuminuria** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Microalbuminuria adjusted for creatininuria on spot urine** | | | | | | | | | | | | | | |
| Negative | % | 96.8 | 91.0 | 84.8 | 74.8 | | 95.7 | 90.9 | 82.4 | 71.5 | | 88.7 | 87.0 | 87.9 |
| Microalbuminuria | % | 3.2 | 9.0 | 14.6 | 23.1 | | 4.3 | 8.5 | 17.6 | 24.0 | | 10.8 | 12.1 | 11.4 |
| Macroalbuminuria | % | 0.0 | 0.0 | 0.6 | 2.1 | | 0.0 | 0.6 | 0.0 | 4.5 | | 0.5 | 1.0 | 0.7 |
| Micro or macroalbuminuria | % | 3.2 | 9.0 | 15.2 | 25.2 | | 4.3 | 9.2 | 17.6 | 28.5 | | 11.3 | 13.0 | 12.1 |
| | | | | | | | | | | | | | | |
| **Metabolic syndrome** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| ATP criteria | % | 4.9 | 19.4 | 31.0 | 29.2 | | 10.1 | 23.9 | 36.7 | 54.8 | | 19.2 | 27.6 | 23.4 |
| WHO criteria | % | 6.5 | 25.4 | 37.3 | 41.7 | | 8.1 | 15.9 | 30.6 | 55.9 | | 25.0 | 23.5 | 24.2 |
| IDF criteria | % | 7.3 | 27.6 | 37.3 | 38.9 | | 15.4 | 29.6 | 45.6 | 68.7 | | 25.4 | 35.3 | 30.4 |
| EGIR criteria | % | 4.9 | 16.4 | 24.7 | 20.1 | | 11.4 | 14.8 | 25.0 | 30.7 | | 15.4 | 18.8 | 17.1 |
| | | | | | | | | | | | | | | |
| **Combinations of risk factors** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **3 major risk factors (BP ≥14090/Rx, smoking, cholesterol ≥5.2)** | | | | | | | | | | | | | | |
| 0 risk factor | | 34.2 | 17.9 | 12.1 | 6.9 | | 53.0 | 36.4 | 20.0 | 5.1 | | 19.9 | 32.7 | 26.3 |
| 1 risk factor | | 40.7 | 42.5 | 40.8 | 38.9 | | 43.6 | 46.0 | 43.3 | 46.1 | | 40.9 | 44.6 | 42.8 |
| 2 risk factors | | 21.1 | 34.3 | 37.6 | 43.8 | | 3.4 | 16.5 | 36.1 | 48.9 | | 32.5 | 22.3 | 27.4 |
| 3 risk factors | | 4.1 | 5.2 | 9.6 | 10.4 | | 0.0 | 1.1 | 0.6 | 0.0 | | 6.7 | 0.5 | 3.6 |
| | | | | | | | | | | | | | | |
| **6 major risk factors (BP ≥14090/Rx, smoking, cholesterol ≥5.2, HDL< 1.0/1.2, BMI≥30, diabetes)** | | | | | | | | | | | | | | |
| 0 risk factor | | 24.6 | 11.9 | 6.4 | 6.0 | | 28.2 | 18.8 | 8.3 | 1.1 | | 13.7 | 16.4 | 15.0 |
| 1 risk factor | | 39.7 | 27.6 | 26.1 | 26.0 | | 36.2 | 34.1 | 27.6 | 20.6 | | 30.8 | 31.0 | 30.9 |
| 2 risk factors | | 23.8 | 35.8 | 33.8 | 33.3 | | 26.9 | 25.0 | 33.2 | 27.2 | | 31.1 | 27.9 | 29.5 |
| 3 risk factors | | 10.3 | 16.4 | 21.7 | 24.0 | | 8.1 | 16.5 | 20.4 | 25.6 | | 17.0 | 16.3 | 16.6 |
| 4 risk factors | | 1.6 | 7.5 | 10.2 | 6.7 | | 0.7 | 3.4 | 8.3 | 21.7 | | 6.1 | 6.7 | 6.4 |
| 5 risk factors | | 0.0 | 0.8 | 1.9 | 3.3 | | 0.0 | 1.7 | 1.7 | 3.9 | | 1.2 | 1.5 | 1.4 |
| 6 risk factors | | 0.0 | 0.0 | 0.0 | 0.7 | | 0.0 | 0.6 | 0.6 | 0.0 | | 0.1 | 0.3 | 0.2 |
| | | | | | | | | | | | | | | |
| **KAP** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Perceived body weight** | | | | | | | | | | | | | | |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| ***Among persons with overweight (BMI 25-29)*** | | | | | | | | | | | | | | |
| Largely too high | % | 0 | 3.77 | 4.69 | 3.7 | | 10.42 | 13.46 | 1.54 | 4.69 | | 2.96 | 7.88 | 5.28 |
| A bit too high | % | 35 | 41.51 | 29.69 | 27.78 | | 60.42 | 48.08 | 50.77 | 37.5 | | 34.4 | 50.69 | 42.1 |
| Good | % | 62.5 | 52.83 | 65.63 | 68.52 | | 29.17 | 38.46 | 46.15 | 57.81 | | 61.38 | 41.04 | 51.77 |
| Too low | % | 2.5 | 1.89 | 0 | 0 | | 0 | 0 | 1.54 | 0 | | 1.26 | 0.39 | 0.85 |
| | | | | | | | | | | | | | | |
| ***Among persons with obesity (BMI ≥30)*** | | | | | | | | | | | | | | |
| Largely too high | % | 33.33 | 25 | 13.89 | 22.73 | | 55.88 | 46.97 | 27.78 | 32.56 | | 22.38 | 40.43 | 35.02 |
| A bit too high | % | 66.67 | 55 | 58.33 | 45.45 | | 29.41 | 43.94 | 55.56 | 43.02 | | 56.95 | 43.81 | 47.74 |
| Good | % | 0 | 20 | 27.78 | 31.82 | | 14.71 | 9.09 | 16.67 | 24.42 | | 20.67 | 15.76 | 17.23 |
| Too low | % | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 |
| | | | | | | | | | | | | | | |
| ***Measures taken to control body weight among persons who think their weight is too high*** | | | | | | | | | | | | | | |
| ***Past measures about their weight*** | | | | | | | | | | | | | | |
| Didn't take action | | 92.3 | 79.1 | 76.0 | 81.6 | | 66.7 | 58.6 | 69.0 | 77.7 | | 81.8 | 66.7 | 71.8 |
| Tried but did not lose weight | | 0.0 | 0.0 | 4.0 | 2.6 | | 2.7 | 2.0 | 6.0 | 5.3 | | 1.5 | 3.7 | 3.0 |
| Lost weight but regained it | | 7.7 | 18.6 | 20.0 | 15.8 | | 29.3 | 38.4 | 24.0 | 12.8 | | 15.9 | 28.0 | 23.9 |
| Lost weight | | 0.0 | 2.3 | 0.0 | 0.0 | | 1.3 | 1.0 | 1.0 | 4.3 | | 0.8 | 1.6 | 1.3 |
| | | | | | | | | | | | | | | |
| ***Current measures about their weight among persons who think their weight is too high*** | | | | | | | | | | | | | | |
| Don't think about it | | 34.6 | 32.6 | 38.0 | 23.7 | | 28.0 | 22.2 | 23.0 | 29.8 | | 33.1 | 25.4 | 28.0 |
| Thinking about it, no action | | 26.9 | 23.3 | 16.0 | 18.4 | | 21.3 | 10.1 | 11.0 | 6.4 | | 21.4 | 13.1 | 15.9 |
| Taking action, no weight loss | | 23.1 | 20.9 | 26.0 | 31.6 | | 25.3 | 42.4 | 37.0 | 30.9 | | 24.5 | 34.1 | 30.9 |
| Taking action, lost weight | | 15.4 | 23.3 | 20.0 | 26.3 | | 25.3 | 25.3 | 29.0 | 33.0 | | 21.0 | 27.5 | 25.3 |
| | | | | | | | | | | | | | | |
| **Health service utilization** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Medical care in last 12 months** | | | | | | | | | | | | | | |
| Visits at health center during past 12 months | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-64 | 25-64 | 25-64 |
| Not at all | | 38.9 | 42.9 | 36.7 | 29.5 | | 30.2 | 30.7 | 32.0 | 18.9 | | 37.9 | 28.9 | 33.4 |
| 1-2 times | | 38.9 | 36.1 | 38.0 | 26.2 | | 37.6 | 35.2 | 30.4 | 21.1 | | 35.8 | 32.5 | 34.1 |
| 3-5 times | | 15.1 | 15.0 | 19.0 | 30.9 | | 18.8 | 24.4 | 27.6 | 46.7 | | 18.7 | 27.1 | 22.9 |
| ≥5 times | | 7.1 | 6.0 | 6.3 | 13.4 | | 13.4 | 9.7 | 9.9 | 13.3 | | 7.7 | 11.5 | 9.6 |
| | | | | | | | | | | | | | | |
| **Visits at private doctor in last 12 months** | | | | | | | | | | | | | | |
| Not at all | | 84.1 | 78.2 | 67.1 | 67.8 | | 63.8 | 68.2 | 68.5 | 70.0 | | 75.7 | 67.2 | 71.4 |
| 1-2 times | | 11.9 | 14.3 | 23.4 | 20.8 | | 28.9 | 23.3 | 20.4 | 21.7 | | 16.8 | 24.1 | 20.4 |
| 3-5 times | | 3.2 | 6.0 | 7.6 | 7.4 | | 5.4 | 6.3 | 7.2 | 6.1 | | 5.7 | 6.2 | 5.9 |
| ≥5 times | | 0.8 | 1.5 | 1.9 | 4.0 | | 2.0 | 2.3 | 3.9 | 2.2 | | 1.8 | 2.6 | 2.2 |
| | | | | | | | | | | | | | | |
| **Visits to government or private Dr in last 2 months** | | | | | | | | | | | | | | |
| No medical visit | | 34.92 | 33.08 | 21.52 | 20.81 | | 20.13 | 23.3 | 17.68 | 15 | | 28.9 | 19.59 | 24.24 |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| Dr MOH | | 49.21 | 45.11 | 45.57 | 46.98 | | 43.62 | 44.89 | 50.83 | 55 | | 46.84 | 47.57 | 47.21 |
| Dr Private | | 3.97 | 9.77 | 15.19 | 8.72 | | 10.07 | 7.39 | 14.36 | 3.89 | | 9.01 | 9.28 | 9.15 |
| Both Dr MOH & private | | 11.9 | 12.03 | 17.72 | 23.49 | | 26.17 | 24.43 | 17.13 | 26.11 | | 15.25 | 23.56 | 19.41 |
| | | | | | | | | | | | | | | |
| **Indicators of health education related to NCD** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Awareness on ongoing programs** | | | | | | | | | | | | | | |
| Ever heard of UPCCD (before study) | | 96.8 | 95.5 | 91.1 | 88.7 | | 98.0 | 97.7 | 96.1 | 96.7 | | 93.8 | 97.3 | 95.5 |
| Heard/saw program on smoking on radio/TV in past 12 months | | 96.8 | 94.8 | 94.9 | 95.3 | | 94.6 | 96.0 | 96.7 | 97.8 | | 95.6 | 96.0 | 95.8 |
| Heard/saw program on HBP on radio/TV in past 12 months | | 85.7 | 89.6 | 93.0 | 91.3 | | 86.6 | 95.5 | 96.7 | 95.0 | | 89.5 | 92.8 | 91.1 |
| Heard/saw program on weight control on radio/TV in past 12 months | | 87.3 | 91.8 | 91.8 | 90.0 | | 88.6 | 94.3 | 94.5 | 97.8 | | 90.1 | 93.1 | 91.6 |
| Heard/saw program on diet on radio/TV in past 12 months | | 91.3 | 94.0 | 93.7 | 91.3 | | 89.9 | 96.6 | 96.7 | 97.2 | | 92.6 | 94.6 | 93.6 |
| Heard/saw program on diabetes on radio/TV in past 12 months | | 93.7 | 93.3 | 93.7 | 91.3 | | 90.6 | 97.2 | 97.2 | 97.2 | | 93.2 | 95.1 | 94.1 |
| Heard of "take 5 campaign" | | 93.7 | 88.8 | 83.5 | 67.3 | | 96.0 | 93.2 | 91.7 | 87.3 | | 85.5 | 92.7 | 89.1 |
| | | | | | | | | | | | | | | |
| **Programs on NCD on radio/TV, wish there were:** | | | | | | | | | | | | | | |
| Less | | 0.0 | 0.0 | 0.6 | 0.7 | | 0.0 | 0.0 | 0.6 | 0.6 | | 0.3 | 0.2 | 0.2 |
| Same amount | | 28.6 | 31.3 | 33.5 | 36.0 | | 24.2 | 22.2 | 21.0 | 27.1 | | 31.8 | 23.4 | 27.6 |
| More | | 69.1 | 67.2 | 62.0 | 56.7 | | 73.8 | 76.1 | 76.8 | 70.7 | | 64.8 | 74.6 | 69.7 |
| DNK | | 2.4 | 1.5 | 3.8 | 6.7 | | 2.0 | 1.7 | 1.7 | 1.7 | | 3.2 | 1.8 | 2.5 |
| | | | | | | | | | | | | | | |
| **Like to read articles on CVD, BP, diet, diabetes, etc in newspapers** | | | | | | | | | | | | | | |
| No | | 28.6 | 29.3 | 31.0 | 28.9 | | 21.5 | 18.3 | 26.5 | 20.0 | | 29.4 | 21.5 | 25.5 |
| A little | | 55.6 | 54.1 | 39.2 | 26.2 | | 61.1 | 60.6 | 48.1 | 41.1 | | 46.4 | 54.5 | 50.5 |
| Much | | 12.7 | 7.5 | 9.5 | 4.7 | | 13.4 | 18.9 | 13.8 | 10.6 | | 9.2 | 14.6 | 11.9 |
| Don't read newspapers | | 3.2 | 9.0 | 20.3 | 40.3 | | 4.0 | 2.3 | 11.6 | 28.3 | | 15.1 | 9.4 | 12.2 |
| | | | | | | | | | | | | | | |
| **Like to hear programs on CVD, BP, diet, diabetes, etc on radio** | | | | | | | | | | | | | | |
| No | | 10.3 | 8.3 | 5.7 | 6.0 | | 6.7 | 4.0 | 2.8 | 1.1 | | 8.0 | 4.1 | 6.0 |
| A little | | 59.5 | 57.6 | 53.2 | 42.3 | | 51.0 | 42.3 | 44.2 | 33.0 | | 54.6 | 44.0 | 49.3 |
| Much | | 25.4 | 31.1 | 34.8 | 49.0 | | 36.9 | 49.1 | 49.7 | 64.8 | | 33.2 | 48.0 | 40.6 |
| Don't listen to radio | | 4.8 | 3.0 | 6.3 | 2.7 | | 5.4 | 4.6 | 3.3 | 1.1 | | 4.3 | 4.0 | 4.1 |
| | | | | | | | | | | | | | | |
| **Like to watch programs on CVD, BP, diet, diabetes, etc on TV** | | | | | | | | | | | | | | |
| No | | 3.2 | 3.0 | 5.1 | 4.7 | | 2.7 | 1.1 | 1.7 | 1.7 | | 3.8 | 1.8 | 2.8 |
| A little | | 50.0 | 51.5 | 50.0 | 44.3 | | 36.9 | 37.1 | 37.0 | 25.1 | | 49.5 | 35.0 | 42.2 |
| Much | | 46.8 | 43.2 | 43.0 | 45.6 | | 58.4 | 60.6 | 59.7 | 71.5 | | 44.7 | 61.5 | 53.1 |
| Don't watch TV | | 0.0 | 2.3 | 1.9 | 5.4 | | 2.0 | 1.1 | 1.7 | 1.7 | | 2.0 | 1.6 | 1.8 |
| | | | | | | | | | | | | | | |
| **Knowledge on CVD** | | | | | | | | | | | | | | |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| Heard of heart attack | | 96.0 | 96.3 | 95.6 | 96.0 | | 96.6 | 96.6 | 97.8 | 97.2 | | 96.0 | 97.0 | 96.5 |
| Heard of stroke | | 86.5 | 88.0 | 88.6 | 97.3 | | 86.6 | 92.6 | 96.7 | 95.0 | | 89.2 | 92.0 | 90.6 |
| | | | | | | | | | | | | | | |
| **Know about someone in family who had a stroke** | | | | | | | | | | | | | | |
| No | | 71.2 | 70.7 | 68.4 | 69.1 | | 75.2 | 70.3 | 63.5 | 71.0 | | 70.0 | 70.4 | 70.2 |
| Family | | 10.4 | 10.5 | 15.2 | 13.4 | | 12.1 | 17.7 | 23.8 | 16.8 | | 12.1 | 17.2 | 14.6 |
| Friends | | 18.4 | 18.8 | 16.5 | 17.5 | | 12.8 | 12.0 | 12.7 | 12.3 | | 17.9 | 12.5 | 15.2 |
| | | | | | | | | | | | | | | |
| **Know about someone in family who had a heart attack** | | | | | | | | | | | | | | |
| No | | 70.4 | 70.7 | 68.4 | 71.1 | | 76.5 | 72.0 | 69.1 | 72.1 | | 70.1 | 72.8 | 71.4 |
| Family | | 12.0 | 9.0 | 16.5 | 12.8 | | 13.4 | 14.9 | 18.2 | 15.1 | | 12.3 | 15.2 | 13.8 |
| Friends | | 17.6 | 20.3 | 15.2 | 16.1 | | 10.1 | 13.1 | 12.7 | 12.9 | | 17.5 | 12.0 | 14.8 |
| | | | | | | | | | | | | | | |
| **Knows someone who had a stroke or heart attack in family** | | | | | | | | | | | | | | |
| None | | 80.16 | 82.09 | 74.05 | 76.67 | | 78.52 | 69.89 | 63.54 | 73.48 | | 78.69 | 71.75 | 75.22 |
| Heart attack | | 7.94 | 8.96 | 9.49 | 10.67 | | 8.05 | 15.34 | 18.23 | 11.6 | | 9.05 | 13.07 | 11.06 |
| Stroke | | 9.52 | 7.46 | 10.76 | 10 | | 9.4 | 12.5 | 12.71 | 9.94 | | 9.31 | 11.13 | 10.22 |
| Both | | 2.38 | 1.49 | 5.7 | 2.67 | | 4.03 | 2.27 | 5.52 | 4.97 | | 2.95 | 4.04 | 3.5 |
| | | | | | | | | | | | | | | |
| **Perceived risk of getting CVD/NCD** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Own risk of getting a heart attack or strok in next 10 years** | | | | | | | | | | | | | | |
| High | | 4.0 | 11.2 | 15.2 | 19.3 | | 10.1 | 16.5 | 17.7 | 18.2 | | 11.2 | 15.0 | 13.1 |
| Medium | | 17.5 | 16.4 | 24.1 | 18.7 | | 14.1 | 24.4 | 27.6 | 22.1 | | 18.9 | 21.5 | 20.2 |
| Low | | 42.1 | 26.9 | 24.7 | 15.3 | | 35.6 | 27.8 | 17.1 | 12.2 | | 29.2 | 25.2 | 27.2 |
| Cannot figure out | | 36.5 | 45.5 | 36.1 | 46.7 | | 40.3 | 31.3 | 37.6 | 47.5 | | 40.7 | 38.3 | 39.5 |
| | | | | | | | | | | | | | | |
| **Own risk of getting a heart attack or stroke in next 10 years** | | | | | | | | | | | | | | |
| <5% | | 27.0 | 11.9 | 8.2 | 3.3 | | 19.5 | 14.8 | 8.8 | 1.7 | | 14.4 | 12.7 | 13.5 |
| 5-10% | | 7.9 | 11.9 | 8.2 | 7.3 | | 8.7 | 14.8 | 8.3 | 7.2 | | 9.0 | 10.1 | 9.5 |
| 10-20% | | 4.0 | 3.7 | 5.7 | 5.3 | | 5.4 | 5.7 | 5.0 | 2.8 | | 4.5 | 4.9 | 4.7 |
| 20-40% | | 5.6 | 3.0 | 4.4 | 2.7 | | 4.0 | 5.1 | 6.6 | 1.7 | | 4.1 | 4.5 | 4.3 |
| ≥40% | | 5.6 | 10.5 | 8.9 | 4.7 | | 6.7 | 8.5 | 5.5 | 7.2 | | 7.5 | 7.0 | 7.3 |
| Cannot figure out | | 50.0 | 59.0 | 64.6 | 76.7 | | 55.7 | 51.1 | 65.8 | 79.6 | | 60.4 | 60.8 | 60.6 |
| | | | | | | | | | | | | | | |
| **Own risk of getting cancer in next 10 years** | | | | | | | | | | | | | | |
| <5% | | 21.4 | 17.9 | 17.7 | 9.3 | | 16.1 | 19.3 | 12.7 | 7.2 | | 17.5 | 14.7 | 16.1 |
| 5-10% | | 7.9 | 6.0 | 1.9 | 4.7 | | 8.7 | 5.1 | 7.2 | 2.2 | | 5.4 | 6.3 | 5.8 |
| 10-20% | | 2.4 | 1.5 | 1.3 | 2.7 | | 2.7 | 5.1 | 2.8 | 0.6 | | 1.9 | 3.0 | 2.5 |
| 20-40% | | 6.4 | 1.5 | 3.8 | 0.0 | | 5.4 | 4.6 | 3.3 | 1.1 | | 3.3 | 3.9 | 3.6 |
| ≥40% | | 8.7 | 6.7 | 3.8 | 3.3 | | 5.4 | 4.6 | 5.0 | 8.8 | | 6.1 | 5.6 | 5.9 |
| Cannot figure out | | 53.2 | 66.4 | 71.5 | 80.0 | | 61.7 | 61.4 | 69.1 | 80.1 | | 65.7 | 66.4 | 66.1 |
| | | | | | | | | | | | | | | |

| SHS 2004 | | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| **Perceived efficacy of lifestyles on NCD prevention** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Think your lifestyle can impact on your future health** | | | | | | | | | | | | | | |
| Much | | 30.2 | 25.4 | 28.5 | 12.7 | | 33.6 | 31.3 | 26.0 | 23.2 | | 25.5 | 29.4 | 27.4 |
| Some | | 44.4 | 49.3 | 43.0 | 53.3 | | 41.6 | 47.2 | 45.9 | 53.0 | | 47.0 | 46.1 | 46.5 |
| A little | | 4.8 | 6.0 | 8.9 | 12.7 | | 11.4 | 5.7 | 8.8 | 6.1 | | 7.4 | 8.3 | 7.9 |
| None | | 18.3 | 14.9 | 15.8 | 16.7 | | 12.1 | 13.1 | 17.1 | 11.6 | | 16.5 | 13.5 | 15.0 |
| DNK | | 2.4 | 4.5 | 3.8 | 4.7 | | 1.3 | 2.8 | 2.2 | 6.1 | | 3.7 | 2.8 | 3.2 |
| | | | | | | | | | | | | | | |
| **What best fits your attitude toward diet and physical activity during past 6 months** | | | | | | | | | | | | | | |
| I don't think of it | | 34.4 | 28.6 | 44.3 | 45.0 | | 26.9 | 24.6 | 23.9 | 22.4 | | 36.9 | 24.8 | 30.8 |
| I think of changes | | 11.2 | 21.8 | 9.5 | 8.1 | | 18.1 | 14.3 | 15.0 | 11.7 | | 13.2 | 15.3 | 14.2 |
| I took action for some time | | 2.4 | 2.3 | 3.2 | 4.0 | | 5.4 | 8.6 | 5.0 | 2.2 | | 2.8 | 5.7 | 4.2 |
| I take continued action | | 52.0 | 47.4 | 43.0 | 43.0 | | 49.7 | 52.6 | 56.1 | 63.7 | | 47.1 | 54.3 | 50.7 |
| | | | | | | | | | | | | | | |
| **Do you think you should do more on diet or physical exercise** | | | | | | | | | | | | | | |
| I do enough | | 27.0 | 18.7 | 22.2 | 23.3 | | 8.1 | 13.1 | 18.8 | 15.5 | | 22.9 | 13.2 | 18.1 |
| I should do a bit more | | 27.8 | 34.3 | 34.8 | 38.0 | | 37.6 | 30.7 | 35.4 | 41.4 | | 33.0 | 35.8 | 34.4 |
| I should do a lot more | | 42.1 | 44.8 | 39.9 | 31.3 | | 54.4 | 55.7 | 44.2 | 40.3 | | 40.5 | 50.0 | 45.2 |
| DNK | | 3.2 | 2.2 | 3.2 | 7.3 | | 0.0 | 0.6 | 1.7 | 2.8 | | 3.6 | 1.0 | 2.3 |
| | | | | | | | | | | | | | | |
| **Opinion on tobacco control** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Smoking should be banned in enclosed restaurants, bars, discos** | | | | | | | | | | | | | | |
| Yes | | 91.3 | 94.7 | 94.3 | 96.0 | | 96.0 | 98.9 | 98.3 | 98.9 | | 93.7 | 97.8 | 95.8 |
| No | | 5.6 | 3.8 | 3.8 | 2.0 | | 2.0 | 0.6 | 1.1 | 1.1 | | 4.1 | 1.3 | 2.7 |
| DNK | | 3.2 | 1.5 | 1.9 | 2.0 | | 2.0 | 0.6 | 0.6 | 0.0 | | 2.2 | 0.9 | 1.6 |
| | | | | | | | | | | | | | | |
| **Smoking should be banned in enclosed workplaces** | | | | | | | | | | | | | | |
| Yes | | 95.2 | 94.7 | 96.2 | 95.3 | | 98.0 | 100.0 | 98.3 | 99.4 | | 95.3 | 98.9 | 97.1 |
| No | | 2.4 | 3.0 | 1.9 | 2.0 | | 0.0 | 0.0 | 1.1 | 0.6 | | 2.4 | 0.4 | 1.4 |
| DNK | | 2.4 | 2.3 | 1.9 | 2.7 | | 2.0 | 0.0 | 0.6 | 0.0 | | 2.3 | 0.8 | 1.5 |

## APPENDIX VI: Selected tabulated results, Seychelles Heart Study 1989

Standard errors for all estimates can be obtained upon request.

| SHS 1989 | Unit | Men | | | | Women | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25-34 | 35-44 | 45-54 | 55-64 | 25-34 | 35-44 | 45-54 | 55-64 | M | W | All |
| | | | | | | | | | | | | |
| **Tobacco habits** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Never smoker | % | 39.1 | 33.9 | 14.5 | 11.8 | 87.8 | 79.0 | 72.4 | 73.9 | 27.3 | 79.4 | 53.3 |
| Ex smoker | % | 8.6 | 20.5 | 20.0 | 27.9 | 4.9 | 9.8 | 13.1 | 11.5 | 17.9 | 9.3 | 13.6 |
| Occasional | % | 4.8 | 3.2 | 2.1 | 2.9 | 0.8 | 0.7 | 0.7 | 1.3 | 3.4 | 0.8 | 2.1 |
| Daily | % | 47.6 | 42.5 | 63.5 | 57.4 | 6.5 | 10.5 | 13.8 | 13.4 | 51.5 | 10.5 | 31.0 |
| | | | | | | | | | | | | |
| **Body mass index (kg/m2)** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| BMI | mean | 22.9 | 23.9 | 23.2 | 23.3 | 23.2 | 26.9 | 27.1 | 27.6 | 23.3 | 25.9 | 24.6 |
| BMI <18.5 | % | 3.8 | 3.9 | 6.9 | 11.0 | 12.2 | 2.1 | 2.1 | 3.2 | 5.8 | 5.5 | 5.6 |
| BMI 18.5-24 | % | 75.2 | 59.1 | 64.1 | 64.7 | 57.7 | 40.6 | 39.3 | 26.8 | 66.3 | 43.4 | 54.9 |
| BMI 25-29 | % | 17.1 | 32.3 | 26.2 | 17.7 | 21.1 | 28.7 | 31.7 | 36.9 | 23.6 | 28.4 | 26.0 |
| BMI 30-39 | % | 3.8 | 4.7 | 2.1 | 5.9 | 8.1 | 27.3 | 23.5 | 31.2 | 4.0 | 21.0 | 12.5 |
| BMI ≥40 | % | 0.0 | 0.0 | 0.7 | 0.7 | 0.8 | 1.4 | 3.5 | 1.9 | 0.3 | 1.8 | 1.0 |
| BMI ≥25 | % | 21.0 | 37.0 | 29.0 | 24.3 | 30.1 | 57.3 | 58.6 | 70.6 | 27.9 | 51.2 | 39.5 |
| BMI ≥30 | % | 3.8 | 4.7 | 2.8 | 6.6 | 8.9 | 28.7 | 26.9 | 33.1 | 4.3 | 22.8 | 13.5 |
| | | | | | | | | | | | | |
| **Blood pressure** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Systolic BP (mmHg) | mean | 124.3 | 131.6 | 137.8 | 143.2 | 113.6 | 124.9 | 136.0 | 144.8 | 132.7 | 127.3 | 130.0 |
| Diastolic BP (mmHg) | mean | 82.8 | 87.3 | 90.6 | 89.9 | 73.7 | 83.1 | 88.0 | 90.3 | 87.1 | 82.5 | 84.8 |
| BP ≥140/90 | % | 25.7 | 44.9 | 54.5 | 65.4 | 8.1 | 33.6 | 43.5 | 63.1 | 44.5 | 32.8 | 38.7 |
| BP ≥140/90 or Rx | % | 25.7 | 45.7 | 55.2 | 67.7 | 8.1 | 34.3 | 47.6 | 66.2 | 45.3 | 34.5 | 39.9 |
| BP ≥160/100 | % | 12.4 | 18.1 | 24.1 | 27.9 | 1.6 | 7.0 | 21.4 | 28.7 | 19.4 | 12.3 | 15.8 |
| | | | | | | | | | | | | |
| ***Among persons with hypertension (BP≥140/90 or Rx)*** | | | | | | | | | | | | |
| Aware | % | 33.3 | 32.8 | 36.3 | 39.1 | 40.0 | 42.9 | 53.6 | 51.9 | 35.5 | 49.1 | 41.3 |
| Treated | % | 3.7 | 20.7 | 13.8 | 18.5 | 20.0 | 22.5 | 37.7 | 33.7 | 15.1 | 30.8 | 21.9 |
| BP <140/90 | % | 0.0 | 1.7 | 1.3 | 3.3 | 0.0 | 2.0 | 8.7 | 4.8 | 1.7 | 4.9 | 3.1 |
| | | | | | | | | | | | | |
| **Diabetes** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Fasting blood glucose (mmol/l) | mean | 4.7 | 5.4 | 5.4 | 5.6 | 4.7 | 5.0 | 5.5 | 6.4 | 5.2 | 5.2 | 5.2 |
| Fasting insulin (mU/ml) | mean | 8.5 | 10.0 | 6.9 | 8.5 | 9.6 | 10.8 | 10.3 | 11.6 | 8.6 | 10.4 | 9.5 |
| Diabetes (FBG≥7 or Rx) | % | 0.0 | 6.3 | 11.0 | 11.0 | 0.8 | 3.5 | 9.0 | 16.6 | 6.2 | 6.1 | 6.2 |
| | | | | | | | | | | | | |
| ***Among persons with diabetes (FBG ≥7 or Rx) & aged ≥35 yrs*** | | | | | | | | | | | | |
| Aware | % | | 12.5 | 43.8 | 46.7 | | 60.0 | 38.5 | 46.2 | 35.7 | 45.7 | 40.6 |
| Treated | % | | 0.0 | 31.3 | 33.3 | | 20.0 | 30.8 | 42.3 | 23.0 | 34.5 | 28.6 |
| IFG | | 14.3 | 17.3 | 17.9 | 25.0 | 7.3 | 16.1 | 17.9 | 29.3 | 17.8 | 16.0 | 16.9 |
| | | | | | | | | | | | | |

| SHS 1989 | Unit | Men | | | | Women | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25-34 | 35-44 | 45-54 | 55-64 | 25-34 | 35-44 | 45-54 | 55-64 | M | W | All |
| ***Among persons under treatment for diabetes & aged ≥35 yrs*** | | | | | | | | | | | | |
| BP <140/90 mmHg | % | | 25.0 | 12.5 | 26.7 | | 40.0 | 38.5 | 11.5 | 20.3 | 25.9 | 23.0 |
| BG <8 mol/l | % | | 25.0 | 31.3 | 26.7 | | 20.0 | 30.8 | 26.9 | 28.1 | 27.1 | 27.6 |
| BG >10 mmol/l | % | | 25.0 | 31.3 | 33.3 | | 40.0 | 38.5 | 57.7 | 30.1 | 47.9 | 38.8 |
| Chol <52 mmol/l | % | | 62.5 | 50.0 | 33.3 | | 60.0 | 30.8 | 15.4 | 48.6 | 28.3 | 38.7 |
| | | | | | | | | | | | | |
| **Blood lipids** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Total cholesterol** | mean | 4.9 | 5.3 | 5.0 | 5.1 | 4.9 | 5.2 | 5.7 | 5.8 | 5.1 | 5.3 | 5.2 |
| ≥5.2mmol/l | % | 35.9 | 43.9 | 41.3 | 39.2 | 36.7 | 41.9 | 64.8 | 70.2 | 40.0 | 50.4 | 45.2 |
| ≥6.2 mmol/l | % | 6.8 | 14.6 | 10.5 | 11.5 | 13.3 | 17.7 | 30.3 | 34.4 | 10.6 | 22.1 | 16.3 |
| ≥6.5 mmol/l | % | 5.8 | 13.8 | 9.8 | 9.2 | 10.0 | 14.0 | 21.8 | 27.8 | 9.6 | 16.9 | 13.2 |
| ≥8 mmol/l | % | 0.0 | 2.4 | 1.4 | 1.5 | 0.0 | 2.2 | 2.8 | 5.3 | 1.3 | 2.2 | 1.7 |
| | | | | | | | | | | | | |
| **LDL-cholesterol** | mean | 3.0 | 3.3 | 3.1 | 3.2 | 3.3 | 3.4 | 3.8 | 4.0 | 3.2 | 3.6 | 3.4 |
| Optimal (<2.5 mmol/l) | % | 26.0 | 29.2 | 32.6 | 24.2 | 24.4 | 21.5 | 11.3 | 10.7 | 28.1 | 18.2 | 23.1 |
| Borderline (2.5-3.9mmol/l) | % | 63.0 | 45.0 | 45.7 | 53.9 | 52.1 | 50.4 | 46.5 | 42.3 | 52.4 | 48.6 | 50.5 |
| High (4.0-5.9 mmol/l) | % | 11.0 | 22.5 | 20.3 | 20.3 | 22.7 | 26.7 | 38.7 | 42.3 | 18.0 | 30.9 | 24.5 |
| Very high (≥6.0 mmol/l) | % | 0.0 | 3.3 | 1.5 | 1.6 | 0.8 | 1.5 | 3.5 | 4.7 | 1.5 | 2.3 | 1.9 |
| | | | | | | | | | | | | |
| **Ratio TC/HDL** | mean | 3.8 | 4.2 | 3.9 | 3.9 | 3.9 | 3.9 | 4.3 | 4.6 | 3.9 | 4.2 | 4.1 |
| TC/HDL ≥5 | % | 15.5 | 30.1 | 19.6 | 18.5 | 16.7 | 16.9 | 22.5 | 34.4 | 21.0 | 21.1 | 21.1 |
| | | | | | | | | | | | | |
| **HDL cholesterol** | mean | 1.4 | 1.4 | 1.5 | 1.4 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| ≤1.0 mmol/l | % | 14.4 | 17.9 | 21.0 | 16.2 | 13.3 | 11.8 | 16.2 | 15.2 | 17.2 | 13.9 | 15.6 |
| ≤1.2 mmol/l | % | 37.5 | 40.7 | 35.7 | 30.8 | 36.7 | 26.5 | 26.8 | 35.1 | 36.8 | 31.3 | 34.1 |
| ≥1.5 mmol/l | % | 28.9 | 30.9 | 42.7 | 36.2 | 21.7 | 33.8 | 35.2 | 28.5 | 33.9 | 29.4 | 31.6 |
| | | | | | | | | | | | | |
| **Triglycerides** | mean | 1.1 | 1.2 | 1.2 | 1.0 | 0.8 | 0.9 | 0.9 | 1.1 | 1.1 | 0.9 | 1.0 |
| ≥1.7 mmol/l | % | 10.6 | 17.1 | 12.7 | 8.5 | 0.8 | 5.9 | 6.3 | 13.3 | 12.6 | 5.6 | 9.1 |
| | | | | | | | | | | | | |
| **Apolipoproteins** | | | | | | | | | | | | |
| ApoA | mean | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 1.3 | 1.4 |
| ApoB | mean | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 | 1.1 | 1.2 | 1.2 | 1.0 | 1.1 | 1.1 |
| | | | | | | | | | | | | |
| **Combination of risk factors** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **3 major risk factors (BP ≥14090/Rx, smoking, cholesterol ≥5.2)** | | | | | | | | | | | | |
| 0 risk factor | | 30.1 | 13.0 | 8.4 | 3.9 | 55.0 | 39.0 | 16.2 | 10.6 | 15.9 | 33.9 | 24.9 |
| 1 risk factor | | 40.8 | 48.0 | 33.6 | 41.5 | 39.2 | 39.0 | 43.7 | 32.5 | 41.2 | 39.0 | 40.1 |
| 2 risk factors | | 19.4 | 32.5 | 49.0 | 41.5 | 5.0 | 19.9 | 37.3 | 54.3 | 33.7 | 25.0 | 29.4 |
| 3 risk factors | | 9.7 | 6.5 | 9.1 | 13.1 | 0.8 | 2.2 | 2.8 | 2.7 | 9.2 | 2.0 | 5.6 |
| | | | | | | | | | | | | |
| **6major Risk factors (BP ≥14090/Rx, smoking, cholesterol ≥5.2, HDL< 1.0/1.2, BMI≥30, diabetes)** | | | | | | | | | | | | |
| 0 risk factor | | 23.8 | 9.5 | 7.6 | 3.7 | 28.5 | 28.0 | 10.3 | 3.2 | 12.6 | 19.8 | 16.2 |
| 1 risk factor | | 38.1 | 39.4 | 26.2 | 27.2 | 51.2 | 26.6 | 25.5 | 20.4 | 33.8 | 33.1 | 33.5 |

| SHS 1989 | Unit | Men | | | | | Women | | | | | 25-64 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | M | W | All |
| 2 risk factors | | 25.7 | 35.4 | 40.7 | 41.2 | | 14.6 | 22.4 | 37.2 | 32.5 | | 34.6 | 25.1 | 29.8 |
| 3 risk factors | | 12.4 | 13.4 | 20.0 | 21.3 | | 4.9 | 17.5 | 20.0 | 28.7 | | 16.0 | 16.0 | 16.0 |
| 4 risk factors | | 0.0 | 1.6 | 2.8 | 6.6 | | 0.8 | 4.9 | 5.5 | 13.4 | | 2.2 | 5.2 | 3.7 |
| 5 risk factors | | 0.0 | 0.8 | 2.8 | 0.0 | | 0.0 | 0.7 | 1.4 | 1.9 | | 0.9 | 0.8 | 0.9 |
| 6 risk factors | | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | 0.0 | 0.0 |

## APPENDIX VII: Costs and funding

- The funding of the survey was largely collaborative.
- The support by the Ministry of Health is invaluable in terms of highly qualified staff, infrastructures and supply of equipment.
- In addition to its major public health value, the scientific value of the survey and a record of successful previous surveys in Seychelles, including high standard reports, have facilitated the collaboration with various University and large institutions (blood analyses, human resources).
- Most of the major institutions associated with this survey had already provided substantial support in previous surveys in 1989 and 2004.
- For same reasons, we were able to obtain large discount rates on materials from companies that supplied equipment and reagents.
- The survey also benefited from a large support by the World Health Organization, in particular through dynamic facilitation of its office and liaison officer in Seychelles.

| Item | Discount | Provider | N needed | Unit cost | Currency | Funding | Cost | Cost in US$ | *Sub-totals* |
|---|---|---|---|---|---|---|---|---|---|
| **Regular staff** | | | | | | | | | |
| Salary 3 senior nurses * 8 months | | | | | | MOH | | | |
| Salary 1 secretary* 8 months | | | | | | MOH | | | |
| Salary 1 cleaner * 8 months | | | | | | MOH | | | |
| Salary 1 consultant, PI 18 months, conduct study & analysis | | | | | | IUMSP | | | |
| | | | | | | | | | |
| **Additional staff** | | | | | | | | | |
| Visiting cardiologist, ultrasound * 5 months | | | | | CHF | IUMSP | 45,000 | 36,885 | |
| Visiting cardiologist, travel | | | | | CHF | IUMSP | 1,500 | 1,230 | *38,115* |
| | | | | | | | | | |
| **Infrastructures, central budget (approximation)** | | | | | | | | | |
| Premices (water, electricity) | | | | | SR | MOH | 3,000 | 600 | |
| Telephone (perhaps 3000 calls) | | | | | SR | MOH | 12,000 | 2,400 | |
| Paper | | | | | SR | MOH | 1,000 | 200 | |
| Postage for sending 2000 letters | | | | | SR | MOH | 2,000 | 400 | *3,600* |
| | | | | | | | | | |
| **New equipment** | | | | | | | | | |
| Freezer | | | available | | | | | | |
| Centrifuger | | | available | | | | | | |
| Notebooks (2), data entry | | | available | | | | | | |
| Desktops (2) | | | available | | | | | | |
| Fridge | | | 1 | | | MOH | 3,000 | 600 | |
| Ultrasound Logiqbook (used for study then goes to MOH radiology unit) | 35% | GE | 1 | 39,516 | CHF | MOH | 39,516 | 32,390 | |
| Cholestec analyzer LDX | 50% | Diagnostica | 1 | 1,450 | CHF | WHO | 1,450 | 1,189 | |
| Clinitek Status analyzer | 45% | Bayer | 1 | 650 | CHF | WHO | 650 | 533 | |
| DCA 2000 analyzer | | | 1 | 1,500 | CHF | WHO | 1,500 | 1,230 | |
| Glucometers Ascentia Elite | 100% | CHUV | 3 | 0 | CHF | IUMSP | 0 | | |
| Glucolet 2 autopiqueur | | CHUV | 3 | 0 | | IUMSP | 0 | | |
| Metris IMT software | 100% | | | 5000 | US$ | IUMSP | 0 | | |
| Software online data entry questionnaire | | UnitedPro, India | 1 | | CHF | IUMSP | 5,000 | 4,098 | |
| Cholestec analyzer LDX | Rental | Diagnostica | 1 | 1,000 | CHF | IUMSP | 1,000 | 820 | *40,859* |

| Item | Discount | Provider | N needed | Unit cost | Currency | Funding | Cost | Cost in US$ | *Sub-totals* |
|---|---|---|---|---|---|---|---|---|---|
| **Consumables, laboratory** | | | | | | | | | |
| Cotton wool, needles packs, gloves, razors, eplast, paper rolls | | MOH | | | SR | MOH | 3,766 | 3,087 | |
| Butterfly Luer 21 Abbott; 1/part | CHUV | CHUV | 1400 | 0.32 | CHF | IUMSP | 448 | 367 | |
| Multi adpater; 1/part | CHUV | CHUV | 1400 | 0.23 | CHF | IUMSP | 316 | 259 | |
| Monovette serum Sarstedt 9 ml; 2/part | CHUV | CHUV | 3000 | 0.32 | CHF | IUMSP | 966 | 792 | |
| Monovette EDTA Sarstedt 5.5 ml; 3/part | CHUV | CHUV | 4000 | 0.30 | CHF | IUMSP | 1,198 | 982 | |
| Pipette Pasteur 1/part | CHUV | CHUV | 2000 | 0.04 | CHF | IUMSP | 79 | 64 | |
| Tube polypropylen 3ml; 3/part | CHUV | CHUV | 4000 | 0.02 | CHF | IUMSP | 99 | 81 | |
| Caps for tube polyprop; 3/part | CHUV | CHUV | 4000 | 0.02 | CHF | IUMSP | 64 | 52 | |
| Tube Brand; 1 /part | CHUV | CHUV | 1500 | 0.02 | CHF | IUMSP | 37 | 30 | |
| 10 parcels to send material | | | 8 | 130 | CHF | IUMSP | 1,040 | 852 | |
| Quality control kit | | Diagnostica | 2 | 150 | CHF | IUMSP | 300 | 246 | |
| Reagent microalbumin for DCA 2000 | 45% | | 250 | 6.00 | CHF | IUMSP | 1,500 | 1,230 | |
| Postage supplement Bayer | | | 1 | 335 | CHF | IUMSP | 335 | 275 | |
| Reagents glucometer Ascentia | | CHUV | 1600 | 1 | CHF | IUMSP | 1,602 | 1,313 | |
| Lancet ames - for glucolet 2 | | CHUV | 1400 | 0.11 | CHF | IUMSP | 154 | 126 | |
| Strips for Clinitek Status (microalb) | 43% | | 1300 | 2.00 | CHF | WHO | 2,600 | 2,131 | |
| Cassette Cholestec lipids glucose | 60% | Diagnostica | 1400 | 7.80 | CHF | WHO | 10,920 | 8,951 | |
| Reagent A1c for DCA 2000 | 46% | | 250 | 7.50 | CHF | WHO | 1,875 | 1,537 | |
| Reagent A1c for DCA 2000 | 45% | | 100 | 7.50 | CHF | WHO | 750 | 615 | |
| VAT 7% Bayer | | | 1 | 605 | CHF | WHO | 605 | 496 | |
| VAT 7% Cholestec | | | 1 | 738 | CHF | WHO | 738 | 605 | |
| Glucose for tolerance tests, gel for ultrasound, alcohol desinfectant, boxes for disposal needles | | Pharmaceutical Production Unit | | | SR | WHO | 2,167 | 433 | *24,525* |
| **Consumables, other** | | | | | | | | | |
| 3 toner copier, printer, plastic files, markers | | | | | SR | MOH | 1,560 | 312 | |
| 2000 envelopees with windows (show merged address) | | | | | SR | MOH | 2,000 | 400 | |
| Miscellaneous (battery chargers, toners, stethoscopes, etc) | | Various, local, internatinal | | | CHF | IUMSP | 1,220 | 1,000 | |
| Panels for study, painting, key locks, paper rolls, electric extensions, toner printer, stationary | | Various, local | | | SR | WHO | 6,361 | 1,272 | |
| Printing forms and results cards | | | | | SR | WHO | 6,540 | 1,308 | |
| Sandwiches for snacks of participants (who are fasting, 20 per day, SR6 per sandwich) | | Temooljee Bakery | | | SR | WHO | 10,736 | 2,147 | |
| 500 enveloppes (repeat invitation to participante to missing participants) | | Excel Trading | | | SR | WHO | 750 | 150 | *6,589* |
| **Stay 9 days in Praslin/La Digue** | | | | | | | | | |
| Boat trip | | | | | SR | WHO | 700 | 140 | |
| Allowance SR 350 HB/lunch /day* 7-9 days to 6 staff | | | | | SR | WHO | 20,250 | 4,050 | |
| Snacks for participants | | | | | SR | WHO | 981 | 196 | *4,386* |

| Item | Discount | Provider | N needed | Unit cost | Currency | Funding | Cost | Cost in US$ | *Sub-totals* |
|---|---|---|---|---|---|---|---|---|---|
| **Blood analyses (regular cost)** | | | | | | | | | |
| Regular cost are provided. Laboratories sponsored the analyses | | | | | | | | | |
| Single nucleotid polymorphisms (90) | | | 1250 | | CH | IUMSP | | | |
| Apolipoprotein A | | | 1250 | 50 | CHF | ICCH | 62,500 | 51,230 | |
| Apolipoprotein B | | | 1250 | 25 | CHF | ICCH | 31,250 | 25,615 | |
| Lp(a) | | | 1250 | 25 | CHF | ICCH | 31,250 | 25,615 | |
| Cystatin C | | | 1250 | 35 | CHF | ICCH | 43,750 | 35,861 | |
| HDL-cholesterol | | | 1250 | 10 | CHF | ICCH | 12,500 | 10,246 | |
| Total cholesterol | | | 1250 | 9 | CHF | ICCH | 11,250 | 9,221 | |
| Triglycerides | | | 1250 | 9 | CHF | ICCH | 11,250 | 9,221 | |
| usCRP | | | 1250 | 23 | CHF | ICCH | 28,750 | 23,566 | |
| Creatinine | | | 1250 | 9 | CHF | ICCH | 11,250 | 9,221 | |
| Uric acid | | | 1250 | 9 | CHF | ICCH | 11,250 | 9,221 | |
| Insulin | | | 1250 | 60 | CHF | IPUL | 75,000 | 61,475 | *270,492* |
| **Other** | | | | | | | | | |
| Printing of report | | | | | SR | WHO | 25,400 | 5,080 | |
| Allowance for extra time and good performance 5 staff | | | | | SR | IUMSP | 8,000 | 1,600 | |
| Transport blood and material | | Air Seychelles | | | CHF | IUMSP | 3,000 | 2,459 | |
| Vouchers to participants | | SMB | 1250 | 50.00 | SR | Sponsor | 62,500 | 12,500 | |
| Large screen TV in waiting room | | Electronic 2000 | | | SR | Sponsor | 0 | | |
| Dry Ice for transport of serum | | SkyChef | 4k for 3 flights | | SR | Sponsor | 0 | | *21,639* |
| **Total** | | | | | | | | **410,205** | |
| Total MOH (including $32'390 ultrasound system for radiology) | | | | | | | | 40,389 | |
| Total IUMSP (Institute for Preventive Medicine, Lausanne) | | | | | | | | 54,762 | |
| Total WHO (Local office and WHO AFRO) | | | | | | | | 32,062 | |
| Total ICCH (Institute for Clinical Chemistry, St Gallen) | | | | | | | | 209,016 | |
| IPUL (University Institute of Physiology, Lausanne) | | | | | | | | 61,475 | |
| Private sponsors (mainly SMB, Electronic 2000) | | | | | | | | 12,500 | |
| *Part of total funding spent on new equipment (asset)* | | | | | | | | | |
| *Total* | | | | | | | | *52,116* | |
| *Funded by MOH* | | | | | | | | *32,990* | |

## APPENDIX VIII: List of publications related to the Seychelles Heart Study 2004

(by 5 November 2008)

Publications on specific issues meet several needs: i) to provide s detailed and peer reviewed account on specific issues related to the epidemiology of NCD for consideration locally (e.g. policy development in Seychelles); ii) to contribute to universal scientific knowledge on the epidemiology of NCD; and last but not least, iii) to provide evidence for successful completion and valorization of survey in 2004 in support to forthcoming grants to future similar surveys in Seychelles.


1. Yerly P, Gedeon J, Riesen W, Bovet P. Low prevalence of abdominal aortic aneurysm in the population aged 50-65 years of Seychelles, a rapidly developing country. ***Annals of Vascular Surgery*** (in press).
2. Bovet P, Gabriel A, Shamlaye C, Paccaud F. Diabetes in Africa: the situation in the Seychelles. ***Heart*** (3 November 2008) [e-letter].
3. Bovet P, Chiolero A, Shamlaye C, Paccaud F. Prevalence of overweight in the Seychelles: 15-year trends and association with socio-economic status. ***Obesity Reviews*** 2008;9:511-17.
4. Kelliny C, William J, Riesen W, Paccaud F, Bovet P. Metabolic syndrome according to different definitions in a rapidly developing country in the African region. ***Cardiovascular Diabetology*** 2008;7:27.
5. Pruijm MT, Madeleine G, Riesen W, Burnier M, Bovet P. Prevalence of microalbuminuria in the general population of Seychelles and strong association with diabetes and hypertension independent of other renal markers. ***Journal of Hypertension*** 2008;26:871-7.
6. Bovet P, Shamlaye C, Gabriel A, Paccaud F. Review of hypertension in Sub-Saharan Africa: a comment from the Seychelles. ***Hypertension*** 2008;51:e24. [letter].
7. Chiolero A, Witteman JC, Viswanathan B, Fostel J, Bovet P. No further decrease in blood pressure when the interval between readings exceeds one hour. ***Blood Pressure Monitoring*** 2008, 13:85–89.
8. Cappuccio FP, Kerry SM, Adeyemo A, Amoah AGB, Bovet P, Connor MD, Forrester T, Gervasoni JP, Kimbally Kaki G, Plange-Rhule J, Thorogood M, Cooper RS. Body size and blood pressure: an analysis of Africans and the African Diaspora. ***Epidemiology*** 2008;19:38-46.
9. Bovet P, William J, Paccaud F. Low prevalence of individuals with optimal or borderline levels of cardiovascular risk factors extends to rapidly developing countries. ***Archives of Internal Medicine*** 2007;167:2262-3.
10. Faeh D, William J, Yerli P, Paccaud F, Bovet P. Diabetes and pre-diabetes are associated with cardiovascular risk factors and carotid/femoral intima-media thickness independently of markers of insulin resistance and adiposity. ***Cardiovascular Diabetology*** 2007;6:32(e).
11. Faeh D, William J, Shamlaye C, Tappy L, Ravussin E, Bovet P. Prevalence, awareness and control of diabetes in the Seychelles and relationship with excess body weight. ***BMC Public Health*** 2007, 7:163(e).
12. Danon-Hersch N, Chiolero A, Shamlaye C, Paccaud F, Bovet P. Decreasing relationship between body mass index and blood pressure over time. ***Epidemiology*** 2007;18:493–500.
13. Rodondi N, Yerly P, Gabriel A, Riesen WF, Burnier M, Paccaud F, Bovet P. Microalbuminuria but not cystatin C is associated with carotid atherosclerosis in middle-aged adults. ***Nephrology Dialysis and Transplantation*** 2007;22:1107-14.
14. Bovet P, Faeh D, Gabriel A, Tappy L. The prediction of insulin resistance with serum triglyceride and high-density lipoprotein cholesterol levels in an East African population. ***Archives of Internal Medicine*** 2006;166:1236-7.
15. Bovet P, Shamlaye C, Gabriel A, Riesen W, Paccaud F. Prevalence of cardiovascular risk factors in a middle-income country and estimated cost of a treatment strategy. ***BMC Public Health*** 2006;6:9(e).