MINISTRY OF HEALTH
SEYCHELLES

Seychelles National Survey of Noncommunicable Diseases 2023 (Seychelles Heart Study V): Procedures and Key Findings

Public Health Authority
Ministry of Health
Republic of Seychelles

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on behalf of the Survey Team

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Contributions to the report

PB: study protocol, questionnaire design, conduct of survey, data analysis & report writing & editing; BV: survey coordination & conduct, draft review; ML & JG: draft review; Survey Team (ABC, GaM, GiM, JW, VL): review & translation of questionnaire, conduct of survey, draft review; Steering committee (CS, ES, JG, ML, SD): review of the study protocol, questionnaire & draft review; External collaborators (EA, FP, LM, NB): draft review. EA: GHQ-12 questionnaire; LM: protocol of carotid ultrasound exam; TR: oral health questionnaire. Survey Team members: support as described in the list of the survey collaborators.

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Foreword

It is with great satisfaction that I present the comprehensive findings of the Seychelles Heart Study V, a landmark national survey aimed at assessing the prevalence and trends of noncommunicable diseases (NCDs) and their associated risk factors among Seychellois nationals aged 18-74 years. Conducted between August and December 2023, this study represents a significant milestone in our ongoing efforts to combat NCDs and improve public health outcomes in our nation.

This Seychelles Heart Study builds upon the foundation laid by four previous surveys conducted by the Ministry of Health since 1989, providing updated and invaluable insights into the epidemiological landscape of NCDs in Seychelles. With a total of 1205 participants, this survey meticulously examined 240 variables, encompassing socioeconomic determinants of health, the prevalence of the main NCDs notably cardiovascular diseases, cancers, diabetes, and chronic kidney disease, as well as the prevalence of their shared behavioural risk factors such as tobacco use, physical inactivity, unhealthy diet, and harmful alcohol consumption and metabolic risk factors such as obesity, high blood pressure and high blood cholesterol.

Key findings from the survey highlight both progress and areas of concern. While a significant proportion of individuals exhibit favourable socioeconomic indicators conducive to adopting healthy behaviours, challenges persist, particularly in addressing tobacco and substance use, physical inactivity, unhealthy dietary patterns, and harmful alcohol consumption. Alarmingly, high rates of overweight and obesity, coupled with elevated prevalence of hypertension, diabetes, and raised cholesterol levels, underscore the urgent need for targeted interventions to mitigate these risk factors and prevent associated NCDs.

Furthermore, this Seychelles Heart Study sheds light on gaps in awareness, treatment, and control of NCD risk factors, emphasizing the importance of comprehensive healthcare delivery and patient education initiatives. Despite advancements in healthcare access, disparities persist, particularly among vulnerable populations, necessitating a concerted effort to ensure equitable healthcare services for all Seychellois citizens.

The data generated from this survey will serve as a lever for evidence-based policy formulation and programmatic interventions aimed at NCD prevention and control. We will utilize the findings to guide our strategic priorities, allocate resources effectively, and collaborate with key stakeholders to implement targeted interventions that address the multifaceted determinants of NCDs in Seychelles.

Let us reaffirm our commitment to promoting health and well-being for all Seychellois citizens. Through collective action and sustained investment in public health initiatives, we can build a healthier and more resilient Seychelles for generations to come.

Mrs. Peggy Vidot

Minister of Health
Republic of Seychelles

Aims and scope of the report

This report describes the procedures of the survey and preliminary key findings for the Seychelles National Survey of Noncommunicable Diseases 2023 (Seychelles Heart Study V) that was conducted between August and December 2023.

The survey focused on cardiovascular health, including health behaviours (e.g. tobacco and substance use, physical activity, alcohol intake, and dietary patterns) and main cardiometabolic risk factors (e.g. high blood pressure, diabetes, and dyslipidaemia), including knowledge and practices around these risk factors, and treatment and control rates of the main modifiable risk factors in Seychelles. The survey also assessed broader socioeconomic variables which are linked to heart health and other chronic diseases; the prevalence of selected noncommunicable diseases (NCDs) (e.g. ischemic heart disease, stroke, rheumatic heart disease, carotid atherosclerosis); chronic kidney disease; cancer screening; physical disability; psychological health; self-reported health status and disability; oral health; COVID-19; and use of health services.

The prevalence of, and associations between risk factors, NCDs and other conditions are presented according to sex, age, socioeconomic and other selected variables. Trends in prevalence of selected major risk factors between 1989 and 2023 are described briefly in Section 20. More detailed analysis will be considered in a future report.

A table with the age-standardised prevalence of selected main findings is provided for quick reference.

The data presented in this report are critical for ensuring that NCD prevention and control programmes and policy in Seychelles are driven by the latest epidemiologic data. The data will also enable Seychelles to report to the World Health Organization on the latest levels of NCDs and their risk factors in preparation for the Fourth High-level Meeting of the United Nations General Assembly (HLM4) in September 2025.[1]

The data collected in the survey also provide public health and academic institutions with a valuable database for further research.

As many readers are likely to focus on a specific section of the report, the report has been written so that each section stands alone. Each section therefore includes relevant background information to set the scene and other general information that may be useful to readers.

It is important that readers recognise that surveys cannot provide recommendations on which interventions are most useful in a particular setting as there are many other issues beyond epidemiologic data that need to be considered. The interventions described at the end of each section and in **Appendix 12** are those recognised as being evidence-based, cost-effective, and feasible to implement.

[1] Resolution A/73/L.2 United Nations General Assembly. Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases. PDF

Summary

Collecting and analysing data related to health is a core business of public health. The Seychelles National Survey of Noncommunicable Diseases 2023 (Seychelles Heart Study V) provides data on population levels of NCDs and their risk factors, as well as other determinants of population health. The data also provide information on the impact of public health policies and the performance of the health system in relation to detection and control of NCDs and their risk factors.

The data presented in this report are critical for ensuring that NCD prevention and control programmes and policy in Seychelles are driven by the latest epidemiologic data. The data will also enable Seychelles to report to the World Health Organization on the latest levels of NCDs and their risk factors in preparation for the Fourth High-level Meeting of the United Nations General Assembly (HLM4) in September 2025.[2]

The data collected in the survey also provide public health and academic institutions with a valuable database for further research.

The 2023 survey is part of a longstanding effort of the Ministry of Health to understand the impact of NCDs as a result of the health transition in the Seychelles and the needed health system changes to cope with demographic and epidemiological transitions, particularly the large NCD burden. Including this survey, the Ministry of Health has now commissioned five population-based NCD surveys (1989, 1994, 2004, 2013, and 2023).

The Seychelles Heart Study V was conducted between August and December 2023. It included 1205 participants aged 18-74 from an age-stratified random sample of the Seychellois population enumerated by the 2022 population census. The participation rate was 66% (or 80% if the 305 persons contacted by the National Bureau of Statistics who refused to communicate their phone number to the MOH are considered as non-eligible).

Based on 200 questions and 60 biological and clinical measurements, the survey examined the prevalence of health characteristics in the population, the awareness, detection, and treatment rates of selected NCD risk factors, and associations between these variables.

While the survey primarily focused on the four main noncommunicable diseases (NCDs), i.e. cardiovascular disease (CVD), cancer, chronic respiratory diseases and diabetes, and their four shared risk factors (i.e. tobacco use, diet, alcohol intake, physical activity, and health conditions such as obesity, hypertension, dyslipidaemias), it also examined other NCDs such as chronic kidney disease, cancer screening, psychological health, oral health, COVID history and use of health services, as well as socio-economic variables and social determinants of health.

Other chronic conditions, such as mental health, neuropsychiatric disorders, and osteo-muscular diseases were not considered in the survey, in large part because these conditions often require thorough and time-consuming medical examination.

Key findings of the survey were presented to the Senior Management Team of the Ministry of Health on the 8th of April 2024 (in presence of the Minister of Health, Public Health Commissioner, and heads of health services) and are expected to be presented to the Cabinet of Ministers and shared with a broad range of relevant national and international stakeholders engaged in reducing the NCD burden nationally and globally (**Appendix 10**).

Selected key findings from the Seychelles Heart Study V are:

1. Social determinants of health

- A large proportion of individuals had education beyond primary school level, most were working and had an income larger than the minimum monthly wage salary, yet 15% reported having difficulties in paying routine bills 'at times' and 5% 'often'. This suggests that a large proportion of adults have literacy and economic means to adopt healthy behaviours.

2. Tobacco and substances

- The prevalence of cigarette smoking, which is much larger in males than females, has largely decreased since 1989 but with no further substantial decrease over the past 20 years.
- The prevalence of electronic cigarettes was >10% in both males and females aged 18-35 and was associated with past smoking (suggesting that smokers had switched to a less harmful habit).
- Marijuana use was reported by 41% of males and 21% of females aged 18-34, but also at older ages.
- Use of heroin, cocaine (crack), fentanyl, and amphetamines was significant, yet underreported in the survey.

[2] Resolution A/73/L.2 United Nations General Assembly. Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases. PDF

3. Physical inactivity

- 74% females and 53% of males reported insufficient PA (<600 METS-minutes/week, equivalent to 30 min of moderate PA on ≥5 days per week).
- Car ownership associated with less PA (82 min walking time less per week).
- Leisure PA contributed <21% of total energy from PA, more in younger vs older.
- >40% report screen time (TV, phone, etc.) ≥3hours per day.

4. Diet

- Diet was assessed using a food frequency questionnaire including >50 food items and patterns.
- Overall, traditional foods in Seychelles, such as rice and fish, were consumed on most days by many individuals, and not rarely 2 times per day.
- The frequency of vegetable, legumes, pulses, stapple foods, and fruit intakes was high.
- Soft drinks and juices, or adding sugar in tea or coffee, was reported frequently.
- 10% reported making 'much effort' to adopt a healthy diet and regular physical activity.

5. Harmful alcohol use

- 46% of females and 31% of males did not drink alcohol.
- 7% of females and 21% of males reported drinking ≥14 standard pure alcohol units per week and 19% of females and 36% of males drank ≥4/5 standard units of alcohol on ≥4 days per month.
- Total pure alcohol per capita (total population) was estimated at 7.4 L/year in males and 3.1 L/year in females.
- It can be calculated that the 20% of the drinkers drank 61% of the total pure alcohol consumption.

6. Overweight and obesity

- 78% of females and 60% of males were overweight or obese (BMI ≥25).
- 49% and 27% had obesity (BMI ≥30).
- 13% and 2% had high grade obesity (BMI ≥40, 'morbid obesity').
- A higher BMI was strongly associated with HBP and high blood levels of blood glucose, insulin, LDL-cholesterol, triglycerides, uric acid, and C-reactive protein.

7. High blood pressure (HBP)

- 42% of females and 38% of males aged 18-74 had HBP (BP ≥140/90 or treatment).
- The prevalence of HBP was 77% at age 55-74.
- 9% of females and 11% of males had high grade hypertension (BP ≥160/100).
- Less than half of all adults knew a value for their own BP or a value for normal BP (whether correct or not).
- Less than 20% of persons in the population knew that HBP generally does not cause symptoms.
- Only 50% knew that HBP treatment should be taken for years.
- Better knowledge was associated with female sex, a higher SES, and having treatment for HBP.
- Blood pressure was strongly associated with age, obesity, and diabetes.
- 65% of persons treated for HBP had an electronic BP measuring device at home.
- 88% of females and 75% of females (age ≥45) with HBP were aware of having HBP.

8. Diabetes (DM)

- 10% of females and 13% of males aged 18-74 had DM based on raised fasting blood glucose (FBG).
- The prevalence of DM at age 18-74 was ~30% in adults aged 55-74 years.
- The prevalence was 12% (F) and 15% (M) based on raised FBG or A1c.
- DM was strongly associated with age, obesity, and HBP.
- Two thirds of participants with DM had a glucometer at home for self-measurement of FBG.

9. High blood cholesterol

- 55% (F) and 53% (M) had raised blood cholesterol (total cholesterol ≥5.2 mmol/l or treatment).
- 28% (F) and 27% (M) had high blood cholesterol level (≥6.2 mmol/l) associated with a high CVD risk.
- Raised blood cholesterol level was associated strongly with age and obesity.

10. Clustering of the four major modifiable CVD risk factors

- 38% of females and 26% of males aged 18-74 had no major risk factor (smoking, HBP, DM, and raised cholesterol) and only 15% (F) and 26% (M) at ag 55-74.
- 19% of females and 33% of males had ≥ 2 of 4 major risk factors at age 18-74 (41% in females and 46% in males aged 55-74.

11. Awareness, treatment & control rates for HBP, high cholesterol & diabetes (age 45-74)

- 70-90% of adults aged 45-74 years with HBP (BP≥140/90 or treated) or with diabetes (FBG ≥7.0 mmol/l or treated) were *aware* of having HBP or diabetes, respectively. The proportion aware of these conditions was ~60% for raised cholesterol (≥6.2 or treated).
- More than 80% of individuals aware of having these risk factors reported *taking a medication*.
- Among those treated, the proportions with these risk factors who were treated to the recommended targets (‘*controlled’;* BP <140/90, FBG <7.0 mmol/l) were ~40% for HBP, ~30% for diabetes, and ~65% for raised cholesterol (<5.2 mmol/l).
- Control of risk factors depend on rates in each step of the *cascade* of ‘being aware of raised risk factor’, ‘receiving a treatment’ and ‘having risk factors treated to the recommended targets’.
- Less than a third of individuals with raised risk factors in the whole population had these risk factors ‘controlled’ to treatment targets.

12. Raised blood uric acid and C-reactive protein (CRP)

- 37% of females and 44% of males had raised uric acid (associated with gout and a CVD risk factor).
- 15% of females and 7% of males had raised CRP (a marker of inflammation and a CVD risk factor).
- Higher levels of uric acid and CRP were associated with increased BMI.

13. Prevalence of noncommunicable diseases: CVD, carotid atherosclerosis, cancer, and chronic kidney disease

- 8% of adults aged 55-74 reported a history of CVD (ischemic heart disease or stroke).
- 13% of females and 34% of males aged 55-74 had carotid atherosclerosis (‘cholesterol plaques’ that narrow the lumen of the arteries, assessed by ultrasound, i.e. subclinical CVD).
- 0.2% reported a history of rheumatic heart disease, a very low rate consistent with the high socioeconomic level of the country and treatment given for Group A streptococcal pharyngitis.
- 6% of adults aged 55-74 reported a history of cancer.
- 9% of females and males aged 55-74 had moderate or severe chronic kidney disease (MDRD stages).

14. Screening for cancer

- Data in the survey cannot assess whether cancer screening was done opportunistically (e.g. check-up), through screening programmes in individuals without symptoms, or because of symptoms.
- 54% of females aged 18-74 reported ≥2 *Pap smear tests* in the last 10 years.
- 41% of females aged ≥45 reported ≥1 *mammography* ever, with an association with higher SES.
- 17% of adults and 21% of those aged 55-74 reported a colonoscopy or a test for occult blood in the faeces, with higher rates among persons of higher SES.
- 45% of men aged ≥45 reported ≥1 PSA test.

15. Self-reported health status

- Approximately 20% of adults aged 18-74 reported their health was ‘not so good or not good at all’, with associations with age and BMI.
- 18% of females and 11% of males had difficulty to walk up one floor, with associations with age and BMI.
- 28% of females and 23% of males had pain due to a physical problem, with associations with age and BMI.
- The causes of these limitations were not assessed, but likely partly relate to musculoskeletal ailments.

16. Psychological health, memory, and sleep

- Based on the General Health Questionnaire (GHQ-12), 10% of females and 6% of males reported depressive symptoms ‘often or always’ in the last 12 months, with association with a younger age.
- 15% of females and 17% of males reported to sleep <6 hours per night.

17. Oral health

- 8% of females and 12% of males reported their teeth state was ‘not so good or bad’, with associations with age, smoking, sugar intake, and a lower socioeconomic status.
- 4% of adults aged 18-74 reported difficulty to chew.
- 92% of males and 88% of males brushed their teeth ≥2 times per day, and less often at age 18-34.

18. COVID-19

- Around 50% of adults reported a history of COVID with higher prevalence in younger vs older persons.
- 20% of female and 11% of males with a COVID history reported hospital admission.
- 93% of females and 92% of males reported ≥1 COVID vaccination jab.

19. Use of health services

- 76% of females and 64% of males (age 18-74) attended a *government* health service ≥1 time in the past 12 months, with associations with female sex, age, lower SES, high BMI, diabetes, and HBP.
- 55% of females and 46% of males (age 18-74) attended a *private* health provider ≥1 time in the past 12 months, with associations with female sex, age, higher SES, and pain.
- 88% of females and 79% of males (age 18-74) attended a *government or private* health care provider ≥1 time in the past 12 months.
- 7% of all adults aged 18-74 reported ≥1 medical visit abroad in the past 5 years.
- 18% of females and 12% of males reported taking ≥3 drugs for HBP, DM, or high cholesterol, and this proportion was 49% (F) and 29% (M) at age 55-74.
- Assuming a conservative average SCR 0.20 cost for 1 pill for a HBP, cholesterol or DM, the cost of medications taken for these risk factors amounts to SCR ~5.7 million per year (age 18-74).

20. Communication and health education

- 48% of adults aged 18-74 reported high interest to listen to or watch health education programmes on the national mass media, yet much lower rates among younger vs older adults.

21. Trends

- Selected trends in major risk factors between 1989 and 2023 are described.

Recommendations

- Data from health surveys cannot inform on which interventions are adequate, cost-effective, or affordable, as the choice of priority interventions in a particular setting also depends on many other considerations.
- Interventions that are those recognised by WHO as evidence-based, cost-effective, and feasible to implement are described at the end of each section and in **Appendix 12**.

Table of selected key findings: prevalence & associations

	Females				Males				Population		Associations
	18-34	35-54	55-74	**18-74**	18-34	35-54	55-74	**18-74**	18-74	35-74	
1. Social and economic determinants											
Education											
Obligatory (up to S4/S5)	18	37	70	**39**	12	38	66	**36**	37	49	
Post obligatory academic or vocational	72	51	25	**52**	74	48	26	**51**	52	40	
University or other high school	10	12	5	**10**	14	15	8	**13**	11	11	
Occupation (last one if retired or unable to work)											
Unqualified, labourer	12	21	40	**23**	8	11	10	**10**	16	19	
Professional or qualifed non manual	35	36	24	**33**	26	32	26	**29**	31	31	
Income (SCR)											
<6000	14	6	18	**12**	8	5	9	**7**	9	9	
6000-9999	36	35	40	**36**	21	20	30	**23**	30	30	
10000-19999	44	41	31	**39**	55	42	38	**45**	43	39	
20000-39999	7	13	10	**10**	13	23	14	**17**	14	16	
≥40'000	0	5	2	**2**	4	10	10	**8**	5	7	
Biological children									0	0	
0	41	10	8	**20**	50	19	8	**27**	24	12	
1-3	58	81	57	**67**	50	68	62	**60**	64	69	
≥4	1	9	35	**13**	0	13	30	**13**	13	20	
People in household (including study participant)											
1	3	5	9	**5**	8	6	11	**8**	7	7	
2-4	50	68	61	**60**	60	60	60	**60**	60	62	
5-6	32	22	21	**25**	23	27	22	**25**	25	24	
≥7	15	5	10	**10**	8	7	6	**7**	9	7	
House/flat owned by participant or his/her family	68	80	92	**79**	65	71	89	**74**	77	82	
Living with a partner											
Spouse	11	33	39	**27**	11	38	52	**32**	30	39	
Partner	41	34	10	**30**	37	34	25	**32**	32	27	
Family	43	28	41	**37**	45	22	12	**28**	32	26	
Alone	4	5	8	**5**	5	7	10	**7**	6	7	
Workplace											
Government or parastatal	45	51	21	**41**	37	34	12	**29**	36	32	
Employee in a private company	34	31	15	**28**	41	26	14	**28**	28	23	
Owns a business	4	12	5	**7**	7	30	25	**21**	14	19	
Casual	4	1	1	**2**	6	6	1	**4**	3	2	
Not working (and not a pensioner)	6	3	5	**5**	2	4	3	**3**	4	4	
Has a private email address	79	66	25	**60**	74	51	28	**53**	57	46	
Economic situation											
Has difficulty paying routine bills 'at times'	19	18	8	**16**	19	13	5	**13**	14	12	
Has difficulty paying routine bills 'often'	11	6	3	**7**	6	4	3	**4**	5	4	
Owns a car, bus or truck	15	23	10	**17**	38	49	43	**43**	31	32	
Has travelled abroad for leisure 1-3 times in past 5 yrs	44	36	39	**40**	28	29	25	**28**	34	32	
Has travelled abroad for leisure ≥4 times in past 5 yrs	6	11	9	**9**	8	12	6	**9**	9	10	
2. Tobacco and substance use											
Smoking cigarette daily	5	6	3	**5**	32	27	21	**27**	16	15	M+, Age-, Cannabis+, OH+
Mean cigarettes/day (in daily smokers)	4	5	3	**4**	4	8	7	**6**	5	6	
Smoking cigarettes occasionally	5	2	0.4	**3**	7	5	2	**5**	4	2	
Electronic cigarette use (daily or occasional.)	12	3	0	**5**	15	2	1	**6**	6	2	Age-, Cannab+, EducH+, Ex Cig+
Marijuana/cannabis use (regular or occasional)	21	4	0	**9**	41	30	6	**28**	18	11	M+, Age-, Cig+, eCig+, Subst+
Heroine, cocaine, crack or other substances	3	1	0	**1**	6	5	1	**4**	3	2	Age-, JobL+
3. Physical inactivity (GPAQ))											
≥1 day/wk with moderate or vigorous PA at work	41	54	50	**49**	67	71	60	**67**	58	59	M+, Age-, JobL+, BMI-
≥1 day/wk with moderate or vigorous PA for leisure	36	37	23	**33**	62	35	28	**42**	38	31	M+, Age-, JobL-
≥3 days/wk walking (not for work, not for leisure)	68	61	46	**60**	64	57	53	**58**	59	55	Age-, JobL+, BMI-
Takes a bus to go to work on all/most days	50	34	19	**36**	24	23	12	**20**	28	23	F+, Age-, JobL+
Inufficient physical activity (>600 MET-days, GPAQ)	80	69	74	**74**	50	51	63	**53**	64	63	F+, JobL-, BMI+
≥3 hrs screen time on weekdays (TV, phone, computer)	69	56	66	**63**	68	71	67	**69**	66	65	BMI+
≥3 hrs screen time on weekends (TV, phone, computer)	76	67	69	**71**	70	75	69	**72**	71	70	BMI+

	Females				Males				Population		Associations
	18-34	35-54	55-74	**18-74**	18-34	35-54	55-74	**18-74**	18-74	35-74	
4. Diet											
Fruit on 7 days/week	18	39	64	**38**	18	34	48	**32**	35	44	F+, Age+, JobH+
Vegetables on 7 days/week	42	64	82	**61**	43	58	65	**55**	58	66	F+, Age+
Salad	70	86	80	**79**	75	77	70	**74**	77	79	Age-, JobH+
Chutney (papaya, pumpkins, eggplant, etc)	37	52	56	**48**	40	58	57	**51**	50	56	Age+
Lentils on ≥3 days /week	45	30	35	**37**	44	38	37	**40**	39	35	JobL+
Stapple foods (breadfruit, cassava, plantain, sweet potato)	10	15	21	**15**	14	13	24	**16**	16	17	Age+
Rice on 7 days/week	52	48	63	**53**	52	64	73	**62**	58	61	M+, JobL+, BMI-
Potatoes	39	23	14	**26**	44	38	24	**36**	31	26	Age-
Fish on 7 days/week	41	59	72	**56**	37	63	73	**57**	57	66	M+, Age+, JobL+
Meat on ≥3 days/week	22	7	5	**11**	28	16	11	**19**	15	10	M+, Age-
Processed meat on ≥3 days/week	38	13	7	**20**	29	17	17	**21**	21	14	Age-, JobH+
Poultry on ≥3 days/week	46	30	26	**34**	57	40	32	**44**	39	32	Age-
Softdrinks on ≥3 days/week	35	17	6	**20**	37	29	14	**28**	25	18	M+, Age-, JobH+
Juices in packet ≥3 days/week	43	25	19	**30**	38	35	19	**32**	31	25	Age-, BMI-
Tea (most often with sugar)	48	69	87	**66**	50	65	85	**65**	66	75	Age-, JobL+
Makes some or much effort to adopt a healthy diet and PA	32	53	49	**45**	54	37	37	**43**	44	44	Age+, JobH+, BMI+
Makes much effort to adopt a halthy diet and PA	12	15	8	**12**	13	6	4	**8**	10	9	Age-, JobH+
5. Harmful alcohol use											
0 day/month	28	50	63	**46**	29	28	38	**31**	38	43	
≥6 days/month	13	15	7	**12**	25	40	26	**31**	22	23	
≥10 days/month	3	6	4	**4**	16	19	18	**18**	11	12	
≥ 4 days/wk drinking ≥4(F)/≥5(M) drinks per day	31	17	8	**19**	36	42	28	**36**	28	25	
>14 standard alcohol units/week (e.g. >2/day)	11	6	2	**7**	16	28	16	**21**	14	14	M+, Age-(F), AgeM+(M)
6. Obesity											
BMI <18.5 (underweight)	6	0.4	1	**3**	6	5	3	**5**	4	2	
BMI 18.5-24 (normal)	29	13	17	**20**	49	30	27	**36**	28	22	
BMI ≥25 (overweight or obesity)	64	86	82	**78**	46	65	71	**60**	69	76	
BMI ≥30 (obesity including severe)	36	56	55	**49**	19	34	29	**27**	38	44	Age+,F+,JobH+(M),JobL+(F),Smok-
BMI ≥40 (severe obesity)	12	13	13	**13**	1	2	2	**2**	7	8	
Among BMI 18-24 (normal), % reporting weight is too low	16	11	8	**12**	15	20	28	**20**	16	17	
Among obese, % reporting weight is 'a bit too high'	62	57	56	**59**	65	61	58	**62**			
Among obese, % reporting weight is 'really high'	33	31	21	**29**	20	20	13	**18**			
Raised Waist circumference (F: >88cm F; M: >102cm)	41	66	81	**61**	10	31	35	**25**			
7. High blood pressure											
Knowledge on HBP (see Table 7.1)											Sex F+, JobH+, HBP
BP <120/80 with/without Rx (normal)	71	40	11	**43**	36	17	8	**22**	33	21	
BP ≥140/90 or Rx (stage 2 hypertension)	10	44	81	**42**	9	41	72	**38**	40	56	M+, Age+, JobL+, BMI+
BP ≥160/100 (with or without Rx)	2	9	18	**9**	2	10	23	**11**	10	14	M+, Age+, JobL+, BMI+
% aware from all with HBP (≥140/90 or Rx), age 45-74		88				75					
% treated from all aware of having HBP, age 45-74		88				83					
% controlled (<140/90) from all treated, age 45-74		46				38					
% controlled from all with HBP in whole population, 45-74		36				24					
% has a BP measuring device at home (among treated)		66				64					
8. Diabetes											
Fasting glucose <5.6 with or without Rx (normal)	95	82	48	**78**	89	68	47	**70**	74	64	
Impaired fasting glucose (5.6-6.9)	4	13	26	**13**	9	20	28	**18**	16	21	
Diabetes (FBG ≥7.0) or Rx	1	7	28	**10**	2	13	27	**13**	12	17	M+, Age+, JobL+, BMI+
Diabetes (FBG ≥7.0 or A1c ≥6.5 or Rx)	1	9	32	**12**	2	16	30	**15**	13	20	M+, Age+, JobL+, BMI+
% aware from all with DM, age 45-74		81				81					
% treated from all aware of having DM, age 45-74		89				80					
% controlled (FBG <7) from all treated, age 45-74		33				33					
% controlled from all with DM in whole population, 45-74		24				22					
% having a glucometer at home		66				69					
9. High blood cholesterol and lipids											
Total cholesterol <5.2 with/without Rx (normal)	69	52	41	**55**	63	47	48	**53**	54	48	
Total cholesterol ≥5.2 mmol/l or Rx	33	54	77	**53**	37	59	65	**53**	53	62	F+, Age+, BMI+
Total cholesterol ≥6.2 mmol/l or RX	11	26	54	**28**	9	36	38	**27**	28	37	F+, Age+, BMI+
% aware from all with total chol ≥ 6.2 or Rx, age 45-74		64				54					
% treated from all aware of having high chol, age 45-74		65				59					
% controlled (<5.2) from all treated, age 45-74		62				72					
% controlled from all with high chol in whole pop. 45-74		26				23					
LDL-cholesterol ≥3.3 mmol/l	31	46	55	**43**	37	55	56	**49**	46	53	Age+, BMI+
HDL-cholesterol <1.0 mmol/l (unfavourable)	8	8	5	**7**	12	14	10	**12**	10	10	BMI+
Triglcerides ≥1.7 mmol/l	4	8	12	**8**	8	23	22	**17**	13	16	Age+, BMI+

	Females				Males				Population		Associations
	18-34	35-54	55-74	**18-74**	18-34	35-54	55-74	**18-74**	18-74	35-74	
10. Awareness, treatment and control (see above)											
11. Clustering of raised major risk factors											
0 risk factor (of 4: BP≥14/9; chol≥5.2; FBG>7.0; cig)	60	34	15	**38**	41	22	12	**26**	32	22	
≥2 raised risk factors	5	19	41	**19**	18	38	46	**33**	26	34	Age+, M+, JobL+, BMI+
12. Raised blood uric acid and CRP											
Blood uric acid ≥0.33/F)/≥0.43(M) mmol/l	31	37	47	**37**	42	45	45	**44**	41	43	M+, Age+, JobL+, BMI+
Bloood CRP ≥10 (mg/L)	19	16	7	**15**	7	7	9	**7**	11	10	F+,Age+,JobL+,BMI+,Carotid ATS+
13. Prevalence of CVD, cancer, and chronic kidney disease (CKD)											
History of MI, IHD or stroke									-	8	
Plaques in carotid arteries (IMT ≥0.12 mm on ultrasound)	0	2	13	**4**	0	5	34	**11**	7	11	Age+, BP+, LDL+,A1c+,Cig+,GFR-
Heart murmur (auscultation)	5	7	13	**8**	0	4	3	**2**	5	6	
Arrythmia (auscultation)	0.6	2.3	1.3	**1**	0.0	1.5	3.5	**2**	1	2	
History of cancer									-	6	
Chron. Kidney Dis.moderate, severe, or end-stage (MDRD)	0	2	9	**3**	0	3	9	**3**	3	5	Age+, M+, BMI+, BP+, DM+
14. Cancer screening											
≥2 Pap tests for cervical cancer in past 10 yrs	44	62	58	**54**	-	-	-		54	60	
≥2 breast examinations by professional ever	31	51	59	**46**	-	-	-		46	54	
≥1 mammography (or US), age ≥45 yrs	37	44	41	**41**	-	-	-		41	43	JobH+
≥1 PSA test (prostate), age ≥45 yrs	-	-	-	**-**	22	49	40	**37**	37	46	JobH+
≥1 colonoscopy or test blood in faeces	7	13	11		18	23	21	**21**	21	22	
15. Self-reported health status and disability											
Health reported as not so good or not good	17	20	23	**20**	17	26	26	**23**	21	24	M+, Age+, BMI+ (+others)
Some or much difficulty walking up 1 floor	11	19	26	**18**	4	11	20	**11**	14	18	F+, Age+, BMI+ (+others)
Some or much pain due to physical problem	25	29	28	**28**	22	20	28	**23**	25	26	Age+, BMI+
16. Psychological health, memory and sleep											
Feeling depressed often or always in the last 12 months	14	8	9	**10**	8	4	5	**6**	8	6	F+, Age-, BMI40+, Stress-
Sleep <6 hours per night	14	17	13	**15**	10	20	21	**17**	16	18	Age-, JobH-, BMI-, Cig-, Stress-
17. Oral health (self-reported)											
State of teeth reported as not good	6	6	11	**8**	7	13	17	**12**	10	11	M+, Age+, JobL+, Sugar+, Cig+
Difficulty to chew and avoids solid foods	2	4	7	**4**	1	3	8	**4**	4	5	Age+, JobL+, Sugar+, Cig+
Brushing teeth ≥2 times per day	88	92	98	**92**	82	88	93	**88**	90	93	M-, Age+
18. COVID											
History of ≥1 COVID episode	69	59	42	**58**	64	43	30	**47**	53	45	Age-
History of COVID as serious or hospital admission	19	24	16	**20**	13	8	12	**11**	16	15	Age+, JobL+, BMI+, DM+
Vaccination ≥1 time	79	89	93	**87**	85	87	92	**88**	88	90	Age+, JobH+, DM+
19. Use of health services in past 12 months											
Government health service	73	74	82	**76**	64	57	74	**64**	70	71	F+, Age+, JobL+, BMI+, DM+, HBP+
Private health provider	62	54	45	**55**	50	45	43	**46**	50	47	F+, Age-, JobH+, Pain+
Government or private health provider	82	89	94	**88**	79	75	85	**79**	84	85	
≥3 drugs for HBP, DM, or high chol (in whole population)	1	13	49	**18**	0	11	29	**12**	15	23	F+, BMI+, JobL+
20. Communication and health education											
Interested 'a lot' in HE programmes on national radio/TV	34	61	76	**56**	21	45	59	**40**	48	59	Age-, JobL+
21. Trends in main RFs between 1989 and 2023	See Section 20										

% aware, treated, and controlled: among persons aged ≥45 years.

Population: standardised for age to the population distribution of Seychelles nationals in 2023.

GFR: glomerular filtration rate MDRD (kidney function); GPAQ: GLobal Physical Activity Questionnaire; GHQ-12: General Health Questionnaire.

Associations: other associations are identifed but not mentioned in this table (see the specific sections for more associations).

Background, population under study, and rationale for the survey

The Seychelles. The Republic of Seychelles is a small island sate consisting of an archipelago of 115 islands (a few granitic and mountainous main islands and many outer corallin islands) located east of Kenya and north of Mauritius. Seychelles' maritime exclusive economic zone spreads on 1,3 million km^2 (i.e. as large as the land surface of South Africa or two times larger than the land area of France). Around 90% of the population live in the main island (Mahé), 8% in Praslin and La Digue islands and <1% in the outer islands. Although intermarriage has widely occurred over time, one can estimate that approximately 65% are of African origin, 5% Indian, 2-5% Caucasian, 2-3% Chinese and the remaining 25% a mixture of these different groups. In addition to Seychelles nationals, there is a substantial foreign population including a large proportion hired on working permits (**Figure 1**). The Christian religion (Roman Catholic, Anglican, and other Christian denominations) predominates (~85%).

Demographic transition. The population has undergone rapid demographic transition (i.e. increasing population size and aging), related to decreasing fertility rates followed by decreasing mortality rates, which are largely attributable to control of infectious diseases, prevention measure and health care, and overall better socioeconomic situation. For example, the population size was 41'000 in 1960 with 40% aged ≤15 years and 6% aged ≥65 years vs 101'000 (Seychellois nationals) in 2022, with 23% aged ≤15 years and 10% aged ≥65. Life expectancy at birth increased from 63 years in 1960 to 73 years in 2022. Almost all households have electricity, running water, and an adequate sewage system. Unemployment rates at age >25 are low for both sexes (<4%).

Socioeconomic development. The drivers of the economy have shifted from cash crops in earlier times (e.g. copra, cinnamon, and patchouli) to tourism (~400'000 tourists pear year, contributing ~21% percent of GDP and 27% of employment in2022), fisheries (contributing ~20% of GDP), and services (contributing >60% of GDP). The gross domestic product per capita (in current US$) rose from 288 in 1960 to 2'478 in 1980, 8'063 in 2000, and 15'874 in 2022. Seychelles is now classified as a high-income country. The debt-to-GDP ratio has fallen to 62% in 2022. The minimum monthly gross wage, currently at ~US$ 465, is highest in Africa.

Health, education and social services. Healthcare has been freely available for all inhabitants through a national health system for several decades. However, the number of private health care facilities providing ambulatory healthcare for fees has largely increased in recent years. Education has been provided without fees at government facilities for several decades but ~10% of children now attend a private school. All nationals aged ≥65 years receive substantial social security benefits (~US$ 400 currently). The health situation and socio-economic indicators in Seychelles has been described previously.[3]

NCD burden. Along the epidemiologic transition, noncommunicable disease (NCDs), mainly cardiovascular disease (e.g. heart attack and stroke), cancer, chronic respiratory diseases, and diabetes have become the main drivers of the disease burden and these NCDs contribute the largest share of the total disease burden, premature mortality, and morbidity in Seychelles. NCDs share common modifiable risk factors, e.g. tobacco use, unhealthy diet, harmful alcohol consumption, and physical inactivity. NCDs, particularly CVD, can therefore be largely prevented by appropriate interventions in various sectors aimed at reducing these risk factors in the population, as well as by detection and timely treatment of hypertension, dyslipidaemia, and diabetes in individuals at risk.

Interpreting epidemiologic data: crude vs age-standardised NCD rates and trends. Although the NCD burden (i.e. total number of persons with NCDs) tends to increase in many populations because of population aging and increasing size (i.e., part of the demographic transition), the age-standardised mortality (i.e. NCD risk at constant age) attributable to CVD and some cancers has significantly decreased in most high and middle income countries, including in Seychelles, due to prevention and control of NCDs.[4] This transition explains the commensurate gains in life expectancy. Remarkable exceptions are obesity and diabetes, which tend to increase markedly in most (but not all) countries.

[3] Bovet P, Gedeon G, Louange M, et al. Health situation and issues in the Seychelles in 2012. *Med Sante Trop* 2013 Nov 27. PubMed

[4] Stringhini S, Sinon F, Didon J, Gedeon J, Paccaud F, Bovet P. Declining stroke and myocardial infarction mortality between 1989 and 2010 in a country of the African region. *Stroke* 2012;43:2283-8. PubMed

The decreasing age-standardised NCD mortality rates partly result from the implementation of interventions to reduce risk factors in the population (e.g. tobacco control and generally improved diet diversity) and improving detection and treatment of individuals at risk over time. There remains, however, a large potential for improved NCD prevention and control. For example, NCD age-standardised mortality rates differ by more than 10 times between countries with low vs high NCD mortality (e.g. Uzbekistan vs Japan), with intermediary rates in Seychelles.

Potential for NCD prevention and control. NCDs can be largely prevented by reducing the shared modifiable NCD risk factors (tobacco use, unhealthy diet, low physical activity, and harmful alcohol use) through public health interventions in multiple sectors by targeting the whole population and by managing risk factors such as high blood pressure, diabetes, and dyslipidaemia among high-risk individuals as well as NCDs such as CVD; cancer and chronic kidney disease.[5]

Best buys. A set of 80 priority cost-effective interventions, including ~20 'best buys' (i.e. highly cost-effective interventions have been identified in the World Health Organization (WHO) Global Action Plan for the prevention and control of NCDs 2013-2030 [6] and are also advocated in the Seychelles NCD Strategy 2016-2025.

Importance of monitoring of NCD risk factors (surveillance). Monitoring the distribution of NCD risk factors in the population enables to assess their trends at regular intervals to evaluate progress and identify gaps in implementing NCD-related policies. WHO recommends that countries conduct population-based NCD risk factor surveys every 5-10 years. Regular monitoring of risk factors in the population is likewise also advocated by the Seychelles National Strategy for the Prevention and Control of NCDs 2016-2025.

Components of NCD surveillance. Population-based surveys should, at a minimum, assess the 25 main NCD-related indicators (e.g. tobacco, physical activity, alcohol, diet, overweight, blood pressure, blood glucose, blood lipids, salt intake, etc.) defined in the WHO Global Monitoring Framework,[7] a companion document of the WHO Global NCD Action Plan. Of note, progress achieved by countries in implementing the targets set by the WHO Global Action Plan between 2010 and 2025 will be appraised at the Follow-Up High Level NCD Meeting that will take place at the United Nations in September 2025.[8] To this end, WHO member states are requested to provide the prevalence of the main NCD risk factors by September 2024, which will enable WHO to compile and analyse data globally.

Previous NCD population surveys in Seychelles and key trends. The distribution of NCD risk factors in the adult population has been assessed previously in Seychelles through 4 NCD surveys in 1989, 1994, 2004 and 2013, respectively the 'Seychelles Heart Surveys I, II, III and IV'. The findings of all these surveys have been reported to the ministry of health (e.g. NCD Survey 2013) and published in medical journals.[9,10,11,12,13] Briefly, data from previous NCD risk factor surveys in Seychelles performed between 1989 and 2013 showed that the age-standardized prevalence of several main modifiable NCD risk factors decreased (i.e. tobacco use, high blood pressure, high blood cholesterol), consistent with strong tobacco control policy and improved treatment over time, but markedly increased for obesity and diabetes.

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[5] United Nations (2011). Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases. web link

[6] WHO (2013). Global action plan for the prevention and control of NCDs 2013–2020 (subsequently extended by WHA up to 2030). web link

[7] WHO (2011). NCD Global Monitoring Framework. web link

[8] WHO, On the road to 2025: The global NCD deadline. web link

[9] Bovet P, Shamlaye C, Kitua A et al. High prevalence of cardiovascular risk factors in the Seychelles. *Arterioscler Thromb* 1991;11:1730-6. PubMed

[10] Heiniger S, Viswanathan B, Gedeon J, Paccaud F, Bovet P. Trends in prevalence, awareness, treatment and control of high blood pressure in the Seychelles between 1989 and 2013. *J Hypertens* 2017;35:1465-1473 PubMed

[11] Stringhini S, Viswanathan B, Gedeon J, Paccaud F, Bovet P. The social transition of risk factors for cardiovascular disease in the African region: evidence from three cross-sectional surveys in the Seychelles. *Int J Cardiol*. 2013;168:1201-6. PubMed

[12] Bovet P, Romain S, Shamlaye C, et al. Divergent fifteen-year trends in traditional and cardiometabolic risk factors of cardiovascular diseases in the Seychelles. *Cardiovasc Diabetol* 2009;8:34. PubMed

[13] Cardoso I, Bovet P, Viswanathan B et al. Nutrition transition in a middle-income country: 22-year trends in the Seychelles. *Eur J Clin Nutr* 2013;67:135-40. PubMed

The importance of population surveys to assess health in the population. Population surveys involve important resources. As information arises from individuals randomly selected from the general population (as opposed to hospital or primary health care data, for example), population surveys are well suited to assess the prevalence of various conditions in the whole population (e.g. health behaviours and diet, risk factors, cancer screening, psychological health, oral health, etc.) and also to inform on health system performance, e.g. rates of awareness, treatment and control for several conditions (hypertension, diabetes, dyslipidaemias), coverage of cancer screening, and patterns of use of health services. It is therefore useful to maximise the output of population surveys and collect, as much as possible, a broad range of data of importance for public health.

Significance of the 2023 survey for public health policy and programmes. The survey findings will provide important information on progress achieved on NCD prevention and control in Seychelles (which can be compared with the targets set by the Seychelles Strategy for NCD Prevention and Control 2016-2025), identify gaps and inform public health policy and programmes. The survey will also provide updated data on NCDs that countries have agreed to report to WHO by September 2024 in preparation of the United Nations High-Level Meeting on NCDs that will take place at the United Nations General Assembly in New York in 2025.[14]

Further information on the global burden of NCDs, principles underpinning surveillance, and components and targets of NCD prevention and control are summarised, for example, in several chapters of *Noncommunicable Diseases: A Compendium*, published by Routledge in 2023, including NCD burden of disease, Epidemiologic and demographic transition as drivers of NCDs, Principles of NCD surveillance, Tools for NCD surveillance, The WHO Global Action Plan for the Prevention and Control of NCDs 2013–2030, Best buys and other recommended interventions for NCD prevention and control, Accountability for NCD prevention and control, and Population and individual approaches for NCD prevention and control.

[14] WHO, On the road to 2025: The global NCD deadline. web link

Procedures and participants

Endorsement of the survey and consent form

The survey was endorsed by the Ministry of Health (MOH). Budget for the survey (SCR 1.195 million of rupees) was approved by the National Assembly. However, the actual total cost amounted to SCR ~3.4 million when accounting for salaries, with a part supported by sponsors (**Appendix 7**). The study protocol was approved by the Health Research Ethics Committee (HREC) of the Ministry of Health (**Appendix 2**).

All participants read and signed an informed consent form that explained the rationale of the survey, its procedures, and participants' rights, including the right to decline any part of the survey (questions, blood tests, etc) or withdraw from the study at any time (**Appendix 4**).

Setting and duration of the survey

The survey took place from August 16th to December 17th, 2023. 1205 individuals aged 18-74 years participated. The survey was conducted in the Unit for Prevention and Control of Cardiovascular Disease (UPCCD) of the Ministry of Health in Victoria for participants of the main island (Mahé Island, which accounts for ~90% of the total population of Seychelles) and in Praslin Island (Praslin Hospital) during 7 working days and in La Digue Island (La Digue Hospital) during 3 working days. The primary survey staff included 7 health professionals (from UPCCD, Cancer Unit, and Diabetes Unit) who all had previous experience in conducting NCD surveys. Several clinical laboratory technicians took responsibility to analyse blood samples daily. One additional worker provided support to daily tasks (e.g. preparing breakfast for the participants, bringing blood to the lab, etc).

Sampling frame

A simple random sex -and age-stratified sample of 2498 Seychellois nationals aged 18-74 years was drawn from the 2022 Census population registry. The list was restricted to the 90% of individuals for whom a phone number (mobile and/or landline) for the household was available in the census data. The National Bureau of Statistics (NBS), with the assistance of the staff of the Unit for Prevention and Control of Cardiovascular Disease (UPCCD) seconded to NBS for this task, made up to 3 phone calls to all the selected eligible persons between March and April 2023 to enquire on their willingness to communicate their phone number to the Ministry of Health in relation to the NCD survey (**Appendix 3**). Information on all calls was recorded to document responses or the lack of response to the calls, including whether a contacted person was eligible to participate in the survey (e.g. if the person's name or phone number were valid and/or if the person was still living in the household, abroad or deceased).

Contacting eligible participants

The survey officers made up to 3 phone calls, including on evenings and on weekends, to contact the eligible participants who had previously agreed to share their phone number with the ministry of health, anticipating that 20-24 persons could attend the study centre daily. When arranging appointment, the eligible participants were informed about the study aims, the procedures of the survey (i.e. a 30-40-minute questionnaire, clinical exams, blood drawing) and that a breakfast would be offered, a SCR 300 voucher given as a token of appreciation for their participation and to cover for transport to the study centre, and medical counselling would be provided. Eligible participants were requested to attend the survey after an overnight fast and bring along all medications they were taking. A text message (SMS) was sent to all eligible participants on the day prior to the arranged visit as a reminder. Participants who did not attend the study on the expected day were recontacted with up to 3 phone call attempts to arrange for an appointment on another day. Information about all phone calls was updated electronically to keep up with participation and appointments. Participants were requested to attend the study centre between 6.00 am (7.30 on Praslin and La Digue) and 10 am and were informed that the visit would last on average between 1.5-3 hours.

Participation rate

From the 2498 eligible participants, 305 persons contacted by the Seychelles National Bureau of Statistics asked for their phone number not to be shared with the MOH. In addition, the following groups of participants were not included in the survey (and considered as non-eligible): phone number recorded in the Census registry was out of service for 158 individuals; phone number was not valid or the person was deceased or abroad for 184 persons; 42 persons were no longer living in the household or were in hospital, in a rehabilitation centre or in prison; and 298 persons could not be reached on up to 3 phone calls. 308 persons refused to participate in the study or did not attend the survey on the agreed study appointment or on subsequent re-arranged appointments. In total, 1205 persons participated in the study.

Based on the 1816 eligible persons (including the 305 persons who refused to communicate the phone number to the MOH), the participation rate was 1205/1816 = **66.2%**. The participation rate would be **79.6%** if the 305 persons who refused to communicate their phone number to the MOH are considered as non-eligible.

The participation rate can be considered as very good for survey for which participants are randomly selected from a general population registry and must attend a study centre in-person for examinations including blood drawing. High participation was promoted by several factors. The survey was largely advertised in national mass media including national TV and radio. Convenient dates could be arranged for appointments as the eligible participants were contacted by phone. The eligible participants were informed on several potential benefits for themselves that would result from participation, including undergoing clinical and biological exams (e.g. diabetes, cholesterol, ultrasound examination of their carotid arteries, etc.), receiving personalised counselling by a medical doctor, and receiving a SCR300 voucher (~US$20, which corresponds to a common daily wage for persons with low-mid qualification) as a token of appreciation for their participation and/or in compensation for transport to the study centre. On the other hand, there were unusual heavy rains during a majority of days during the whole study period (attributed to a 'El Nino' year), including one day with state emergency.

Services and benefits of the survey for the participants

- Beyond being useful to the Ministry of Health to help assess the current situation of NCDs in the population and help inform health policy and programmes, the survey could bring several direct benefits to the participants:
- Participants received a 'cardiovascular risk factor card' (used by UPCCD since many years for screening programmes) displaying results on BP, diabetes, BMI, etc., including a brief written advice on healthy lifestyle.
- Participants had their results reviewed on the survey day by a medical doctor and counselling was given accordingly, including referral to health services for conditions that needed further diagnosis and management (e.g. new cases of diabetes, hypertension, etc).
- Participants with abnormal laboratory results (received a few days after a participant had attended the survey) were informed by telephone and, if they wished, they could be reviewed at the study centre and given a referral form to attend a health service when appropriate.
- Participants received a SCR300 voucher (sponsored by SEYPEC) as a token of appreciation and to cover for travel expenses to the study centres.
- Participants were informed that an automatically generated 1-page summary report of their personal main results (including clinical lab results) would be available when the survey is completed and could be collected at UPCCD.
- In April 2024, all the participants were informed by SMS, with announcements on the same on national TV and radio, that they could pick up in person a personal letter including each participant's selected findings (including laboratory results) at the UPCCD main Study Centre in Mahe **(Appendix 9).**

Data collected

Questionnaire

- The data were recorded on electronic tablets using the data entry REDCap software and saved electronically on a cloud-based server (i.e. no data was saved on the tablets themselves).[15]
- The questionnaire included ~200 questions which are listed in **Appendix 6**.
- The branching logic of the data entry software enabled questions to appear depending on participants' answers (e.g. if a person reported to be a non-drinker, no further questions were asked on alcohol intake) or conditions (e.g. questions appearing only if a participant was of a certain sex or age), so that a participants would have to respond, on average, to substantially fewer than 200 questions.
- The questionnaire could be completed in approximately 25-40 minutes.
- The structured questionnaire was administered face-to-face by survey officers or self-administered by the participants using tablets if a participant preferred. When self-administered, a study officer checked that all answers had been answered (allowing for no response if a participant so wished). Less than 5 participants declined to answer one or more questions.
- The questionnaire was available in Creole but could be administered in English (in <20 participants).
- 13 questions assessed socio-economic variables.
- Several questions on the main NCD risk factors came from the WHO STEPS questionnaire. STEPS is a simple, standardized method for collecting data on key NCD risk factors in population surveys.
- This included 15 questions on tobacco, electronic cigarettes, and substance use.
- Physical activity was assessed using 15 questions the Global Physical Activity Questionnaire (GPAQ).
- 52 questions assessed food frequency, of selected foods, dietary patterns, including behaviour change in relation to diet and physical activity, and were reviewed by the head of the Nutrition Unit in the MOH (SD).
- 15 questions assessed alcohol consumption.
- 8 questions assessed CVD history (heart attack, stroke, claudication, angina pectoris and stent or bypass history).
- 9 questions assessed personal history of cancer and history of screening of colon, breast, cervix, prostate cancers.
- 4 questions from the 12-Item Short Form Survey instrument (SF-12) assessed general health perceptions and limitations in physical activity.[16,17]
- 12 questions of the Global Health Questionnaire (GHQ-12) instrument assessed different psychological health domains, including social dysfunction, anxiety/depression, and loss of confidence.[18,19]
- 1 question assessed memory[20] and 1 question assessed sleep duration.
- 3 questions assessed health services use (e.g. frequency of use, public, private, abroad, etc.).
- 5 questions assessed a participant's interest in listening to mass media in relation to programmes on lifestyle, diet and NCDs in the Seychelles' mass media.
- 4 questions assessed oral health, based on the oral health module of the STEPS questionnaire.
- A few questions assessed history of COVID.

Clinical assessment

- Blood pressure (BP) was measured 7 times over a period of ≥1 hour, with 2 additional measurements in case of high BP, using a validated electronic device (Omron M6), appropriately sized cuffs, and standard BP measurement procedures (a procedure protocol is available at UPCCD). The average of the 2 last BP readings was used for BP estimates in the report.

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[15] 2.Harris PA et al. The REDCap consortium: Building an international community of software partners. *J Biomed Inform*. 2019:95:103208. PubMed

[16] Jenkinson C et al. A shorter form health survey: can the SF-12 replicate results from the SF-36 in longitudinal studies? *J Public Health* 1997;19:179-86. PubMed

[17] Rand Health Care. 12-Item Short Form Survey (SF-12). https://www.rand.org/health-care/surveys_tools/mos/12-item-short-form.html .

[18] Goldberg DP et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med* 1997;27: 191–97. PubMed

[19] Anjara SG et al. Using the GHQ-12 to screen for mental health problems among primary care patients: psychometrics and practical considerations. *Int J Ment Health Syst* 2020;14:62 PubMed

[20] Ferreira D et al. A 'disease severity index' to identify individuals with subjective memory decline who will progress to mild cognitive impairment or dementia. *Sci Rep* 2017:7:44368. PubMed

- Body weight and height were measured using standard instruments (Seca), which were regularly checked for accuracy (a procedure protocol is available at UPCCD).
- Waist was measured two times with a tape and measured at a level midway between the lowest palpable rib and the iliac crest (a procedure protocol is available at UPCCD).
- Auscultation and a portable 2-lead ECG monitor (Omron HeartScan ECG Monitor HCG 801) were used to assess heart rhythm abnormalities.
- The presence of atherosclerosis plaques in carotid arteries was assessed in all participants using a portable ultrasound system (Philips Lumify with a L12-4 transducer linear transducer). A review of portable devices found that the Lumify system had the best image quality and overall satisfaction rat among 5 recent ultraportable ultrasound devices, with an image quality similar to that of much more expensive ultrasound devices.[21] Atherosclerotic plaques constitute a subclinical cardiovascular disease and their presence is a predictor of major cardiovascular events (myocardial infarction and stroke).[22] The presence of plaques (which are easy to identify with an ultrasound exam) predicts coronary events at least as well as increased carotid artery intima media thickness (IMT) and as powerfully as coronary artery calcium score (CAC).[23,24] The device (US$ 15'000) was sponsored by the Victoria branch of Mauritius Commercial Bank (MCB).

Blood measurements

- Participants were requested to not have any food or beverages, except for water or non-sugared tea or coffee from 10 pm on the evening preceding their visit to the survey.
- Blood (~18 ml) was collected by experienced registered nurses (mostly by BV) at the study centre and brought within <3 hours to the laboratory of Victoria Hospital (or to Praslin /La Digue hospital laboratories depending on where the survey took place) for centrifugation within 1-2 hours. Serum/plasma was analysed for blood variables on the same day, except for insulin which was analysed by batches every few weeks.
- Total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, blood sugar, creatinine, uric acid, gamma GT, insulin, and A1c were measured with an automatic analyser using standard methods and quality control procedures. See **Appendix 7.**
- A reserve of serum was frozen and kept at the Hospital Lab to enable repeat tests in case of unexpected or unlikely values.
- Capillary glucose was measured at the study centre using a glucometer (Bayer Contour plus).

Urine measurements

- A sample (2-3 ml) of spot urine (second morning urine) was collected in a sub-sample of the first ~400 participants attending the survey centre between 8 and 10 am for measurement of urine sodium, potassium, and creatinine concentrations (creatinine is needed to estimate urinary 24-hour sodium excretion).
- The albuminuria/creatinine ratio (ACR) was determined in spot urine in participants with diabetes (if fasting capillary blood glucose ≥7 mmol/l and/or if the person was aware of having diabetes) to determine the presence of micro-albuminuria (an early sign of diabetes-related kidney failure).
- For participants with diabetes, a urinary stick (e.g. Combur 9 test) was used to assess the presence of protein, glucose and ketones and measurement was made at UPCCD.

[21] Le MP et al. Comparison of four handheld point-of-care ultrasound devices by expert users. *Ultrasound J* 2022;14:27. PubMed
[22] Visseren FLJ et all. 2021 European Society of Cardiology guidelines on cardiovascular disease - Developed by ESC and 12 medical societies. *Eur Heart J* 2021;4:3227-37. PubMed
[23] Inaba Y et al. Carotid plaque, compared with carotid intima-media thickness, more accurately predicts coronary artery disease events: a meta-analysis. *Atherosclerosis* 2012;220:128-33. PubMed
[24] Baber U et al. Prevalence, impact, and predictive value of detecting subclinical coronary and carotid atherosclerosis in asymptomatic adults: The BioImage Study. *J Am Coll Cardiol* 2015;65:1065-74. PubMed

Data analysis

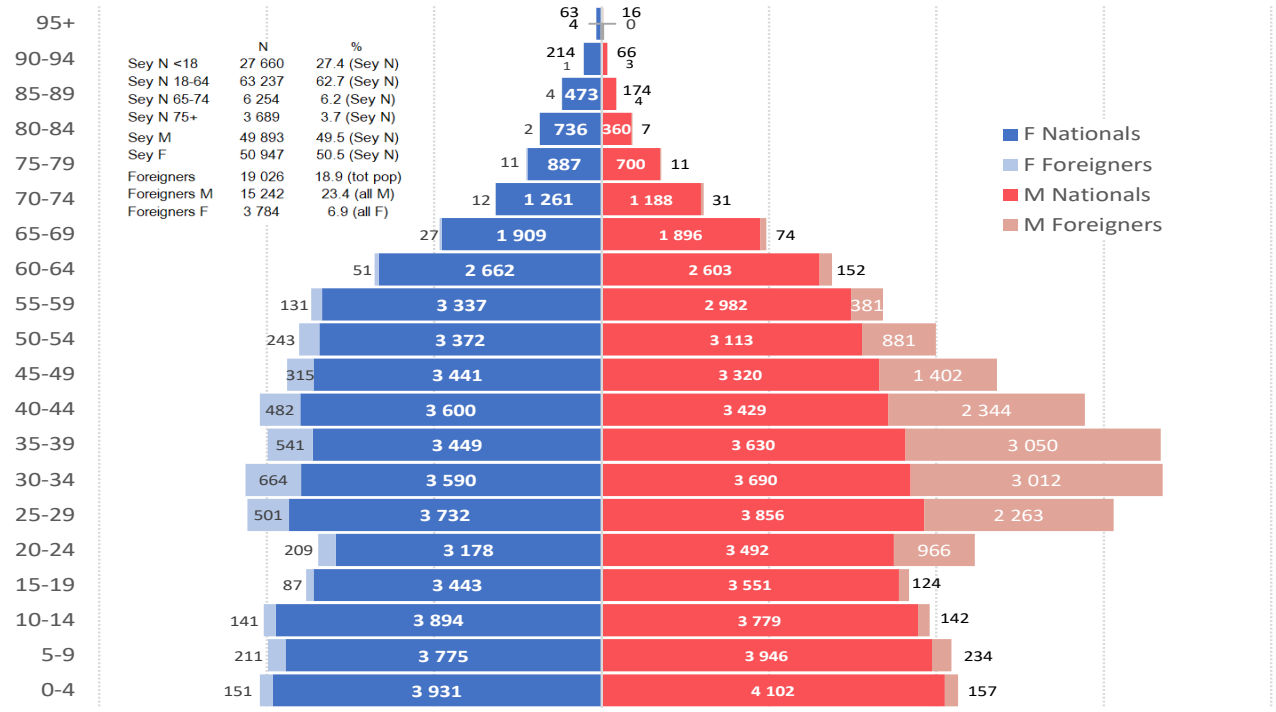
All statistical analyses were performed using Stata/IC 16.1. Stata command lines were prepared and tested between August 2023 and December 2023 and compiled into a 60-page log file (i.e. command lines only, without Stata outputs). Analyses were performed between January 2024 and March 2024 using this log file of Stata commands. Results from Stata outputs were copied into MS Excel spreadsheets and graphics and tables were generated in MS Excel. The report was developed in parallel between January 2024 and April 2024.

Age categories and age-standardisation

NCDs, NCD risk factors, and health behaviours are strongly associated with age. Estimates in the report are shown according to three age categories for conciseness. Prevalence estimates for females, males and population aged 18-74 were standardised to the age distribution of Seychelles nationals in the 2022 census. There were 24'299 Seychellois nationals aged 18-34 years, 27'354 aged 35-54 years, and 17'838 aged 55-74 years, which corresponds to age weights of 0.35, 0.39, and 0.26, respectively. The numbers of individuals with a condition X in the whole population aged 18-74 can be obtained by multiplying the age-standardized prevalence of the condition X (range 0-1) by 69'491 (i.e. individuals aged 18-74 in the population).

The population of Seychelles is displayed in **Figure 2**. The population size was 119'886 inhabitants by mid-2022, including 100'840 Seychellois nationals (69'491 individuals aged 18-74 years).

Figure 2. Distribution of the Seychelles population by sex, age, and citizenship categories by mid-2022.[25]



Prevalence estimates

Confidence intervals (CIs) of the prevalence estimates are not shown in the report for conciseness (95% CIs can be obtained from the authors). As a rule of thumb, CIs may range by a few percents, e.g. 3%-8% above and under point estimates. This means, for example, that a prevalence estimates of a variable X of 12% in men (for which the 95%CI could be 9%-15%) and 14% in women (for which the CI could be 11%-17%) would not be statistically 'significantly' different. Providing prevalence estimates with decimals (i.e. a precision of 1/1000) is therefore not useful and would make tables and figures cumbersome.

[25] National Bureau of Statistics. Statistical Bulletin, 6 June 2023.

Associations

Linear or logistic regression models were performed to examine associations of potential interest, e.g. to identify population subgroups at risk who could benefit most from specific interventions and programmes. Multivariate models were used (vs univariate models) because several variables examined in this study are associated with each other and/or are associated with age. Multivariable analysis (vs univariate analysis) prevents or reduce potential confounding (i.e. biased association estimates). For example, body mass index and age are both associated with blood pressure, hence it is important to include both in a same model when analysing their respective 'independent' effects on an outcome variable (here BP). However, multivariate models used in this report do not account for other potentially confounding variables and/or interactions between the different variables. Hence, association estimates shown in this report should be considered as *indicative*.

In cross-sectional surveys, exposures and outcomes are measured at the same time. Hence, associations cannot determine unambiguously if an 'explanatory' variable is a cause or a consequence. For example, the association between large soft drink intake and low BMI should not be interpreted as 'soft drinks are preventing obesity', but rather that 'persons with obesity reported to drink fewer soft drinks than persons without obesity' (possibly partly due to systematic misreporting or efforts by persons with obesity to control their weight).

Main variables for subgroup analyses

Most prevalence estimates are displayed according to categories of selected variables of particular interest for NCDs, including age, sex, and socioeconomic variables, and often body mass index (BMI). Estimates according to these important NCD variables provide useful information for designing and monitoring a prevention and control policy and programmes.

Socioeconomic status. Socioeconomic status (SES) was assessed in the survey based on 3 questions on education, occupation (job), and income. These SES variables were further categorised as 'low', 'medium', and 'high' level categories for conciseness.

***Occupation*.** The current paid occupation was assessed along 10 categories. If a person was retired or currently unable to work, the last paid job was considered. Categories included:

(1) Professional (e.g. executive, lawyer, high administration, etc.). Often 4+ year training and/or executive function.
(2) Qualified non-manual (e.g. teacher, nurse, executive clerk, accountant, informatics, etc.). Often 3-4 year training.
(3) Semi-qualified non-manual (e.g. salesperson, clerk, nursing assistant, junior secretary, etc.). Often 1-2 year training.
(4) Qualified manual (fully trained mechanic, carpenter, etc.). Often 2-3+ year training.
(5) Semi-qualified manual (partly trained mechanic, carpenter, etc.). Often 1-2 year training.
(6) No job specific qualification (e.g. labourer, casual, untrained health carer or security officer, etc.).
(7) Fisherman/farmer.
(8) Housewife/man (if a person had never previously worked for a salary).
(9) Student.
(10) Other.

For most analyses in this report, job was categorised into 3 groups:

- 'Low': labourer, casual worker, etc. (categories 6 and 8).
- 'Intermediate' (mid): other job categories (categories 3, 4, 5, 7, 9, 10).
- 'High': professional or fully trained non-manual (categories 1 and 2).

***Education*.** Formal school training was assessed along 6 categories:

(1) Primary school not completed (e.g. did not attend 'Form 3' in the 1970-80s).
(2) Primary school completed up to S4 or equivalent (e.g. 'Form 3' in the 1970s-80s).
(3) Completed NYS/S5 (implies ≥10 years 'obligatory' school, up to age 15-16).

(4) Post obligatory vocational school (e.g. mechanic, maritime, construction, tourism, secretarial, etc; often 1-2 years).
(5) Post obligatory academic school (e.g. A levels, nursing, lab technician, accounting, administration, etc.; 2-3 years).
(6) University or similar high-level schools (this generally implies ≥4 years post obligatory).

Education was further categorised into 3 groups:
- 'Low': some or complete obligatory school (up to S4).
- 'Intermediate' (mid): S5 or 1-3 years post-obligatory school (e.g. polytechnic, Maritime, Seychelles Tourism Academy, Guy Morel Institute, etc.).
- 'High': university or similar high-level school. This generally implies 5 or more years of post-obligatory school.

***Income*.** Income was categorised along 6 categories (in Seychelles rupees):
(1) <3000
(2) 3000-5999
(3) >6000-9999
(4) >10'000-19'999
(5) >20'000-39'999
(6) ≥40'000.

Income was further categorised into 3 groups:
- 'Low': <SCR 10'000 per month (categories 1, 2, 3).
- 'Intermediate': SCR 10'000 – 19'999 per month (category 4).
- 'High': ≥SCR 20'000 SCR per month (categories 5, 6).

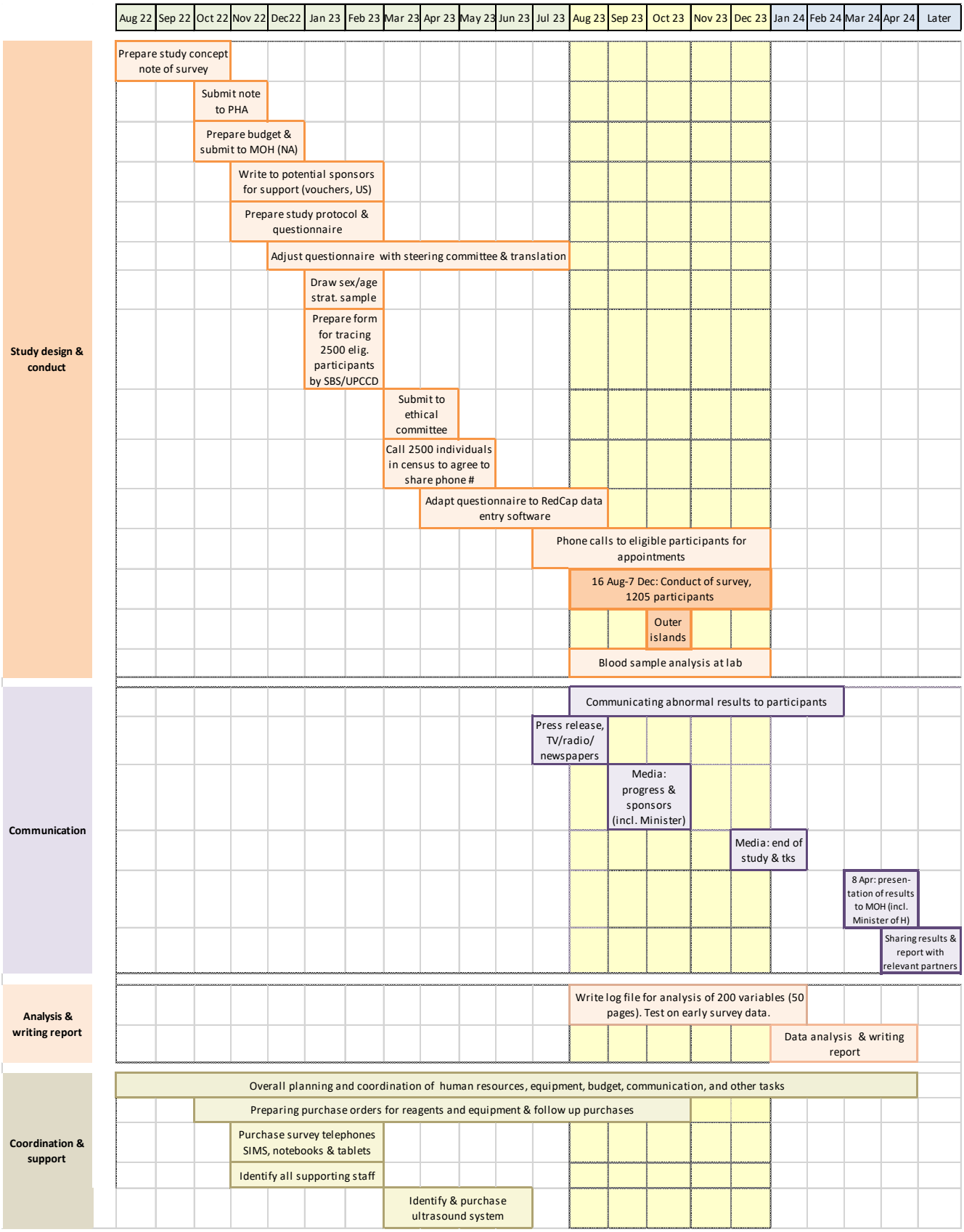
Job, education, and income categories correlate strongly. Since using several variables of a same domain (e.g. job, education, and income) in a multivariate analysis can result in overadjustment and/or instable estimates, only one indicator (job) was used in most association analyses in this report.

The choice of using job category as the main SES indicator in most analyses consider the following:
- The distribution of occupation categories in the population (e.g. the respective proportions with higher vs lower occupation status) may not have changed largely over time, making comparisons of job categories between younger vs older participants relatively robust.
- In contrast, the education system has changed markedly over time in Seychelles. Many more young participants (who attended school in the 1990-2000s) completed a higher education level than older participants (who went to school in the 1970-80s). This makes the comparison of education levels in older vs younger participants not directly comparable.
- Income has increased largely over time, making comparisons across generations challenging. Income is also difficult to assess accurately based on one single question (as done in the survey), particularly for persons who are self-employed and/or generate income from different activities or assets, and some may be reluctant to disclose their full income.

***Obesity status*.** Body mass index (BMI, weight/height^2 [kg/m^2]) is the most widely used method to assess adiposity in population-based epidemiologic surveys. Adiposity was assessed along the BMI categories defined by the World Health Organization:
- Underweight: BMI <18.5
- Normal weight: BMI 18.5-24.9
- Overweight: BMI 25.0-29.9
- Obesity: BMI 30.0-39.9 (high health risk). More generally, 'obesity' often refers to BMI ≥30.
- Extreme obesity: BMI ≥40 (very high health risk)

For most analyses in this report, BMI was categorised into 3 categories: BMI <25 (low), 25-29.9 (mid, 'overweight') and BMI ≥30 (high. 'obesity'). Other categories are considered in selected analyses (BMI <18.5: underweight; BMI ≥40: extreme obesity).

Overall survey organisation and timeline



Key findings

1. Socioeconomic variables

Introduction

Socioecological and economic variables are components of social determinants of health (SDOHs) and encompass socioeconomic, political, and environmental contexts. Detrimental levels contribute to an increased risk of disease, particularly CVD, but also other chronic diseases such as cancer or chronic kidney disease. For example, there is a ~2% lower mortality risk per each additional year of education.[26]

Figure 1.1 Conceptual Framework of the WHO Commission on Social Determinants of Health.[27]

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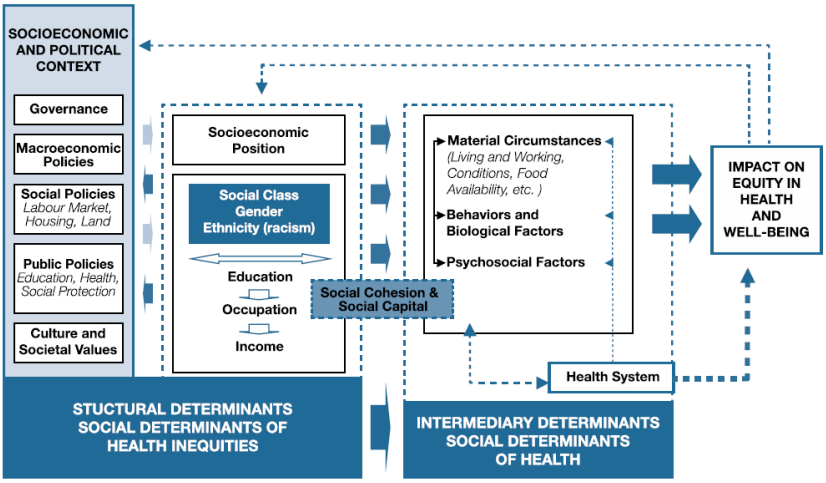
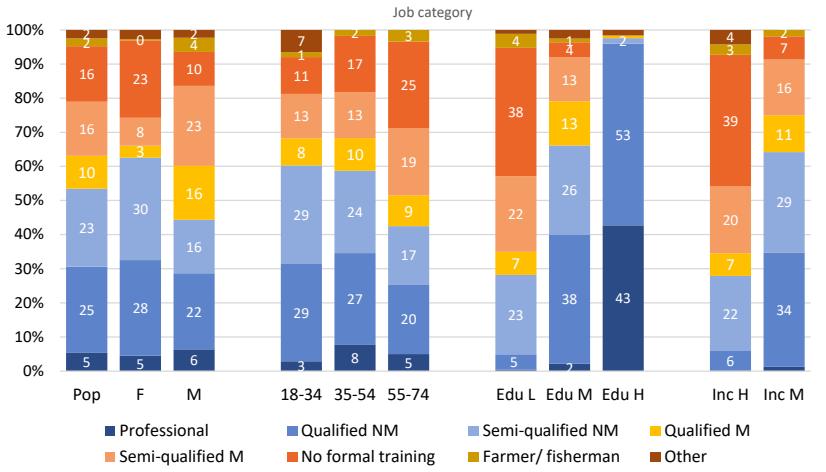


Several socio-economic variables were assessed in the survey, including education, income, job, social, family, and economic characteristics.

Occupation

Job categories were described earlier in the report and refer to current paid work or the last paid work for persons who had retired or were currently unable to work for medical reasons. Prevalence for all, males and females are standardized for age.

Figure 1.1. Type of job by sex, age, education, and income categories (M: manual, NM: non manual)



[26] IHME-CHAIN Collaborators. Effects of education on adult mortality: a global systematic review and meta-analysis. *Lancet* 2024;9: e155–65. PubMed

[27] Adapted from Solar O & Irwin A. A conceptual framework for action on the social determinants of health, WHO, 2010. In Chapter on social determinants of health and NCDs in *Noncommunicable Diseases: A Compendium'*, Routledge, 2023.

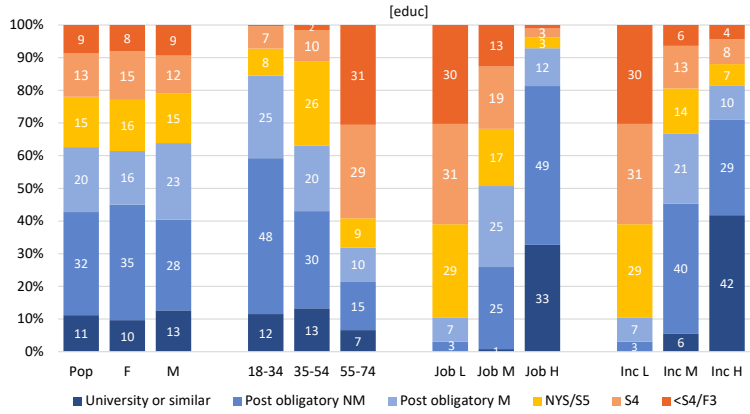
Comments

- Around 40% of men and women reported a 'professional' or 'non manual qualified' occupation and ~30% reported no qualification or a semi-skilled manual qualification.
- The distribution of job categories was similar in the 18-34 vs. 35-54-year age categories but there were more persons with an unqualified job in the older age category.
- The prevalence with a higher job qualification was much lower among persons with higher vs lower education levels and among persons with higher vs lower income levels.

Education

Education categories, described earlier in this report, include 'obligatory school not completed (<S4)', 'obligatory school completed (S4)', 'up to S5 (S5)', 'post obligatory vocational (vocational)', 'post obligatory academic (academic)', and 'university or similar high school' (university or equivalent).

Figure 1.2 Level of education by sex, age, job, and income categories



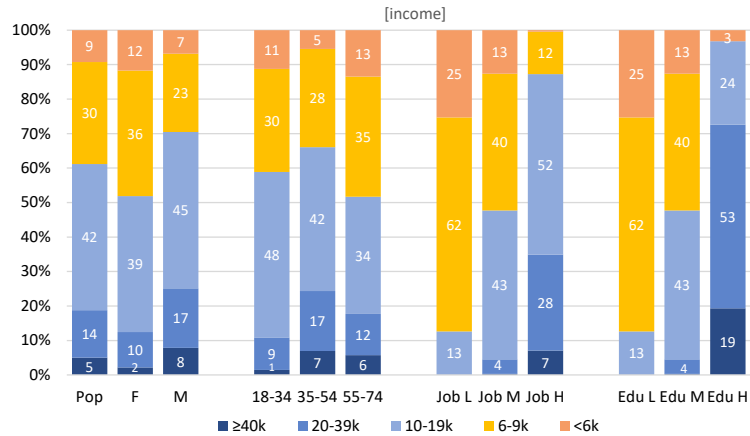
Comments

- The distribution of education categories was similar according to sex, with >60% males and females reporting post obligatory school (i.e. education after the age of 15-16 years) and nearly 10% with advanced education.
- A higher school attainment was strongly and inversely associated with age, a higher job qualification, and a larger income.

Income

Income categories were described earlier in this report and were expected to include all income sources, including salary, bonuses, pension, accessory activities, income from renting premises, etc., expectedly before payment of tax, loans, or other charges.

Figure 1.3 Income by sex, age, job, and education categories

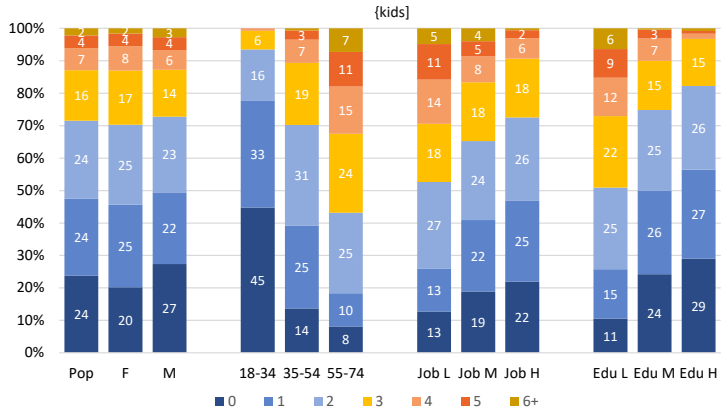


Comments

- Income was higher in males and was associated with higher SES categories.

Number of biological children

Figure 1.4 Number of biological children by sex, age, job, and education categories

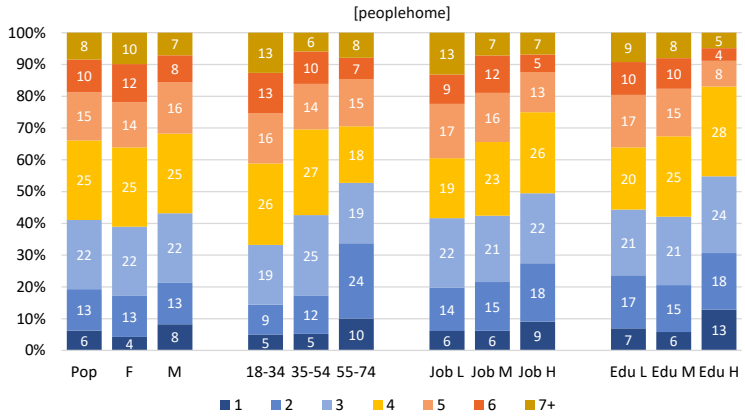


Comments

- Around 25% of all adults aged 18-74 years had ≥3 children, around 50% had 1-2 children, and around a quarter had no children.
- The number of children was associated with increasing age. Given that most people have children at the age of 18-34 years, this reflects a 'period effect', i.e. that individuals tended to have less children over calendar years, consistent with the rapid demographic transition in Seychelles during the past few decades.
- The number of children was also associated inversely with a higher job position and a higher education level, consistent with these social markers being important drivers of the demographic transition (i.e. decreasing fertility rates) observed in most populations.

Number of persons living in the household

Figure 1.5 Number of persons living in participant's households by sex, age, job, and education categories



Comments

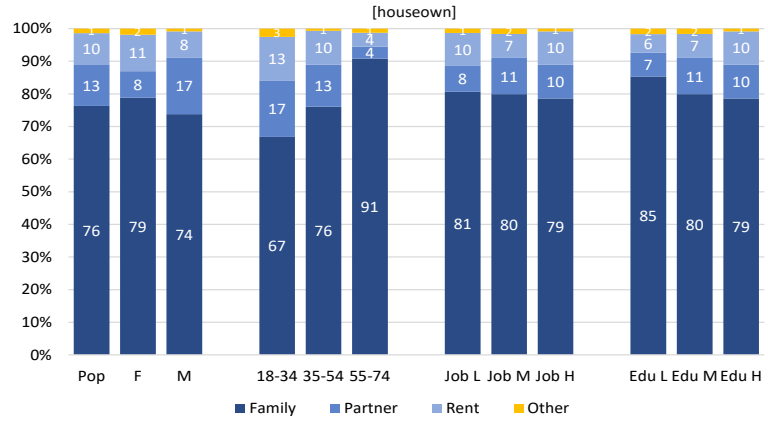
- Around 6% of individuals reported to live alone (i.e. the participant was living alone), 35% reported a household with 2-3 persons, 50% a household with 4-5 persons, and 18% a household with ≥6 persons.
- The number of persons living in the household was lower in younger vs older persons, and slightly lower in persons with higher vs lower job or education categories.
- Overall, the average number of people living in a household was generally quite large (compared to other high-income countries) and differences by socioeconomic status small, possibly suggesting a (still) strong

family cohesion (e.g. households with several generations of family members living together) and/or challenges for young adults to afford living in separate housing premise.

Ownership of residence place

The response options to the question on ownership of the primary residence were: 'I or my family owns it' (Family); 'my partner or his/her family owns it' (Partner); 'I rent it' (Rent); 'other situation' (Other).

Figure 1.6 Ownership of residence place by sex, age, job, and education categories



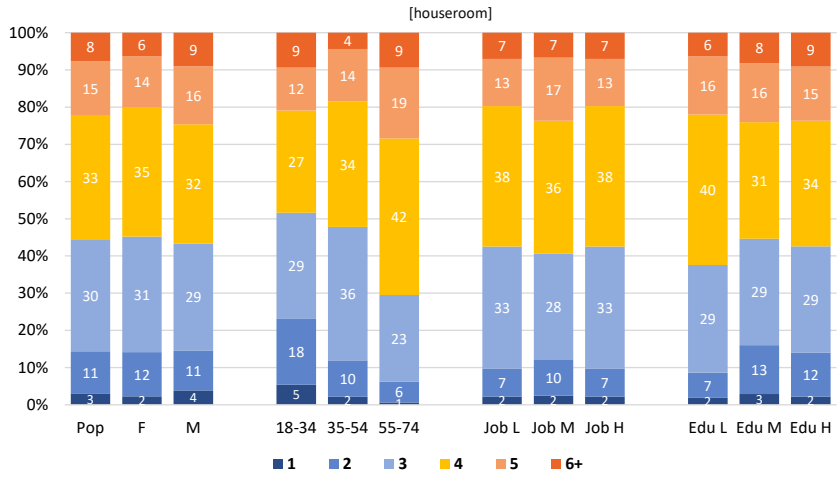
Comments

- As many as 76% of individuals reported owning their primary accommodation place (themselves or their family), 13% lived at their partner's family residence, 13% rented it, and 1% lived in another situation.
- There was no substantial difference by sex, job, and education categories, but ownership raised with age (e.g. 91% at age 55-74 years).
- This high rate of residence ownership (compared to many other high-income countries) may relate to several factors. There may be little need to change residence location when taking up jobs at different workplaces in a small country; a strong family nucleus; government having encouraged ownership of primary housing since several decades (including land redistribution with a piece of land given to every Seychellois in the 1980s); government construction programmes; absence of property tax on a person's primary residence); and house/apartment rental is expensive in the private housing market.

Number of rooms in the primary residence

The question enquired about the number of rooms, including the living room, but excluding the kitchen, toilet, and terrasse. Prevalence for all, males and females are standardized for age.

Figure 1.7 Number of rooms in participants' house or flat by sex, age, job, and education categories



Comments

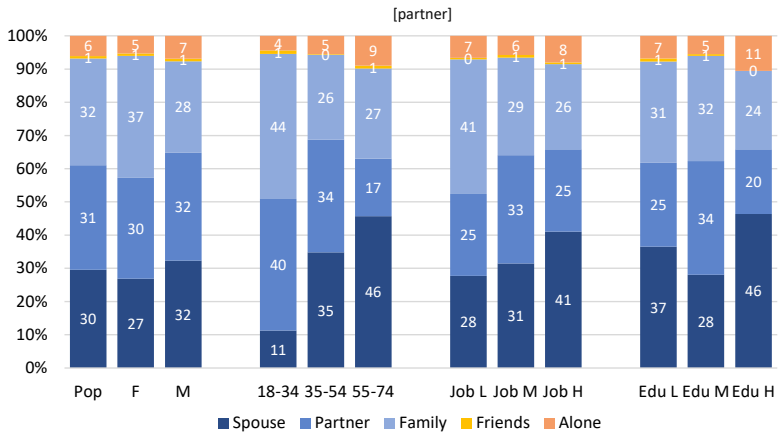
- Around 85% of residence premises had ≥3 rooms, 55% ≥4 rooms, and 22% ≥5 rooms.
- The number of rooms increased with respondents' age but did not vary substantially with socio-economic status variables.
- Although many households comprise a fairly large number of members (**Figure 1.5**), many households include many individuals spanning over several generations.

Partner

Staying with a partner (vs not) is known to be associated with healthier behaviours and better NCD outcomes.

The question read: 'Do you stay in the same house/flat with a partner'? Response options were: 'I stay with my husband/wife' (Spouse); 'I stay with my partner' (Partner); 'I have no partner and I stay with one or several family members' (Family); 'I have no partner and I stay with one or several friends' (Friends); and 'I stay alone'.

Figure 1.8 Living with a partner by sex, age, job, and education categories



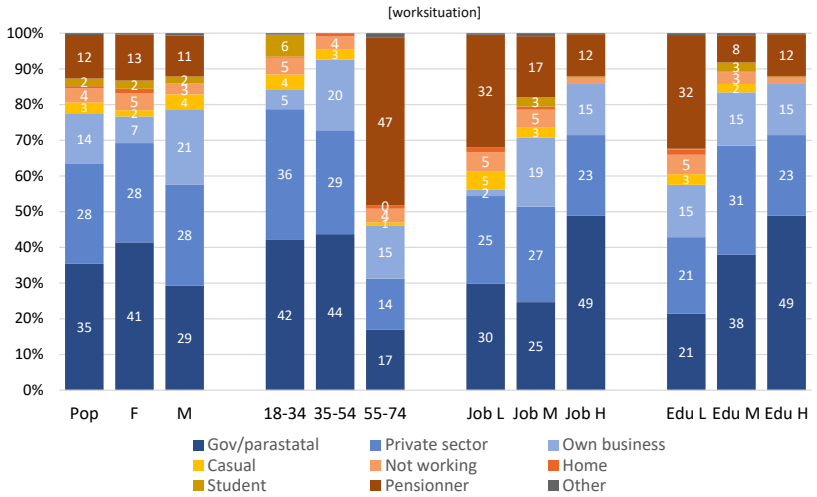
Comments

- Around 30% of the individuals were currently living with either a spouse (married), 31% with a partner (non-married), and 32% with one or several family members (implicitly not with a partner).
- Only 6% were living alone (9% at age 55-74 years).
- Living with a married partner increased with age (from 11% at age 18-34 to 46% at age 55-74 years) and was slightly more frequent for persons of higher vs lower job/education categories.
- Of note, the question assessed the current living situation, not the civil status (e.g. a widowed person may live with a partner, a married person may live alone or with another partner, etc.).

Work situation

The question assessed the current work situation as: 'employed by government or parastatal' (Government/parastatal, including government programmes such as 'health carer' taking care of disabled persons, etc.), 'employed by a private company' (Private sector); 'having his/her own business' (Own business); 'casual worker' (Casual); 'currently working for any reason' (Not working), 'staying at home such as housewife' (Home); 'student' (Student); 'pensioner' (Pensioner); 'other situation' (Other).

Figure 1.9 Work situation by sex, age, job, and education categories

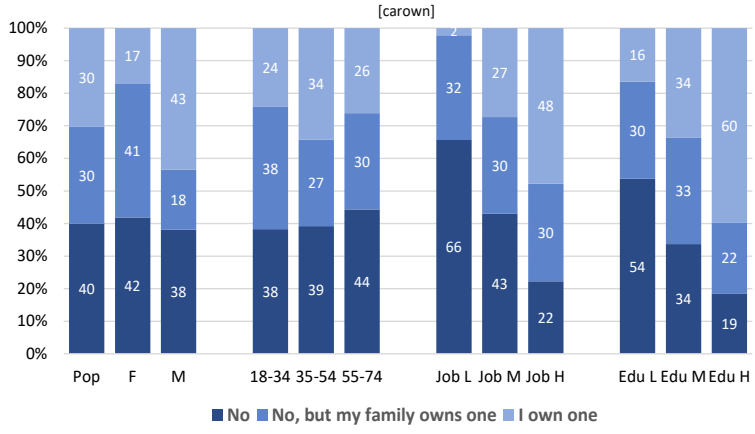


Comments

- 35% of individuals aged 18-74 years reported working at a government or parastatal workplace (this includes government-sponsored programmes, e.g. home carers, government cleaning agencies, etc); 28% worked in the private sector; 14% had their own business (this includes small 1-2 person businesses such as taxi driver, small cleaning agency, craftsperson, etc); and 3% were casual workers (e.g. stevedores, handyman, etc.).
- Only 4% of adults reported to not be working (including due to medical reasons). This reflects a high employment rate among both men and women.
- The proportions working at home (which includes 'housewife' without other work for pay) was very small (<1%), in line with active professional engagement and financial independence of most women in Seychelles.
- Of note, a substantial proportion of individuals having reached pension age were still working (full or part time), particularly those of higher job and education categories.

Ownership of a vehicle

Figure 1.10 Car ownership by sex, age, job, and education categories

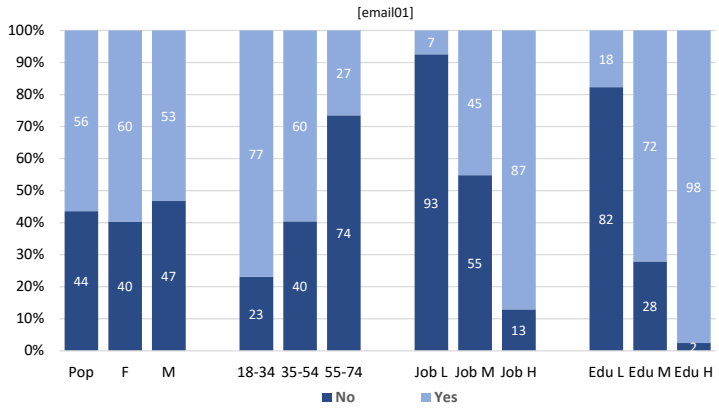


Comments

- 40% of all adults aged 18-74 year owned a car (or pick up or small bus), 30% reported a car was owned by a member of the family, and 30% reported that they or other family members in the same household did not own a car.
- The proportions did not differ largely by sex and age, but car ownership increased markedly among persons with higher socioeconomic status.
- These findings have relevance for different sectors (traffic, pollution, etc) but also in relation to physical inactivity (owing a car has been shown to be associated with less overall physical activity in many studies).

Has an email address

Figure 1.11 Having an email address by sex, age, job and education categories



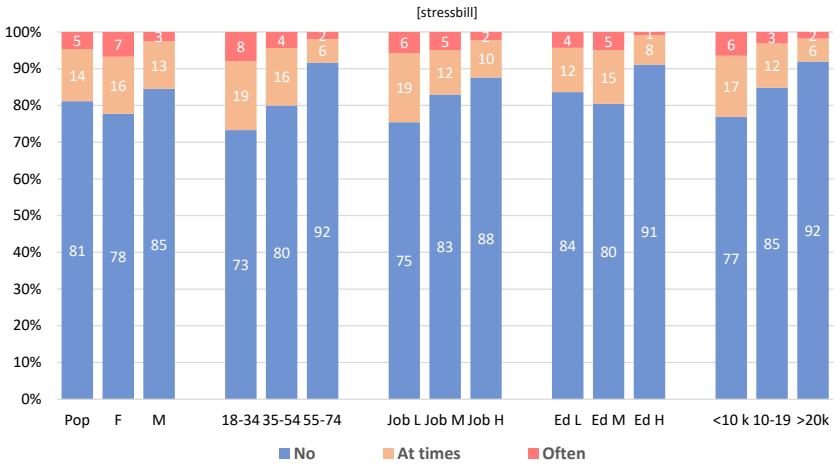
Comments

- 56% had an email address.
- Having an email address was strongly related with a higher SES and inversely with age.

Difficulty in paying routine bills

The question read 'Do you face difficulties paying your ordinary bills (such as water, electricity, telephone, cable TV, etc)'. Answer options included: 'no', 'at times', 'often' and 'always'. Only 9 persons answered 'always' and 42 persons 'often'. The 2 categories were merged into 1 category 'often or always' ('Often' in the figure).

Figure 1.12 Difficulty in paying ordinary bills by sex, age, job, education, and income categories



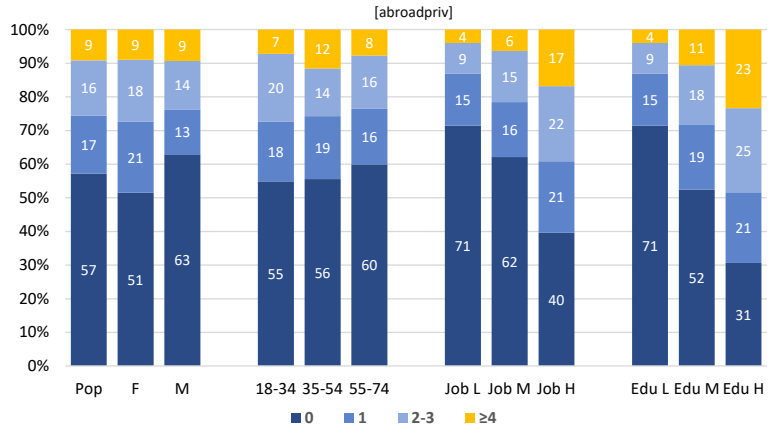
Comments

- Less than 20% of adults reported difficulty in paying ordinary bills 'at times' or 'often', with similar proportions in men and women.
- The proportion was larger in younger vs older individuals and in persons with lower vs higher job categories.
- 8% of persons with a large income reported difficulty, illustrating that difficulty in paying bills is a relative notion.
- The small proportions with difficulty may relate to several factors: health care and education provided at no cost to users through government services, government paying electricity and/or water bills for over 3000 households, relatively small income tax, and substantial social security payment to the elderly.
- The findings have implications for health as it can be implied that many individuals have a substantial purchasing power and may afford, for example, to buy healthy foods, yet also unhealthy products such as unhealthy foods, tobacco, alcohol, or substances.

Traveling abroad for leisure

The question read: “Over the past 5 years, how many times did you travel abroad only for holidays of leisure, not counting for traveling abroad for medical reasons or for work”.

Figure 1.13 Number of travels abroad for leisure in the past 5 years by sex, age, job, and education categories



Comments

- Nearly 60% of all adults had travelled abroad for leisure at least once in the past 5 years (the referred 5-year time interval included COVID and travel limitations), and nearly 10% ≥4 times.
- The proportions did not differ largely according to sex and age but were markedly larger in individuals with higher vs lower job or education categories.

2. Tobacco and substance use

Introduction

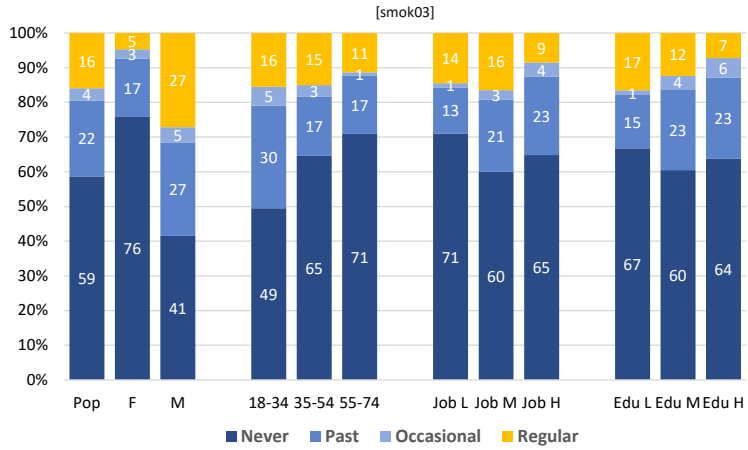
Tobacco use accounts for the largest burden of cardiovascular disease, cancer, and other diseases, causing 9 million deaths worldwide, and expected to rise until 2050. The harm of ordinary (burnt) cigarettes is mainly due to combustion, which produces harmful chemicals, while nicotine is less harmful but causes addiction ('People smoke for nicotine, but they die from the tar' [28]). The smoking habit is most often taken up from an early age (adolescence). Most smokers wish to stop smoking but find it difficult due to addiction. Nicotine is described by WHO as being as addictive as, or more addictive than heroin. Interventions to reduce the prevalence of smoking are described in the last paragraph of this section, consistent with obligations under the Framework Convention on Tobacco Control, a treaty that Seychelles has ratified first in the African region in 2003.

E-cigarettes are less harmful than combustible cigarettes and can help smokers quit combustible cigarettes.[29,30] However, e-cigarettes, particularly those with flavours, can be attractive to young persons, highlighting the need for regulations like those applying for combustible cigarettes (e.g. ban on use in indoor premises, ban on advertising, etc.) and a ban on flavoured products and on single-use disposable devices.

Of note, outdoor and indoor air pollution worldwide, largely through particular matter (PM), cause 8 million deaths worldwide, including cardiovascular disease, chronic respiratory diseases, cancers, and respiratory infections.[31] Concentrations of PM 1, PM 2.5, and PM 10 are recorded in real time by sensors placed in several places in Seychelles. PM concentrations, partly due to fumes from diesel electric power plants and vehicles, often exceed the recommended quality air levels.[32]

Cigarette smoking

Figure 2.1. Prevalence of cigarette smoking by sex, age, and socioeconomic categories



Comments

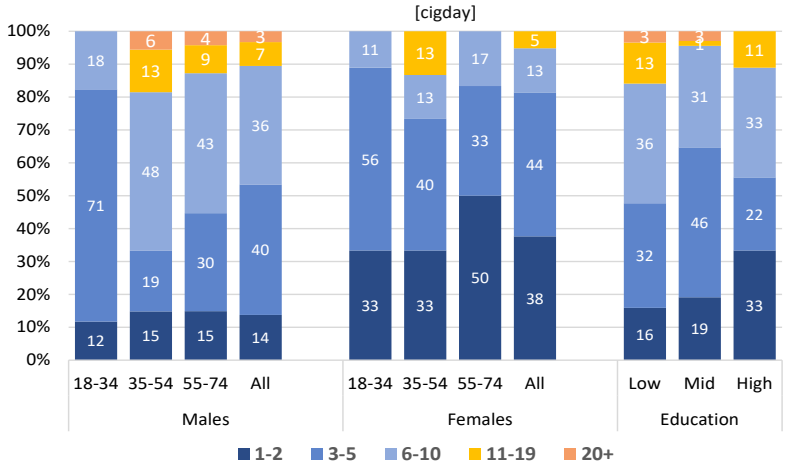
- 15.9% of all adults aged 18-74 years reported smoking cigarettes daily.
- The prevalence was much larger in males (27.1%) than in females (4.7%).
- The prevalence of daily cigarette smoking decreased with age (and the proportion of past smokers increased) and was around two times greater in persons of lower vs higher socioeconomic status.
- 4.5% of men and 2.6% of women reported smoking occasionally.
- The prevalence of occasional smoking was greater among younger vs older persons and in persons with higher vs lower socioeconomic status.

[28] Russell MA et al. Low-tar medium-nicotine cigarettes: a new approach to safer smoking. *BMJ* 1976;1:1430–33. PubMed
[29] Auer R et al. Electronic nicotine delivery systems for smoking cessation. *N Engl J Med* 2024; 390: 601-610. PubMed
[30] Lindson N et al. Electronic cigarettes for smoking cessation. *Cochrane Database Syst Rev* 2024; 1(1): CD010216. PubMed
[31] Fussel J et al. Air pollution and NCDs. Routledge 2023 Web Link
[32] Worldwide Air Quality AirNet Sensor Network, e.g. Victoria: https://aqicn.org/station/@421585/

- When asked informally about their smoking pattern, many occasional smokers, particularly women, mentioned that they would smoke 1 cigarette only on some special festive occasions, often with an alcohol drink (and abstain on other days).

Number of cigarettes smoked among daily smokers

Figure 2.2 Number of cigarettes smoked per day in male and female smokers by sex, age, and education categories



Comments

- The number of cigarettes smoked by regular smokers was larger in males vs females and highest in the 35-54 years age category (for both sexes).
- The average number was 5.4 cigarettes per day in male regular smokers and 4.1 in female regular smokers.
- There may however be some under-reporting in a behaviour that is becoming socially less acceptable.

Shisha, tobacco chewing and e-cigarettes use

Responses options for the questions on shisha use, chewing tobacco, and use of e-cigarettes were: 'no', 'occasionally', 'weekly' and 'every day'.

Table 2.1 Prevalence of shisha use, e-cigarettes use, and tobacco chewing by sex, age, and education categories

	Females				Males				Education		
	18-34	35-54	55-74	All	18-34	35-54	55-74	All	Low	Mid	High
Shisha											
Occasional	0	0	0	0	6.5	1.5	0	2.9	0.6	2.4	0
Daily	2.4	0.8	0	1.1	0.9	0	0.4	0.4	0	0.4	0
Chew tobacco											
Occasional	0.6	0	0	0.2	0	0	0	0	0	0.2	0
Daily	0.0	0	0	0	0	0	0.4	0.1	0	0.2	0
E-cigarettes											
Occasional	10.6	2.7	0	4.7	14.0	1.5	0.4	5.6	0.9	5.8	5.7
Daily	1.2	0	0	0	0.9	0.5	0.4	0.6	0	0.7	0.8

All: age-standardised.

Comments

- *Shisha*. The prevalence of shisha use was relatively low (3.3% in males and 1.1% in females aged 18-74 years) and most often occasional (vs daily).
- Shisha use was more frequent in the younger vs older age categories and uncommon in the highest education category.
- *Chewing tobacco*. The prevalence was very low (0.1% among males and 0.2% among females; only 2 persons in the study).

- *Electronic cigarettes*. The prevalence of e-cigarette use was 5.6% in males and 4.7% in females aged 18-74 years.
- Use was much more frequent in the youngest 18-34 age category (occasional or daily use in 12% in females and 15% in males aged 18-34 years) and in the higher vs lower education categories.

Table 2.2 Relation between e-cigarette use and combustible cigarettes

..	User of combustible cigarettes				
	Never	Past	Occas.	Daily	Total
User of e-cigarettes					
No use	766	208	28	154	1,156
Occasional	**0**	**27**	7	10	44
Regular	**0**	**4**	0	1	5
Total	766	239	35	165	1,205

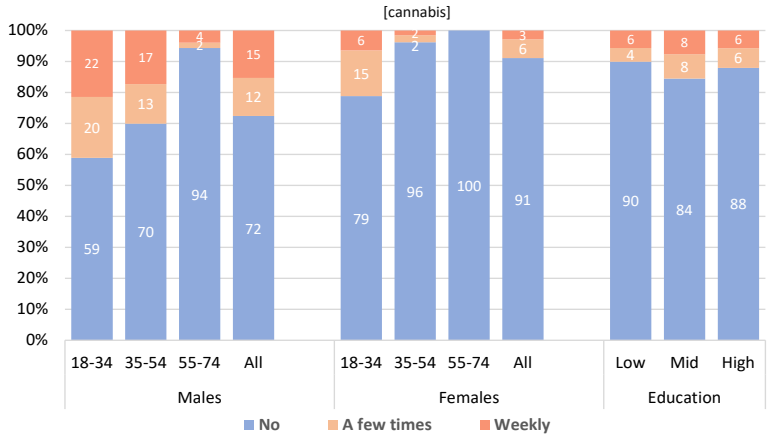
Comments

- A large proportion of e-cigarette users ([27+4] / [44+5] = 63%) were past smokers of combustible cigarettes, suggesting that a significant proportion of cigarette smokers had switched to e-cigarettes.
- Inversely, no e-cigarette users were never-smokers of combustible cigarettes, suggesting no substantial uptake of e-cigarettes among adults who had never smoked combustible cigarettes.

Cannabis

One question assessed the use of cannabis, marijuana, or hashish (cannabis) iin the past 12 months with 3 response options: 'no', 'a few times', 'weekly'.

Figure 2.3 Prevalence of cannabis use in the past 12 months by sex, age, and job categories



Comments

- The prevalence of cannabis use (regular or occasional) in the last 12 months was 27% in males and 9% in females at age 18-74.
- The prevalence was highest at age 18-34 years (males: 42%; females: 21%).
- The prevalence was not markedly different according to job category.
- The estimates may be underestimated given the illegal nature of cannabis.

Other substances

Use of heroin (or methadone), fentanyl, cocaine (or crack), and amphetamines (ecstasy, meth, crystal, etc.) in the past 12 months was assessed using separate questions on each of these substances with response options being 'no', 'a few times' and 'regularly'. These questions were not asked to participants aged ≥65 years.

Table 2.3 Prevalence (%) of occasional or regular substance use in the past 12 months by substance, sex, age, and job categories

	Female				Male				Job		
	18-34	35-54	55-74	All	18-34	35-54	55-74	All	Low	Mid	High
Heroin or methadone	0.6	0.4	0.0	0.3	1.9	4.1	0.9	2.3	3.1	1.1	0.0
Cocaine or crack	1.8	0.4	0.0	0.6	1.9	1.0	0.0	0.9	0.4	0.3	0.3
Fentanyl	0.6	0.0	0.0	0.1	1.9	0.5	0.0	0.7	0.4	1.1	0.0
Amphetamines	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.5	0.4	0.2	0.0
Any substance above	2.9	0.8	0.0	1.0	5.6	4.6	0.9	3.4	4.0	2.3	0.3

All: age-standardised.

Comments

- 3.4% of all men and 1.0% of all women aged 18-64 years reported using one or more substance occasionally or regularly (not including marijuana) in the past 12 months.
- The prevalence of 2.1% in the population 18-74 would corresponds to around 1700 users in Seychelles, which is lower than the 3166 users enrolled in the government methadone programme at end of 2022.[33]
- Underestimation of 'hard drugs' use in the survey can be due to *underreporting* (e.g. participants not willing to disclose their use) and *underrepresentation* of substance users in the survey (e.g. difficulty to contact users to invite them to participate the survey and/or some contacted users were unwilling to attend the survey).
- None withstanding these limitations, the data illustrate the large magnitude of substance use and further confirm that all these substances can be procured locally.

Associations of cigarette, e-cigarettes, cannabis, and other substances with selected variables

Table 2.4 Associations of smoking, e-cigarette use, cannabis use, other substances use, and alcohol use with selected variables

		Cigarettes R2:0.23		E-cigarettes R2: 0.20		Cannabis R2: 0.25		Heroine/subst. R2: 0.26		Alcohol R2: 0.03	
	Prevalence	OR	P	OR	P	OR	P	OR	P	OR	P
Male	43.2	4.82	***	0.76	ns	3.39	***	1.67	ns	1.21	ns
Age (vs 55-64)	25.0	1		1		1		1		1	
Age 35-54	46.8	1.14	ns	3.62	ns	3.39	***	2.79	ns	1.68	*
Age 18-34	28.2	1.30	ns	15.5	**	9.35	***	7.71	**	1.64	ns
Education (vs low)	36.9	1		1				1		1	
Mid	51.7	0.50	**	2.51	*	1.09	ns	0.22	**	0.90	ns
High	11.4	0.34	**	2.92	*	0.74	ns	-		0.62	ns
Cigarette (vs never)											
Current smoker	14.5	-		1.55	ns	4.84	***	2.27	ns	1.99	*
Past smoker		-		2.72	*	3.92	**	2.45	ns	1.46	ns
E-cigarettes	4.9	1.25	ns	-		3.74	***	0.32	ns	1.53	ns
Cannabis	16.3	4.19	***	3.21	**	-		7.22	***	0.94	ns
Heroine/substances	2.4	1.98	ns	0.40	ns	6.55	***	-		0.21	ns
Alcohol (4 categories)	11.9	1.37	***	1.11	ns	1.12	ns	0.60	*	-	

Heroine/subst.: including other substances such as methadone, cocaine, fentanyl, ecstasy, etc.
High alcohol: percentile 80 of consumption in the population.
OR: odds ratio; 1 is for no association; >1 is a direct association, <1 is an inverse association (e.g. an OR 0.5 means 2 times smaller).
R2 (range 0-1) means to which extent the variables predict the outcome.
P: ns: not statically significant; *: <0.1; *: <0.01; ***: <0.001. Red colour highlights direct associaations and blue colour inverse associations.

Comments

- Of note, associations in cross-sectional surveys do not inform if a predicting 'explanatory' variable is a cause (e.g. a predisposing factor), a co-occurrence, or a consequence (e.g. a pathway to use of another substance).
- *Cigarette smoking* was associated with male sex, cannabis use, alcohol use, and lower education status.
- *E-cigarette use* was associated with a younger age, higher education, and cannabis use, with no association with sex, cigarette smoking, substance use, and alcohol intake.
- *Cannabis use* was associated with male sex, a younger age, cigarette smoking, e-cigarette use, and substance use. There was no association with education.
- *Heroin or other (hard) substance use* was associated with a younger age, lower education, and cannabis use.

[33] Annual health-sector performance report 2022. Ministry of Health, 2023.

Interventions to curb tobacco use

- *Tobacco*. A high tax is the most powerful intervention to curb tobacco use in the population. Other measures, addressed in the Seychelles 2009 Tobacco Control Act, include a ban on smoking in enclosed public places and transport, a total ban on all advertising, promotion and sponsorship, and large health warnings on cigarette packages.
- Other measures to be considered may include:
  - A further increase in excise tax on tobacco products (so that tax represents >70% of the cigarette sale price, as advocated by WHO).
  - A regulation requiring plain packages for all tobacco products sold in the country.
  - A tracking and tracing system of tobacco products should be developed to tackle counterfeit products and smuggling.
- *Shisha use*, which is a tobacco product, is regulated in Seychelles under the 2009 Tobacco Control Act. The ban on shisha use in public enclosed places (particularly in restaurants and bars) should be enforced strictly.
- *E-cigarettes*. An amendment to the Tobacco Control Act regulation is being finalised to regulate the sale and use of electronic nicotine delivery systems to make their use and sale liable to the same regulations applying to tobacco products with, in addition, a ban on the sale of products with flavours and single use disposable devices.
- *Substances.* A discussion of policy for substances is beyond the scope of this report.

- Interventions to curb tobacco use in the population are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in several chapters of *Noncommunicable Diseases: A Compendium*, Routledge 2023 (e.g. Tobacco use, The Framework Convention on Tobacco Control, Air pollution and NCDs).

3. Physical inactivity

Introduction

Physical activity (PA) promotes health while physical *inactivity* is a risk factor for NCDs (e.g. CVD, diabetes, and cancer). GPAQ measure PA (not physical inactivity).

Physical activity (PA) was assessed with the 16-question GPAQ instrument, which is part of the WHO STEPS NCD survey methodology. Questions assess PA at work (separately for moderate and vigorous PA), recreational PA (separately for moderate and vigorous PA) and walking time (excluding walking as part of work or recreational activities). For each of these 3 PA domains, a question assesses if a person does PA for ≥10 minutes consecutively. If yes, questions enquire on the number of days per week and duration of the activity.

Self-reported PA has limited accuracy because of recall bias (i.e. difficulty in abstracting total physical activity made during a past week) and responses can be under or over reported. As respondents are requested to report PA when practiced for ≥10 minutes *consecutively*, this can lead to underestimation of true PA levels (i.e. total voluntary energy expenditure).

Prevalence of physical activity on ≥1 day per week

Figure 3.1 Prevalence of ≥1 day/week with moderate or or vigorous PA as part of *work* (incl. at home)

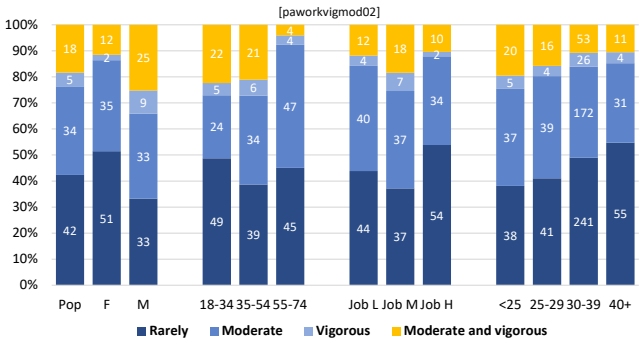


Figure 3.2 Prevalence of ≥1 day/week with moderate moderate or vigorous PA as part of *leisure activity*

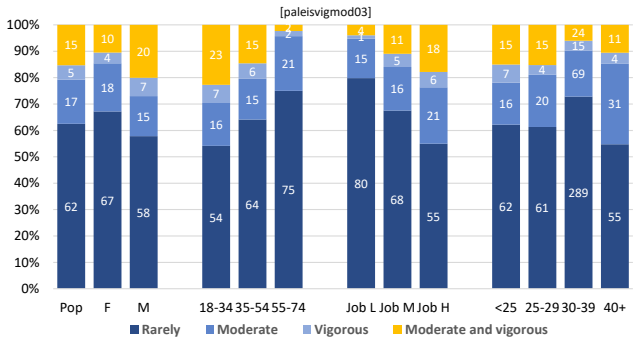
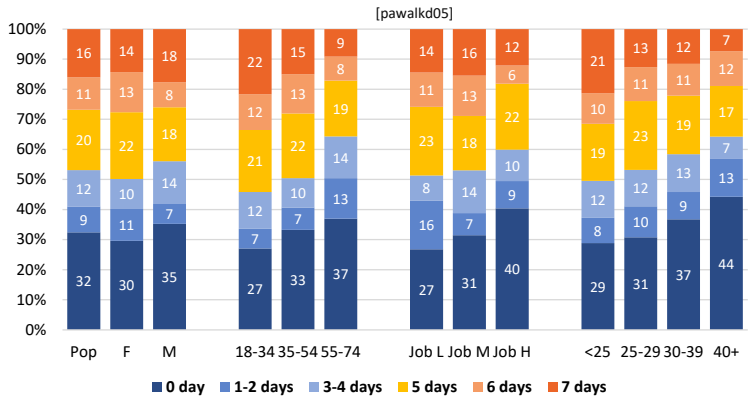


Figure 3.3 Number of days walking for ≥10 min per week to go to/from places (not at work & not for leisure)



Comments

- Large proportions of adults did *not* engage in any PA *at work* for ≥10 min consecutively on any day of the week with larger proportions of inactivity in females (51% females vs 33% males) and in individuals with larger vs lower BMI.
- Two thirds of adults did not report any PA *at leisure time* in a typical week. The proportions were larger in females, in older persons, and in persons with lower SES.

- Two thirds of adults reported *walking* to/from places for ≥10 min consecutively on ≥1 day per week and ~50% walked on ≥5 days per week. The proportions were larger in younger persons and slightly larger in persons with low BMI, females, and in persons with lower SES.
- *Overall*, fairly large proportions of adults reported no or little PA at work or at leisure time. The fairly large proportions walking on ≥1 day per week suggest that walking from/to places is a significant source of PA in large segments of the population.

Metabolic equivalents (MET) derived from physical activity

The GPAQ questionnaire enables to calculate energy expenditure attributable to physical activity in MET-minutes, with 1 MET-minute corresponding to approximately 1 kcal/kg/hour. 1 MET is the energy cost of sitting. Running corresponds to 8-9 MET (for persons weighing 70 kg). Moderate and vigorous PA at work and during recreational activity correspond to 4 MET and 8 MET, respectively, and walking to 4 MET.

For each of the 3 domains (PA at work, PA at leisure, and walking time), the number of days with PA ≥10 min in a typical week was multiplied by duration and intensity (moderate or vigorous) of PA reported on those days.

The American Heart Association (AHA) and WHO suggest that an individual should have ≥150 minutes per week of moderate-intensity aerobic activity or ≥75 minutes per week of vigorous aerobic activity, or a combination of both, preferably spread throughout the week. This translates to approximately 600-885 MET-minutes per week. For example, PA of moderate intensity (4 MET) for 150 minutes (e.g. 30 minutes per day on 5 days per week) contributes 600 MET-minutes (150*4 = 600) per week. 60 minutes of PA of moderate intensity on 5 days per week correspond to 1200 MET-minutes (5*60*4 = 1200).

Table 3.1 Mean MET-minutes per week (energy expenditure due to voluntary PA) by domain of PA, sex, and age.

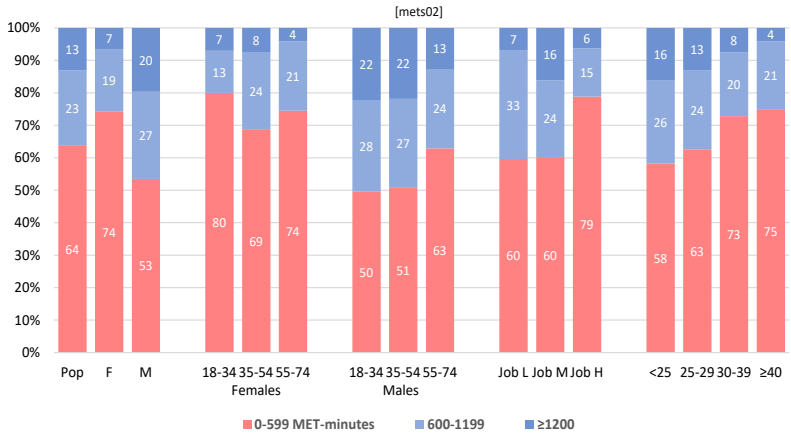
Domain	Intensitiy	Females 18-74		Males 18-74		Females			Males			Job		
		MET-min	% of Total	MET-min	% of Total	18-34	35-54	55-74	18-34	35-54	55-74	Low	Mid	High
At work	Vigorous	64	*14.5*	170	*22.7*	75	78	27	182	228	66	82	136	46
	Moderate	191	*43.5*	258	*34.5*	141	215	221	226	282	267	281	252	152
	Total (at work)	254	*58.0*	428	*57.2*	216	293	248	407	510	333	363	388	198
Walking		110	*25.1*	169	*22.7*	107	107	119	132	230	129	140	132	98
Recreational	Vigorous	30	*6.8*	73	*9.8*	38	40	3	148	47	12	18	43	42
	Moderate	44	*10.1*	77	*10.3*	52	44	33	112	59	57	37	54	65
	Total (leisure)	74	*16.8*	150	*20.1*	90	84	36	260	106	69	55	96	107
All	Total	438	*100*	747	*100*	413	484	403	799	846	531	558	616	402

Comments

- Average MET-minutes per week was larger in males, but not markedly different according to age.
- PA at work was the larger contributor of energy expenditure from PA, followed by walking to/from places.
- The large average number of MET-minutes from PA at work among men aged 35-54 years may be partly driven by high PA among individuals with strenuous occupations, e.g. in stevedores, farmers, masons, etc.
- Mean METS-minutes from PA at work was larger among persons with lower SES,
- PA at leisure time contributed <21% of total energy from PA.
- PA at leisure time was associated with a higher SES and with a younger age, particularly among males.

Sufficient level of PA and physical inactivity (at work, leisure, or walking) by age, sex, and BMI

Figure 3.4 Prevalence of sufficient PA (≥600 MET-minutes per week) by sex, age, job, and BMI categories



Comments

- Only one third of adults (around 50% of males and 25% of females) met the recommended minimal target for sufficient PA (≥600 MET-minutes per week).
- The proportions *not* meeting sufficient PA (i.e. physical inactivity) were larger among females, older persons and persons with higher BMI.

Travelling from home to different places

Table 3.2 Walking time from home to the nearest bus stop from home

Time	Percent
<5 min	46
5-10 min	33
10-20 min	14
20-30 min	3
30+ min	1
La Digue	3

Comments. Nearly 50% of individuals lived at a short walking distance from a bus station (<5 minutes) and 80% at a walking distance of <10 min (except in the small La Digue island where there is no bus service). This emphasizes the density and convenience of bus lines in the country.

Figure 3.5 Prevalence taking a bus to go to places

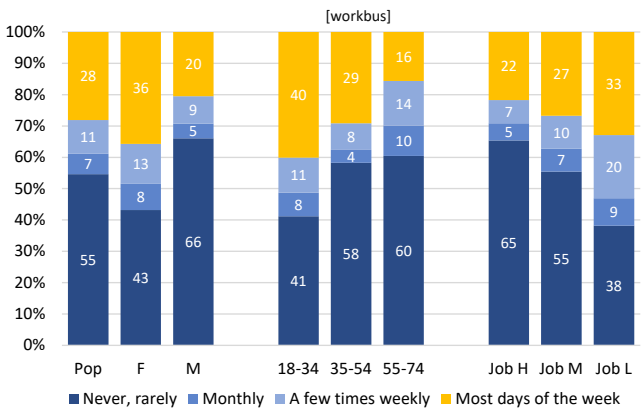
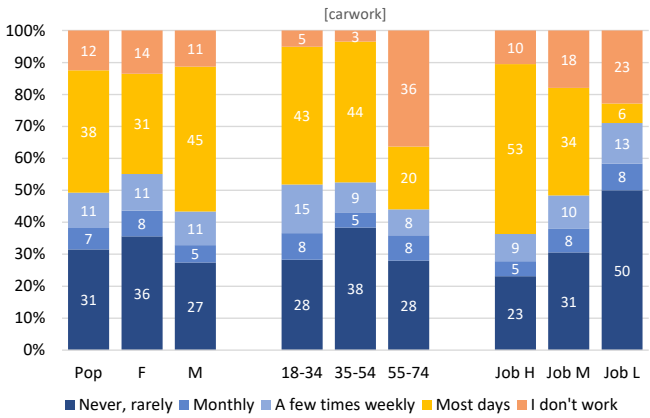


Figure 3.6 Prevalence taking a car to go to work



Comments

- 55% of adults never or rarely took a bus to go to/from work, shops, church, etc.
- The proportions taking a bus were larger in females, older persons, and individuals with a lower SES.
- 38% of adults commuted to their workplace with a private care on most days of the week.
- The proportion was higher in males and in persons with higher SES.
- The proportions of adults who owned a car is displayed in **Figure 1.10**.

Association of walking time and MET-minutes with selected variables including owning a car

Table 3.3 Associations of walking time to go to/from places (excluding walking for work and leisure) and MET-minutes (i.e. total energy expenditure from all PA) with car ownership, sex, age, job, and BMI categories

	Min walking per week (not incl. at work or for leisure)		Total MET-min per week from all PA domains	
	Reg coef.	P-value	Reg coef.	P-value
Male sex	34	**	215	0.000
Age (18.34 ref)	-		-	
Age 35-54	15	ns	65	0.152
Age 55-74	3	ns	-117	0.010
Car ownership (not, ref)	-		-	
Car in the household	-33	**	-56	0.172
Owns a car	-83	***	-71	0.116
Job (high, ref)	-		-	
Job mid	14	ns	176	0.000
Job low	15	ns	209	0.000
BMI (BMI<25, ref)	-			
25-29	-2	ns	-33	0.456
30-39	-9	ns	-144	0.001
≥40	-46	*	-195	0.006

Reg coef: multivariate regression coefficient (numbers of minutes/METS-min).
For example, those owning a car wakk 83 min less per week than those not owning a car.
P: ns: not significant; * <0.05; **: <0.01; ***: <0.001.

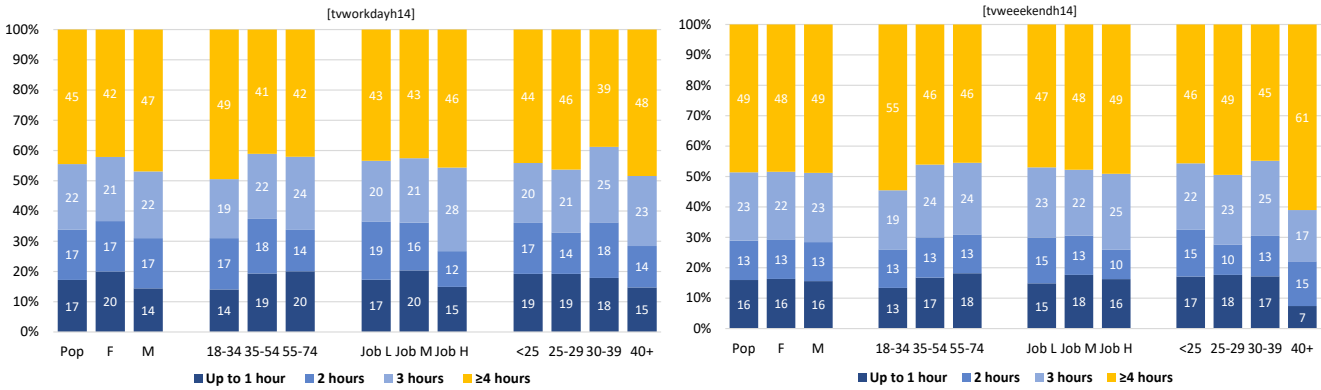
Comments

- Walking time to/from places and METS-minutes per week (i.e. total energy expenditure from PA for work, walking, and PA at leisure time) were larger in males and persons with a lower SES.
- Walking time (min per week) to/from places was lower in individuals owning a car (40% owned a car, 30% had a car in the household) and individuals with a higher BMI.

Screen time

Two questions assessed screen viewing time. The questions read: 'In a typical [weekday] [weekend], how many hours do you spend watching TV, your phone, a tablet, or using internet, per day?

Figure 3.7 Distribution of screen time during weekdays (left) and weekend (right) by sex, age, job, and BMI



Comments

- Nearly half of people spent ≥3 hours per day on workdays or on weekends watching a screen (tablets, phone, computer, or TV).
- Screening time was similar across population subgroups, although slightly larger among younger persons and among persons with severe obesity.
- The questions did not distinguish screen types used (TV, computer, phone) nor if screen time was aimed for work of leisure (but screen time during weekends is likely mostly related to leisure).
- This implies that substantial time could be available for other activities (e.g. physical activity).

Interventions that promote PA and reduce physical inactivity

- Awareness campaigns are useful to inform the public on the benefits of regular physical activity for all.
- Policies in several sectors can contribute to promote PA in the population, including developing bus lanes (this encourages bus use and implies some walking time to walk to/from bus stops).
- Cycling lanes (including for electric bicycles) enables safe cycling and can promote PA. This could be developed, for example, along the roads between Perseverance-Victoria-Roche Caiman where a large proportion of the total population of Seychelles lives and works. This would also help minimise traffic and reduce air pollution.
- Building and maintaining sidewalks in/around towns and districts makes walking safe and attractive, including structures that provide shades for side-walks – to protect from sun and rain, and promote PA.
- Increasing free drinking water-points in and around town can also help promote walking.
- Various programmes in the community can promote PA among specific population subgroups (youth, elderly, women, etc).

- Interventions to promote physical activity are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (Physical inactivity)**.**

4. Diet

Introduction

A healthy diet is a major component of good health. Unhealthy diet is estimated to account for 11 million deaths worldwide. Several common foods have beneficial effect on health, particularly vegetables, fruit, unrefined grains, tubers, and seeds. Inversely, highly processed foods (including sugary drinks and junk food) usually contain large amounts of saturated sugar, saturated fat, and salt, which have detrimental impact on health and increase risk of CVD, kidney disease, cancer, and other health conditions.

Excess energy intake (calorie) intake, particularly from excessive consumption of highly processed foods such as sugary drinks and junk food, but also from large portion sizes of other foods that are high in energy (e.g. white rice) is associated with obesity, which itself is a risk factor for hypertension, diabetes, CVD, and cancer.

Self-reported food intake can be misreported due to recall bias and is often underreported due to social desirability, particularly in persons with overweight/obesity. Results on self-reported diet should therefore be interpreted cautiously.

The frequency of dietary intake was assessed with questions on food items reading: ‘On average, on how many days per week do you use food X’ with 5 response options: ‘never or rarely’, ‘1-2 days per week’, ‘3-4 days per week’, ‘5-6 days per week’, and ‘every day’. The number of ‘portions’ eaten on a day was also assessed in the survey but are not shown in this report for concision.

Frequency of intake of selected foods and associations with sex, age, and job categories

(see next page)

Table 4.1. Weekly frequency intake of selected foods and associations with sex, age, job, and BMI categories

		Frequency (%)					Multivariate associations (regression coefficient, p value)							
Description	Food	Never rarely	1-2 day/wk	3-4 days/wk	5-6 days/wk	Every day	SexM		Age		Job		BMI	
Fresh, frozen, canned. Banana, mango, starfruit, orange, apple, grape, etc.	**Fruit**	7	26	22	9	35	-0.30	***	0.59	***	0.14	*	-	
Fresh, frozen, canned. Carrot, cabbage, eggplant, pumpkin, beans, green papaya, lentils, etc. ('legim')	**Vegetables**	2	9	19	12	58	-0.15	*	0.34	***	-		-	
	Rice	2	5	15	20	57	0.26	***	-		-0.29	***	-0.11	**
Fresh, toasted, sandwiches.	**Bread**	12	20	22	10	36	0.19	*	-		-0.25	***	-0.14	*
Spaghetti, macaroni, etc.	**Pasta**	35	60	5	0.2	0.1	-0.09	**	-0.18	***	0.07	**	-	
Boilled, backed, fried, salad, etc.	**Potato**		13	57	21	5			-0.29	***	-		-	
Breadfruit, cassava, sweet potato, plantain, etc.	**Staple food**		39	45	11	2	-		0.11	*	-		-	
	Lentils		14	48	27	6	-		-		-0.09	*	-	
Green papaya, pumpkins, eggplant, gourd, etc.	**Chutney**	9	41	36	6	7	-		0.15	***	-		-	
Tomato, lettuce, watercress, carrots, cabbage, cucumber, etc.	**Salad**	5	18	32	13	31	-0.32	***	-		0.14	**	-	
Fried, omelette, other uses.	**Eggs**	11	43	28	8	10	-		-		-		-	
Plain or flavoured, drink or cereals. Excluding milk added in tea/coffee.	**Milk**	37	18	12	4	28	-		-		-		-	
Sliced, spread.	**Cheese**	28	41	20	5	6	-		-		0.17	***	-	
Natural, plain, flavoured.	**Yaourt**	42	29	16	4	9	-0.30	***	-		-		-	
With meat, poultry, fish, seafood, etc. Often also contains potatoes.	**Curry**	14	62	21	2	1.2	-		-		-		-0.11	*
Fresh, frozen or can.	**Fish**	2	12	29	28	28	0.15	*	0.31	***	-0.37	***	-	
Salted or smoked fish.	**Salted fish**	70	27	3	0.6	0.3	0.11	*	-0.07	***	-		-	
Octopus, prawn, lobster, crab, etc.	**Seafood**	72	24	3	0.4	0.2	-		-0.16	***	0.09	***	-	
Chicken, duck, turkey, etc.	**Poultry**	6	55	29	5	4	-		-0.17	***	-		-	
Fresh, frozen. Pork, beef, lamb. Not accounting for processed meat.	**Red meat**	21	64	12	2	0.6	0.10	*	-0.16	***	-		-	
Processed meat: ham, sausage, bacon, corned beef, lunch meat, etc.	**Processed meat**	26	53	15	2	3	-		-0.32	***	-0.10	**	-	
Bottle, can. Carbonated lemonades.	**Softdrink**	48	28	13	4	7	0.26	***	-0.46	***	-0.17	***	-	
Bottle, can. Excluding fresh juice.	**Fruit juice**	41	29	15	5	11	-		-0.33	***	-		-0.14	*
E.g. RedBull, KiddyBelle, DarkDog, Monster, Glucozade, etc.	**Energy drink**	90	7	2	0.3	0.4	0.10	***	-0.08	***	-		-	
Home-made fresh juice.	**Fresh juice**	50	32	12	2	4	-		-		-		-	
Black, green, lemongrass, etc.	**Tea**	24	10	7	5	54	-		0.80	***	-0.14	*	-	
	Coffee	59	16	8	2	15	0.17	*	-0.11	*	0.37	***	-	
Tap, bottle, etc.	**Water**	0.4	1.2	1.5	1.7	95	-		0.09	***	-		0.04	*

Mode (highest frequency) in blue; significant direct associations in green; significant inverse associations in red.
Frequencies are age-standardised.
Sex: M vs F; age : score 0-2 (low, mid, high); job: score 0-2 (low, mid, high status); bmi: score 0-2 (<25, 25-29, 30+).
P-values: *: <0.05; **: <0.01; ***: <0.001.

Comments

- A detailed description of the numerous findings in the table is beyond the scope of this report.
- Nearly 80% of adults ate rice on ≥5 days per week.
- Large proportions of adults reported frequent consumption of fruit and vegetables, including chutney, lentils, legumes, and staple foods. This enables a sufficient intake of micronutrients and vitamins.
- Nearly 80% ate fish on ≥5days/week and large proportions ate meat and poultry at least once per week.
- Around 20% ate processed meat on ≥3days/week.
- Large proportions used soft drinks and sugar juices (which contain large sugar amounts, e.g. >10 g/100 ml).
- Several associations were found, e.g. higher SES with less fish, less rice, less soft drinks, less processed meat and more legumes.

Frequency of intake of selected common foods by sex, age, job, and BMI categories

Figure 4.1 Vegetables ('legim')

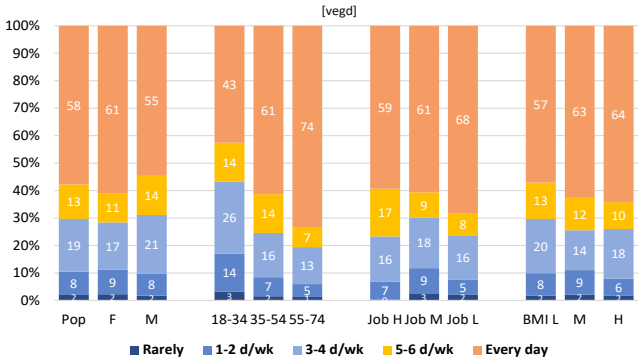


Figure 4.2 Fruit

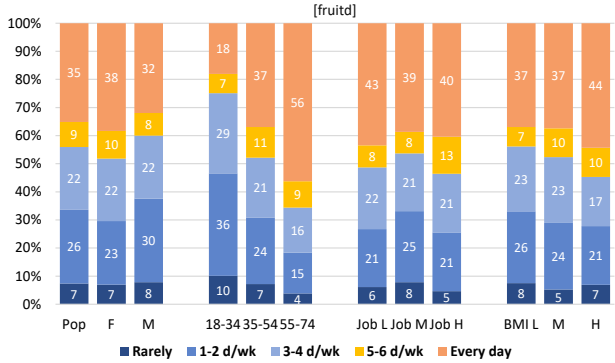


Figure 4.3 Rice

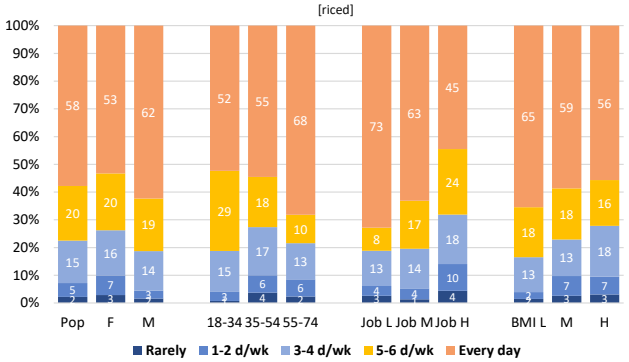


Figure 4.4 Bread

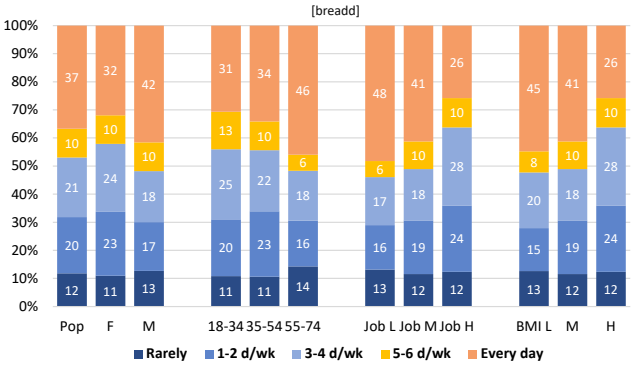


Figure 4.5 Fish (excluding salted fish and seafood)

Figure 4.6 Poultry (chicken, turkey, etc.)

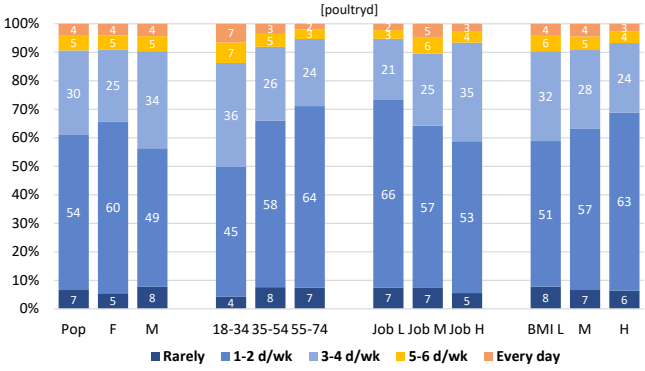
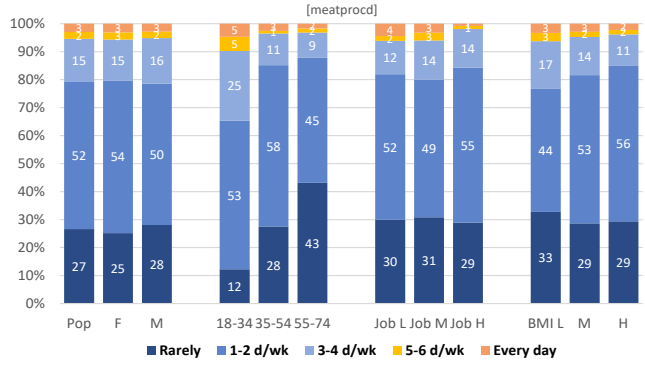


Figure 4.7 Fresh meat (beef, pork, lamb, etc.)

Figure 4.8 Processed meat (ham, bacon, sausage, etc.)



Comments

- Fish consumption and rice (i.e. two major components of the traditional diet) was less frequent in younger persons, individuals with a higher SES, with inverse trends for poultry fresh meat and processed meat.
- These findings suggest a nutrition transition from traditional to 'global' food products.

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Figure 4.9 Soft drinks

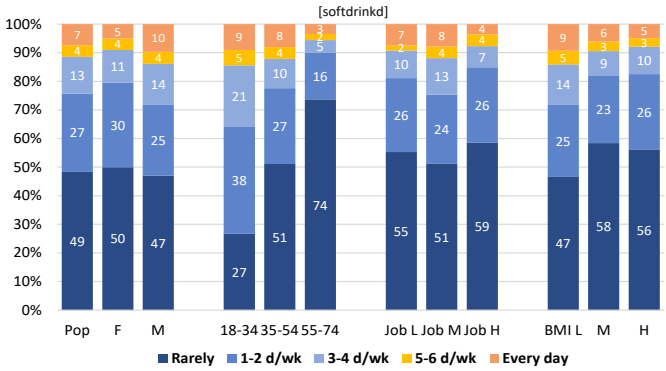


Figure 4.10 Juices (not home-made)

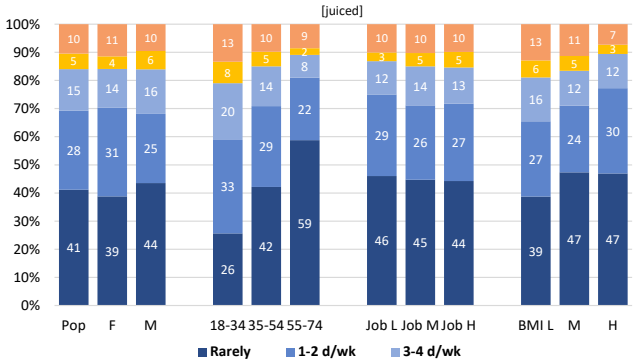


Figure 4.11 Energy drinks (RedBull, Glucozade, etc.)

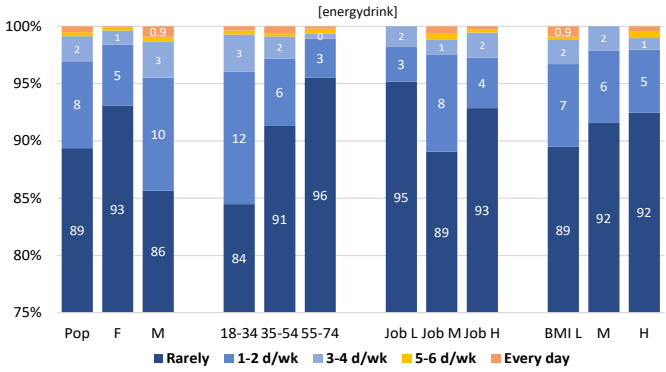


Figure 4.12 Homemade juices

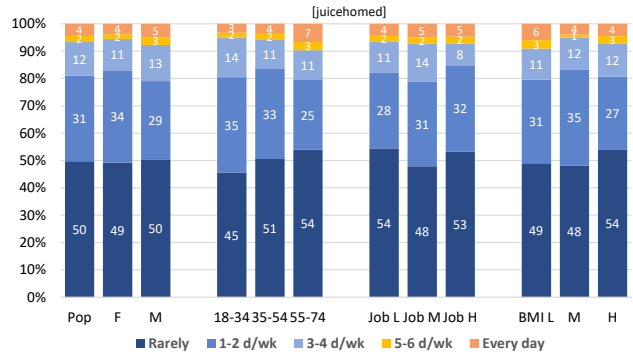


Figure 4.13 Tea

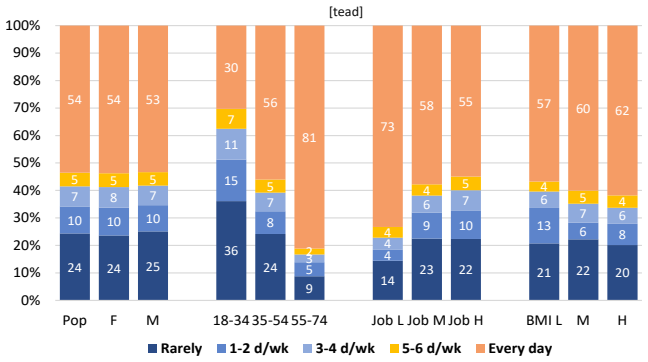


Figure 4.14 Coffee

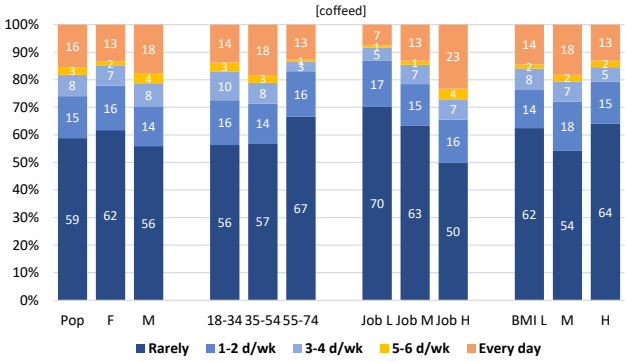


Figure 4.14 Food purchased from takeaway vendors

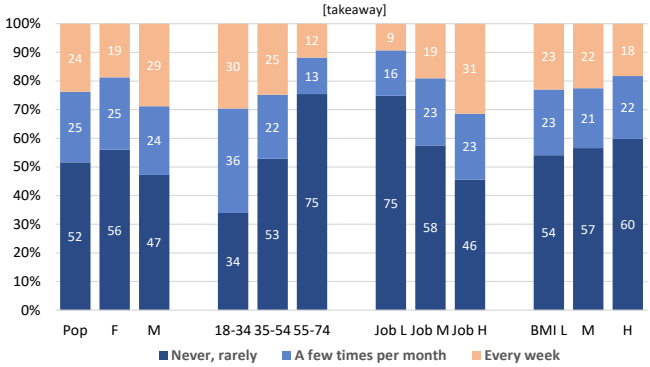
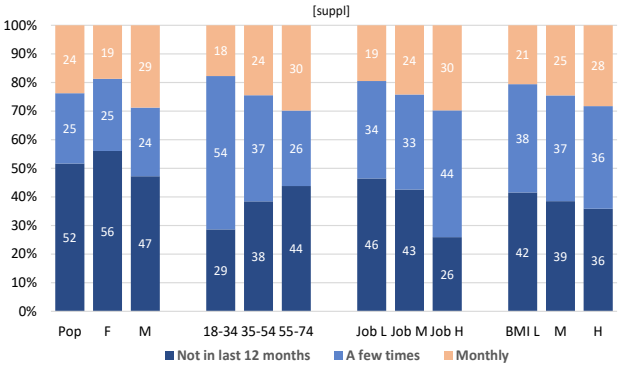


Figure 4.15 Use of medicinal supplements



Comments

- Briefly, the following can be emphasized:
- The frequency of sugary drinks intake (soft drinks and juices) and tea was larger among younger persons with no marked difference by SES (except for tea, consumed more frequently by older persons).
- Coffee consumption was markedly more frequent among persons of higher SES.
- Take away food was consumed more often by younger persons and persons of higher SES.

Frequency of selected dietary patterns

Table 4.2 Frequency of selected dietary patterns, and associations with sex, age, job, and BMI categories

	n	Frequency (%)				Multivariate associations (linear reg coef, p value)							
		1	*2*	*3*		Sex		Age		Job		BMI	
Meals with rice on days eating rice	1175	36	61	3		-		-0.14	***	-0.05	*	-0.09	***
Meals with fish on days eating fish	1182	44	53	3		-		-0.04	*	-0.09	***		
		Never/rarely	*Monthly*	*Weekly*	*Most often*								
Uses **brownbread**	1201	68	8	11	14	0.33	***	0.15	*	0.39	***	-	
Fries fish	1177	10	9	47	34	-		-0.17	***	-0.18	***	-	
Takes food from **takeway** vendors	1197	57	22	21		-0.18	***	-0.29	***	0.20	***	-	
		Never, rarely	*1-2 times per wk*	*3+ times per wk*									
Uses **olive oil**	1202	42	14	44		0.15	**	0.23	***	0.29	***	0.08	*
		Whole milk	*Semi-skim.*	*Skimmed*	*Any/other*								
Milk type for those using milk	731	63	11	20	6	0.16	*	-		0.09	*	0.16	***
		1	*2*	*3*	*4*								
Tea: cups per day on drinking days	952	41	38	15	6	-		-		-		-0.10	**
Coffee: cups per day on drinking days	475	71	19	6	4	-0.14	*	-0.13	**	0.11	*	-0.11	*
		0	*1*	*2*	*3+*								
Tea: small spoons sugar per cup on drinking days	953	29	29	30	11	-0.25	***	-0.42	***	-0.19	***	-0.12	**
Coffee: small spoons sugar per cup on drinking days	476	28	30	30	12	-0.24	**	-0.39	***	-0.34	***	-0.15	**
		1	*2*	*3*	*4+*								
Softdrinks: small bottles, glasses per day on drinking days	552	73	19	4	3	-0.14	*	-0.17	***	-		-	
Juices: small bottles, packets, glasses per day on drinking days	665	76	18	5	2	-0.09	*	-0.19	***	-		-	
Juices homemade: small glasses on drinking days	594	57	28	9	6	-		-0.31	***	-		-	
		1-2	*3-5*	*6-9*	*10+*								
Water: glasses/small bottles on drinking days	1200	5	21	44	30	-0.31	***	0.20	***	-0.10	**	0.11	***
		Unlimited fish/meat	*Less meat/fish*	*No fish or meat but dairy or eggs*	*No fish/meat/ milk/eggs*								
Intake of **meat/fish/milk/eggs/vegan**	1205	60	38	1	0	0.11	**	-		-		-	
		No	*A few times*	*Monthly*									
Medicinal suppl. in past 12 months	1200	38	37	25		0.26	***	-		0.18	***	-	
Medicinal plants ('lafresisan')	1203	63	25	12		-0.8	*	-		-		-	

Mode (highest frequency) in blue; significant direct associations in green; significant inverse associations in red.

Frequencies are not age-standardised.

Sex: M vs F; age : score 0-2 (low, mid, high); job: score 0-2 (low, mid, high status); bmi: score 0-2 (<25, 25-29. 30+).

P-values: *: <0.05; **: <0.01; ***: <0.001.

Comments

- A large proportion of persons ate rice and fish on at least 2 meals per day (among those who ate these foods).
- A large proportion of persons fried fish.
- Substantial proportions of persons used olive oil (a healthy oil).
- Only few people used semi-skimmed or skimmed milk (which contains less unhealthy saturated fats).
- Most people added sugar in tea and/or coffee, often with 2 or more sugar teaspoons.
- Persons with a higher SES tended to consume more brown bread, more olive oil, fried fish less often, and added less sugar in tea/coffee.
- Using food supplements was frequent (this is not needed in most instances given the overall varied diet).

Correlations between dietary intakes of selected foods

Table 4.3 Correlation coefficients between dietary intakes of selected foods

Fish	Fish																	
Poultry	-0.27	Poultry																
Meat fresh	-0.17	0.28	Meat f.															
Meat processed	-0.18	0.24	0.31	Meat p.														
Rice	0.22	-	0.08	0.07	Rice													
Bread	0.08	-	-	0.11	0.24	Bread												
Potatoes	-	0.28	0.24	0.27	-	-	Potato											
Pasta	-0.23	0.12	0.20	0.20	-0.10	0.05	0.17	Pasta										
Tubers (gro manze)	0.18	-	-	-0.09	-0.10	-	-	-	Tuber									
Lentils	0.10	-	0.06	0.07	0.08	-	-	0.07	0.06	Lentils								
Eggs	-	0.10	0.08	0.14	-	0.14	-	-	-	-	Eggs							
Milk	0.15	-	-	-	0.07	0.13	-	-	0.07	-	-	Milk						
Salad	0.14	0.06	-	-	-	-	0.12	-	0.14	0.07	-	0.16	Salad					
Cheese	-0.07	0.11	0.17	0.18	-	0.22	0.17	-	-	0.06	0.21	0.09	-	Cheese				
Fruit	0.19	-0.10	-0.12	-0.15	-0.09	-	-0.18	-0.08	0.23	-	0.09	0.10	0.19	-	Fruit			
Vegetables (legim)	0.19	-	-	-0.06	-0.06	-	-	-	0.19	0.11	0.06	-	0.46	0.07	0.35	Veg.		
Softdrinks	-	0.08	0.19	0.24	0.14	0.09	0.17	0.10	-0.09	-	-	-	-	-	-0.19	-0.15	Soft dr.	
Juice commercial	-	0.09	0.15	0.20	0.12	0.13	0.16	0.12	-	0.06	-	0.12	-	0.14	-	-	0.22	

Correlation coefficients (range 0-1). Red: p value <0.001; blue: p value <0.05: Correlation coefficients that are not statistically significant are not displayed (-).
Each food item is graded in 5 categories: 1: <1 day per week; 2: 1-2 d/wk; 3: 3-4 d/wk; 4: 5-6 d/wk; 5: daily or almost daily.

Comments

- A detailed description of the many findings is beyond the scope of this preliminary report, but the data will be useful to those working in public health nutrition.
- There were many direct correlations between intakes of several traditional foods (e.g. fish, rice, lentils, tuber 'gromanze'), and correlations between intakes of less traditional foods (e.g. meat, processed meat, cheese, soft drinks, etc).
- There were inverse associations between intakes of some 'traditional' foods (e.g. fish, lentils, tuber) and 'less traditional' (e.g. soft drinks, eggs, cheese, pasta).
- This suggests different dietary patterns among different population subgroups.

Sugar intake from consumption of sugar beverages

The estimates assume a sugar content of 30 grams per small bottle, small packet, or glass (300 ml) of soft drink, juice, or energy drink, 20 grams per glass of homemade juice (given that some water may be added to homemade juices, e.g. lime juice) and 5 grams per spoon of sugar added in tea or coffee.

Table 4.4 Mean sugar intake (g/day) from different beverages in the population and in drinkers, by sex and age

	Average sugar intake (in gram) in the whole population					Among drinkers of the specific beverages:		
	Sex		Age			Proportion of drinkers in the study sample	Sugar intake for the 50% of drinkers who drink the least	Sugar intake for the 10% of drinkers who drink the most
	F	M	18-34	35-54	55-74	%	g/day	g/day
Softdrinks	7.8	10.9	15.7	10.3	4.1	46	<20	>47
Juices	10.9	11.1	18.2	10.6	7.1	55	<15	>45
Homemade juices	6.3	6.7	8.7	6.1	5.6	49	<9	>30
Energy drinks	0.8	1.8	2.1	1.3	0.5	9	<12	>60
Tea (sugar added)	5.9	8.1	6.8	6.8	7.0	79	<4	>24
Coffee (sugar added	1.4	2.3	2.8	1.9	1.1	39	<2	>12
Total	33.1	40.9	54.3	37.0	25.4	91	<29	>82

Blue: larger intake in subgroups.

Comments

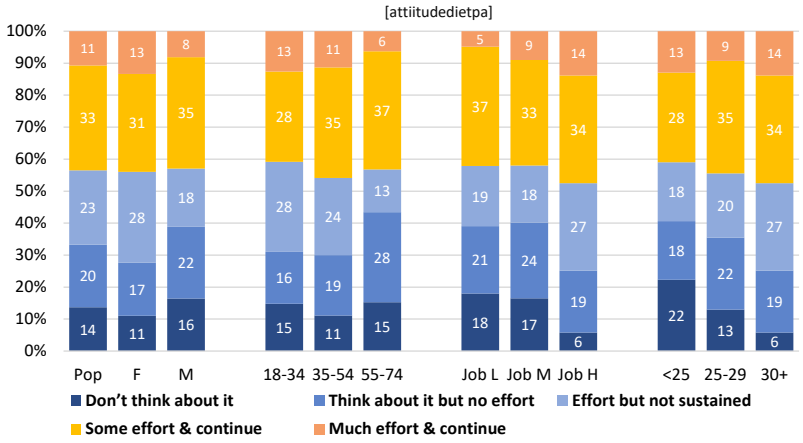
- The mean sugar intake in the population from sugary beverages and sugar added in tea/coffee (i.e. not accounting for sugar from solid foods) was 54 gram per day, which is larger than the maximal total daily sugar intake (from beverages *and* solid foods) of 40 gram recommended by the World Health Organization.
- Soft drinks and juices contributed the largest share of all sugar consumed from sugary drinks.
- Sugar intake from sugary drinks was markedly larger in younger persons, except for sugar added in tea, which was similar at all ages.
- It should be noted that the mean sugar intake at the population level does not reflect that some people drink sugary beverages regularly and others do not or less often.
- Nearly 10% drinkers of soft drinks had sugar intake ≥47 g per day, 10% of juice drinkers had sugar intake >45 g per day, and nearly 10% of drinkers of any sugary beverages had >82 g sugar intake per day.

- *Overall (from all figures and tables above)*, the findings suggest a diet that includes a large variety of foods, including fresh and frozen vegetables and fruit (which bring healthy nutrients and vitamins) but also meat, dairy products, processed foods, and sugar beverages (which can provide large and unhealthy amounts of calories, sugar, saturated fats, and/or salt).
- The findings are consistent with a 'nutrition transition' from a traditional diet (with fish and polished rice contributing the bulk of calories a few decades ago) to a currently 'globalized' diet with foods including both 'healthy' and 'less healthy' foods, which all are nowadays available in nearly all shops in Seychelles.

Attitude and action on adopting a healthy diet and physical activity

A question asked about attitude and action toward adopting a healthy diet and doing regular physical activity. The question read: 'What best describes your attitude and actions regarding taking regular physical activity or having a balanced diet during the past 6 months? with responses being: 'I didn't think much of it', 'I thought of it but didn't take action'; 'I took action but did not sustain it'; 'I took action and still continue'; 'I made a big effort and still continue'.

Figure 4.16 Attitude and action on adopting a healthy diet and doing regular physical activity, by sex, age, job and BMI categories



Comments

- 44% said they do 'some or much effort 'to have a healthy diet and regular physical activity and sustained it (in the past 6 months), with larger proportions in persons with a higher SES and those with higher BMI.
- The proportions doing 'much effort and sustaining it' was 11%, with higher proportions in females and in individuals with a higher SES. This response option may better reflect individuals who engage in substantial effort in relation to adopting a healthy lifestyle.
- These rather low proportions reporting sustained changes reflect the challenges to adopt and sustain a healthy diet and practicing regular physical activity in the obesogenic environment where unhealthy food is ubiquitous and practice of physical activity is demanding (lack of time, high temperature, etc).

Interventions promoting a healthy diet

- Health education programmes should emphasize the components of a healthy diet, including the need to avoid excess calorie intake, particularly in relation to sugary beverages and highly processed food, but also in relation to excess intake of other foods (e.g. rice).
- Interpretative food labelling systems (e.g. 'traffic light') can enable consumers to easily choose between healthy vs less healthy foods. It is worth noting however that most pre-packaged foods are imported, and such a measure would require trade negotiations.
- Developing a healthy meal certification label can promote the availability of healthy meals, particularly if selling at least 1-2 menu options that comply with the label is mandated for selected food providers (e.g. school and work canteens, tuck shops, etc).
- Implement commercial, trade, fiscal, and other measures that promote the local production of healthy foods at affordable cost (e.g. vegetables, fruits, etc), cognizant of low food self-sufficiency with ~90% of food consumed in Seychelles being imported.[34]
- Ban advertisements for sugar beverages and junk food in public areas and in the media.
- Install water fountains in public places, such as workplaces, canteens, and schools (some are already placed in some schools and workplaces) to incentivise the public to drink water instead of sugary beverages.
- Increase the excise tax on sugar beverages (currently 4 SCR per litre for beverages with >5 grams of sugar per 100 ml, as per the 2019 Imposition of Sugar Tax on Drinks Regulations).
- Implement fiscal and other measures that enable the price of commercial water bottles to be markedly cheaper than the price of soft drinks to incentivise people to switch from sugary beverages to water drinking.
- Other interventions are needed and described in the references below.

- Interventions to promote a healthy diet are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (Diet, Salt, Sugar, Food reformulation, Food labelling).

[34] Darras A et al. L'agriculture des Seychelles: évolution, chiffres clés et défis. PRéRAd Océan Indien, 2020. Web Link

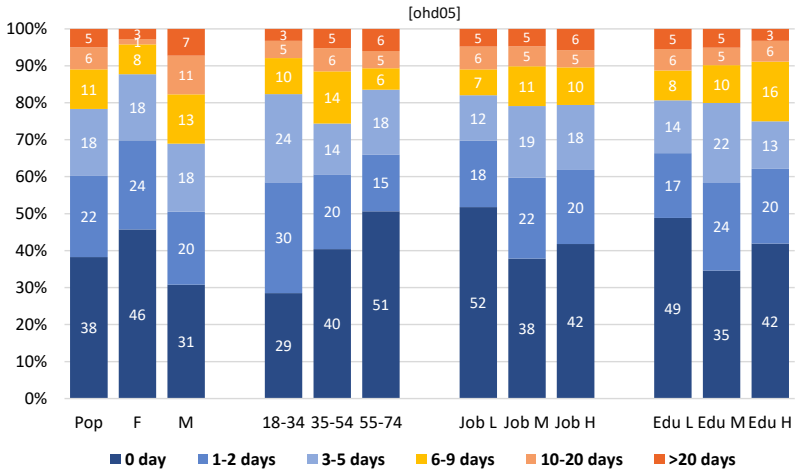
5. Harmful use of alcohol

Introduction

Harmful use of alcohol causes large mortality and morbidity globally. Alcohol intake increases the risk of cardiovascular diseases, several cancers, liver cirrhosis and external causes of deaths (e.g. accidents). It also has a large negative impact on individuals, families and communities, including domestic and sexual violence, homicide, victimization, risky behaviour and criminal activity. WHO defines 'harmful use' as 'drinking that causes detrimental health and social consequences for the drinker, the people around the drinker and society at large, as well as patterns of drinking that are associated with increased risk of adverse health outcomes'. However, the health risk associated with drinking no more than 1-2 drinks per occasion is relatively low. Consumption of alcohol in a population often tends to concentrate in a minority of heavy drinkers. Interventions at the population level aim at reducing the overall alcohol consumption, while interventions at the individual level aim at identifying problem drinkers and managing health risk and alcohol use disorders.

Drinking frequency

Figure 5.1 Prevalence of alcohol drinking frequency in the past 30 days by sex, age, job, and education categories.



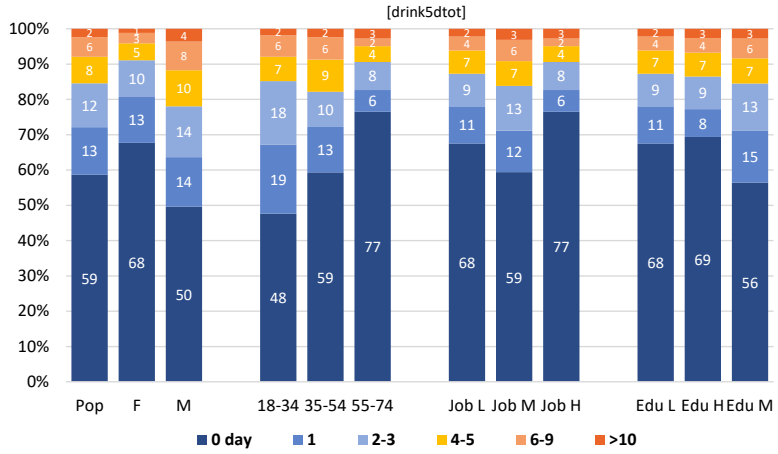
Comments

- Not drinking was reported by 46% of females and 31% of males.
- Not drinking alcohol increased with age (29% at age 18-34 vs 51% at age 55-74 years).
- 31% of males vs 12% of females drank alcohol on ≥6 days per month.
- Drinking frequency was not largely different according to SES categories.
- Of note, alcohol consumption frequency does not inform well on harmful use as some people may drink a small alcohol amount regularly (with a relatively low health risk) while others may drink harmful large alcohol amounts on a few days.

Binge drinking frequency

Binge drinking refers to episodic excessive drinking. Different definitions exist as harmful use depends on several factors (e.g. body weight, sex, susceptibility to alcohol, if alcohol is consumed with a meal or while fasting, etc.). However, the colloquially "4/5" definition is often used and refers to drinking ≥5 (males) or ≥4 (females) standard alcohol units on one occasion.

Figure 5.2 Days per month drinking ≥5 (M) or ≥4 (F) standard units by sex, age, job, and education categories

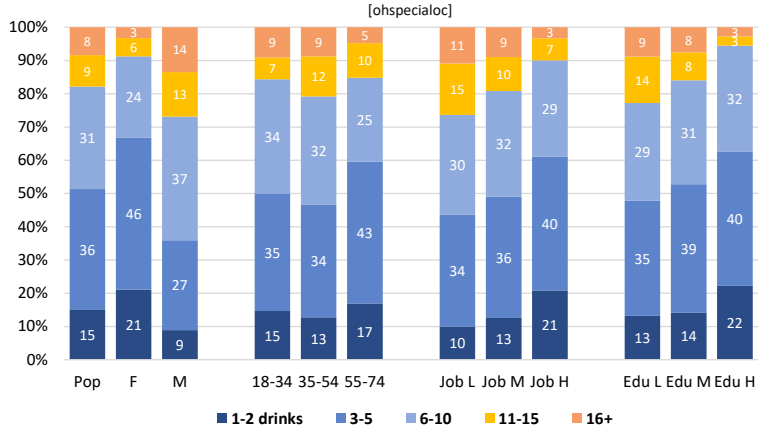


Comments

- Nearly 60% of adults reported drinking ≥5 (males) or ≥4 (females) standard alcohol units on ≥1 day per month.
- More males (24%) than females (9%) reported binge drinking on ≥4 days per month (which could correspond, for example, to binge drinking on one day every weekend).
- The number of days with binge drinking was larger in younger adults.

Drinking frequency on special occasions

Table 5.3 Number of drinks on special occasions among drinkers, by sex, age, job, and education categories.



Comments

- The number of drinks on special occasions was larger in male vs female drinkers (e.g. 64% of male drinkers vs 33% of female drinkers had ≥6 drinks on special occasions, and 27% of male drinkers vs 9% of female drinkers had ≥11 drinks).
- The number of drinks on special occasions increased markedly from lower to higher SES categories, with no marked difference by age.
- The high prevalence of binge drinking is consistent with the tradition in Seychelles of drinking large alcohol amounts on weekends, end-of-the-month, and other special occasions.
- This has large implications for public health, as binge drinking is a cause of health problems, car accidents, drowning, violence, and social problems.

Alcohol volume per capita

Consumption of pure alcohol (ethanol) was calculated by multiplying the weekly consumption of beverages by the volume and alcohol content in standard units (18 ml ethanol or 14 grams ethanol in 1 standard drink).

1 bottle/can (often ~3 dl) of beer: 1 standard unit; 1 bottle (often 5-6 dl) of beer with high alcohol content (Guinness, Gold Seal): 2 units, 1 glass (often 1.5 dl) of wine: 1 unit, 1 'peg' of spirit (0.05 dl): 2 units (as spirits are often drank at home with generous servings); and 1 bottle of homebrew (0.5 l or 1 l, ~5-9% alcohol): 2 units.

Table 5.2 Mean consumption of pure alcohol per capita of total population by sex and beverage categories

	Pure alcohol standard units per week		Volume of pure alcohol per day (ml/day)		Volume of pure alcohol per year (litres/year)		Percent of all alcohol consumed (%)	
	M	F	M	F	M	F	M	F
Beer 5-6%	2.6	1.0	6.6	2.6	2.41	0.94	32.6	30.4
Beer 8-11%	1.3	0.2	3.4	0.6	1.23	0.21	16.6	6.7
Wine	0.3	0.7	0.8	1.8	0.29	0.64	4.0	20.8
Spirit	3.2	0.9	8.3	2.2	3.03	0.81	40.9	26.3
Liquor	0.1	0.2	0.2	0.6	0.09	0.20	1.2	6.6
Alcopop	0.2	0.3	0.6	0.7	0.21	0.27	2.8	8.7
Homebrew	0.2	0.0	0.4	0.0	0.15	0.01	2.0	0.5
Total			20.3	8.4	7.4	3.1	100	100

Mean values.

Comments

- Self-reported consumption may underestimate true alcohol intake, notably because questions were administered by health personnel (social desirability).
- Nonetheless, self-reported alcohol in surveys (as opposed to sale or trade data) can inform on consumption by nationals (i.e. excluding tourists or foreigners) and assess homebrew consumption (which is sold outside of commercial channels and venues).
- The estimates suggest an overall high alcohol consumption per capita at 7.4 litres per year in men and 3.1 litres per year in women (age standardised: 7.5 l/year and 3.4 l/year, respectively).
- Beer contributed ~50% of all alcohol consumed in males and ~40% in females. Spirits contributed ~40% of total alcohol consumed in males and ~36% in females.
- Wine contributed ~21% of total alcohol consumed in females but only ~4% in males.
- Alcopops contributed ~9% of total alcohol consumed in females and ~3% in males.
- Homebrew contributed only a very little share of total alcohol intake, a sharp contrast with decades ago, e.g. homebrews contributed ~50% of total alcohol intake in the population in 1994.[35]

Figure 5.4 Alcohol volume (standard units) per day by sex, age, job, and education categories in the *whole* population

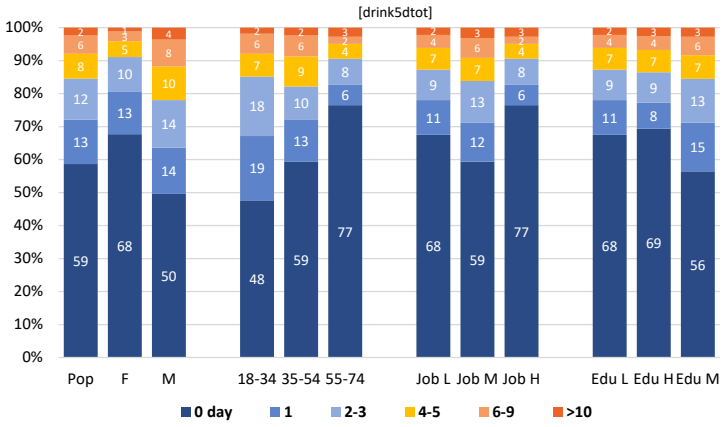


Table 5.3 Percentiles of alcohol volume in alcohol *drinkers*

	Among drinkers	
	Females	Males
Mean consumption		
Liters/year, crude	7.1	12.1
Percentiles *(litres/year)*		
P 10	1.4	2.8
P 25	2.8	4.7
P 50 (**median**)	4.7	9.4
P 75	9.4	14.0
P 80	11.3	18.7
P 90	14.5	23.9
P 95	20.1	33.7

All estimates among drinkers (>0 ml alcohol every month).
Percentiles: e.g. P 75 means that 75% people have a consumption below the cutoff (i.e. 14.0 in males, 9.4 in females) and 25% have a consumption above.

[35] Perdrix J, Bovet P, Larue D, et al. Patterns of alcohol consumption in the Seychelles Islands (Indian Ocean). *Alcohol* 1999;34:773-85. PubMed

Comments

- The distribution of alcohol volume was strongly skewed toward high values, i.e. a small proportion of drinkers consumed a high alcohol amount. It can be calculated that the *20% of the heaviest drinkers consumed 61% of all pure alcohol consumed in the population*.
- Heavy drinkers are at particularly high risk of several diseases (NCDs) and disorders (problem drinking).
- These drinkers are a coveted clientele for the alcohol industry as they buy the largest share of all alcohol sold.

Associations between alcohol intake and biological markers

Table 5.4 Association between alcohol intake and HDL-cholesterol and gamma GT blood levels

alcohol intake in the population	Sample size (n)		Ethanol intake (ml/day)		HDL-cholesterol (mmol/l)		Gamma GT (U/l)	
	M	F	M	F	M	F	M	F
0	207	375	0	0	1.29	1.51	37	29
< P80	259	225	21	12	1.41	1.56	63	54
≥ P80	65	59	79	48	1.58	1.54	119	50

Comments

- *Gamma GT*. A larger alcohol volume was associated with a higher blood concentration of 'gamma glutamyl-transpeptidase enzyme' (GGT), a marker of liver damage typically increased in heavy drinkers. Monitoring GGT levels over time can be used as an incentive for drinkers to stop or reduce their harmful alcohol consumption.
- *HDL-cholesterol*. The association between a higher alcohol consumption and lower HDL-cholesterol (the 'good cholesterol'; the higher HDL-cholesterol, the lower CVD risk) is speculated to account for the apparently protective effect of alcohol intake on ischemic heart disease observed in numerous epidemiological studies. However, the significance of this association is still debated.

Interventions to reduce harmful alcohol use

- Health education programmes should further emphasize the multiple hazards of harmful alcohol use including binge drinking.
- Increasing tax on alcohol beverages is effective for reducing alcohol consumption in the population, with a minimum excise tax proportional to pure alcohol content applicable to avoid that consumers shift their consumption to inexpensive alcohol drinks.
- Reducing access to alcohol beverages is effective (e.g. limiting the number of shops selling alcohol and reducing selling hours).
- Banning advertisement and promotion in public places and on the media is a WHO best buy for NCD prevention.
- Performing frequent random alcohol spot tests in car drivers (breathalyser on the spot followed by blood alcohol concentration (BAC) at the hospital for confirmation), particularly at night and on weekends, with heavy penalties for those with raised BAC (high fines, driving license withdrawal) has dramatically reduced the number of car accidents and casualties in several countries (e.g. Western Europe). This requires that validated portable ethylometers are available and appropriate legislation authorises random alcohol checks.
- Several brief screening tests can identify problem drinkers at the primary health care level and enable to provide them with medical and social support.
- Internet-based tests assessing a person's drinking problems and providing advice accordingly can be managed by health authorities of NGOs (e.g. through Ministry of Health or organisations involved in alcohol and drug problems such as CARE in Seychelles).

- Interventions to reduce harmful alcohol use are described in the Seychelles NCD Strategy 2016-2025 and the Seychelles Alcohol Policy 2015.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (Harmful use of alcohol).

6. Overweight and obesity

Introduction

Burden and physiology. It is estimated that that 51% of the world, or >4 billion people, will be obese or overweight by 2035.[36] The global expansion has been in response to easy access to inexpensive, high-caloric, processed food, and improved technologies that contribute to a sedentary lifestyle. Adipose tissue is an endocrine organ that produces several substances (e.g. adipokines) that can increase health risks, including type-2 diabetes, high blood pressure, dyslipidaemia, cardiovascular disease, and several cancers. Obesity also incurs other complications such as respiratory (e.g. obstructive sleep apnoea), gastrointestinal (e.g. non-alcoholic fatty liver disease, reflux oesophagitis), musculoskeletal (e.g. knee or lower back pain), soft tissue (e.g. cellulitis), reproductive (e.g. polycystic ovary syndrome), postoperative complications, psychosocial harms (e.g. weight stigma, discrimination), and lower quality of life.

Body mass index. Body mass index (BMI), calculated as weight divided by height squared (weight/height^2, kg/m^2), is the most-often used indicator to quantify adiposity in population surveys. In adults, a BMI of 25-30 indicates *overweight*, BMI ≥30 indicates *obesity*, and BMI ≥40 indicates high grade *morbid obesity*. A BMI <18.5 indicate *underweight* in adults and suggests undernutrition but can also be consistent with a healthy weight, particularly among young adults.

Underlying mechanisms leading to obesity. Obesity is not just a question of will as some believe. Powerful neuroendocrine loops involving the gut and the brain promote adipose accumulation by stimulating energy intake (hunger) over energy expenditure. These mechanisms have favoured energy conservation and human survival when food was scarce but promote unhealthy weight gain in the current obesogenic environments. This explains that weight loss from food restriction is most often followed by weight regain (often at levels higher than before dieting). A new class of drugs (GLP-1 receptor agonists such as semaglutide, tirzepatide, retatrutride) act on these appetite regulation loops and effectively reduce weight, diabetes, and lower CVD risk.

Prevalence of underweight, normal weight, overweight, and obesity

Figure 6.1 Prevalence of underweight, normal weight, overweight, and obesity by age and job in males and in females

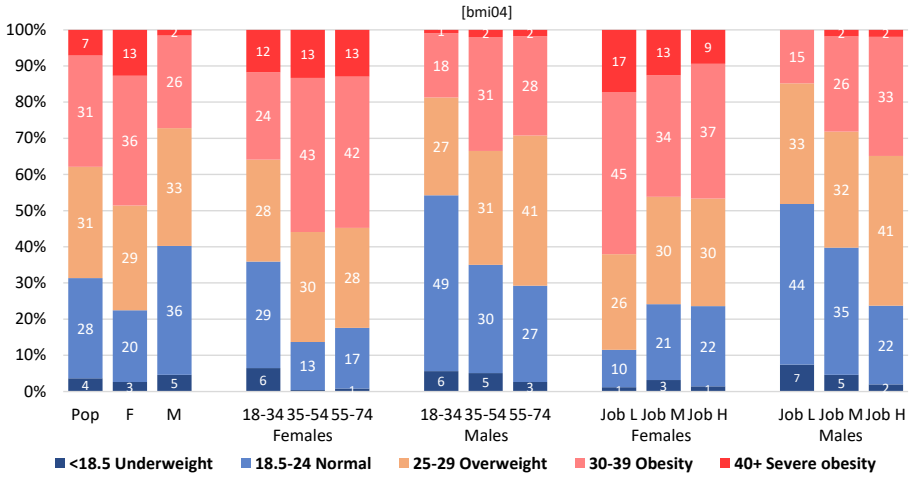


Table 6.1 Age-standardized prevalence of categories of BMI by sex

	Age 18-74				Age 35-74			
BMI	<25	≥25	≥30	≥40	<25	≥25	≥30	≥40
Females	22.5	77.5	48.6	12.7	15.2	84.8	55.5	13.2
Males	40.2	59.8	27.2	1.6	32.7	67.3	31.8	1.9

Age-standardised.

[36] The 2023 World Obesity Atlas. Web link

Comments

- The prevalence of overweight or obesity (BMI ≥25) was very high at 77.5% (females) and 59.8% (males) at age 18-74, and 84.8% in females and 67.3% in males at age 35-74.
- The prevalence increased with age, particularly between early and middle age categories.
- The prevalence of obesity (BMI ≥30) was 49% in females and 27% in males aged 18-74 years. The prevalence of grade-2 obesity (BMI ≥40, morbid obesity) was 12.7% in females and 1.6% in males aged 18-74 years.
- The prevalence of obesity was higher in females of *lower* vs higher SES but higher in males of *higher* vs lower SES. This sex-specific social pattern was already observed in the past health surveys in Seychelles and suggests different body weight perceptions in females and males.[37,38]
- Of note, the prevalence of obesity may have increased during the COVID epidemic (confinement, etc.), as seen in several countries in which serial surveys were conducted, but this cannot be assessed in the survey.

Comparison of the prevalence of obesity in Seychelles and in other countries

The prevalence of obesity (BMI ≥30) in adults (% in females / % in males) in selected other countries is shown below.[39] Estimates for several countries are not recent and would likely be larger nowadays. A prevalence larger than in Seychelles is highlighted in red. Prevalence of obesity was higher in Seychelles than in several small island states and some high-income countries (e.g. a 3-6 times higher prevalence in Seychelles than in Italy, Switzerland, Japan, or Singapore). Newer global estimates have been published in March 2024.[40]

Seychelles	49% (F)/27% (M) (2023, age 18-74), (39%/22% in the 2013 SHS survey)
Island states	Jamaica 41%/15% (2017), Barbados (43%/23%), Bahamas 55%/32% (2019), Nauru 61%/56% (2004) Tonga 83%/67% (2017), Tokelau 68%/59% (2005), Mauritius 26%/11% (2015), French Polynesia 42%/39% (2010), British Virgin 44%/45% (2009), Fiji 42%/22% (2015), Cabo Verde 23%/7%
Western countries	Italy 10%/11% (2021), Switzerland 10%/12% (2017), France 17%/17% (2020), England 25%/25% (2019), USA 42%/42% (2018), Australia 30%/32% (2018)
Asia	Japan 6%/6% (2019), Hong Kong 5%/9% (2022), China 7%/6% (2015)
Arabic countries	Egypt 49%/25% (2017), Bahrain 43%/33% (2018), UAE 31%/25% (2018)
Africa	Kenya 17%/4% (2022), South Africa 41%/11% (2016), Ethiopia 1%/1% (2016)
Others	Russia 31%/28% (2014), Mexico 41%/**32%** (2021)

Self-reported weight vs actual weight

Participants were asked to report their body weight before measurements were made at the survey centres.

Table 6.2 Comparison of self-reported weight vs. measured body weight in males and females

	Females	Males
Knows a value for his/her own weight	55.5	57.4
Among those who know, mean difference between self-reported vs measured own weight	-1.07	-1.30

Comments

- Less than 60% of participants knew a value of their body weight.
- Among those who knew a value, actual weight was underestimated.

[37] Bovet P, Chiolero A, Shamlaye C, Paccaud F. Prevalence of overweight in the Seychelles: 15-year trends and association with socio-economic status. *Obes Rev* 2008;9:511-7. PubMed

[38] Rossi IA, Rousson V, Viswanathan B, Bovet P. Gender and socioeconomic disparities in BMI trajectories in the Seychelles: a cohort analysis based on serial population-based surveys. *BMC Public Health* 2011;11:912. PubMed

[39] https://data.worldobesity.org/rankings/

[40] NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in underweight and obesity from 1990 to 2022: a pooled analysis of 3663 population representative studies with 222 million children, adolescents, and adults. *Lancet* 2024;403:1027-50. PubMed

Table 6.3 Associations between knowing a value for his/her own weight and sex, age, and job categories

	Females		Males	
Age				
<35 years	1.51	*	1.54	*
BMI				
<25	1	-	1	-
25-29	0.89	ns	1.43	ns
30-39	0.89	ns	1.32	ns
40+	0.58	*	0.61	ns
Job qualification				
Low	1	-	1	-
Mid	1.71	**	2.05	**
High	2.75	***	4.1	***

Mutivariate odds ratio (OR). An OR >1 shows better knowledge.

ns: not significant*: P<0.05; **: P<0.01; ***: P<0.001.

Comments

- Knowing his/her own weight was associated with a younger age and a higher SES.
- Knowledge of his/her own weight was lower in persons with high grade obesity possibly, possibly partly because of denial or fat-shame aversion.

Body weight reported as too high or too low among persons with obesity

Perceiving his/her own body weight status as 'too low', 'normal', or 'too high' can be a clue for behaviour change (e.g. Health Belief Model). Perceptions also depend on social norms (e.g. Bandura' social behaviour theory).

One question asked participants if they thought that their body weight was 'really low', 'a bit too low', 'good', 'a bit too high' or 'really high'. Perceptions were compared with their objectively measured adiposity status.

Table 6.4 Proportions (%) of perceiving his/her body weight as too high or too low vs. measured BMI

	Measured body mass index									
	Females					Males				
Perceived weight	*N*	18.5-24	25-29	30-39	≥40	*N*	18.5-24	25-29	30-39	≥40
'Really low'	*2*	2	0	0	0	*2*	1	0	0	0
'A bit too low'	*19*	10	2	0	2	*31*	15	2	1	0
'Good'	*240*	82	47	16	7	*274*	77	58	22	11
'A bit too high'	*297*	6	48	67	31	*175*	7	38	62	33
'Really high'	*100*	0	3	17	59	*29*	0	2	15	56
Total	*658*	100	100	100	100	*511*	100	100	100	100

In percent (%), except sample sizes (n).

BMI 18.5-24.9: Normal weight; 25-29: overweight; 30-39: obese; ≥40: severe obesity.

Comments

- Large proportions of females and males with obesity perceived their weight as 'good' or (only) 'a bit too high'.
- Inversely, 20-25% of men and women with a normal weight (BMI 18.5-25) perceived their weight as too low.
- This suggests social norms (preferences) favouring a large body weight.

Table 6.5. Associations of perceiving his/her own weight as too high with selected variables among females and males with overweight or obesity

	Females		Males	
	OR	*P*	OR	*P*
Age				
<35 years	1.8	*	1.9	*
BMI				
25-29	1.0	-	1.0	-
30-39	6.7	***	5.2	***
40+	13.6	***	13.5	*
Job qualification				
Low	1.0	-	1.0	-
Mid	2.5	***	0.8	ns
High	5.4	***	1.6	ns

OR: odds ratio.A OR >1 shows better knowledge.

ns: not significant; *: p<0.05; ** p<0.01; ***: p<0.001.

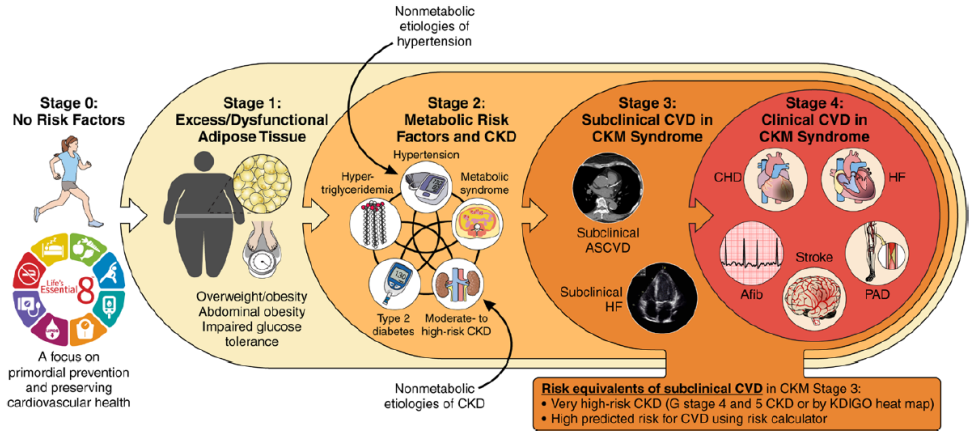
Comments

- Perceiving his/her own weight as 'too high' among persons with overweight or obesity was associated with a younger age and (expectedly) a higher measured BMI.
- Adequately perceiving his/her weight as 'too high' when overweight or obese was strongly associated with a higher SES in *females* with no association with SES in *males*. This is consistent with the prevalence of obesity that is larger in males of *higher* vs lower SES but larger in females of *lower* vs higher SES (**Figure 6.1)**.
- This finding provides useful information for designing locally-sound awareness programmes on weight control that consider beliefs and social norms. Behaviour change (e.g. healthy diet, physical activity) is more likely to take place if a person recognizes a gap between an unhealthy body weight and a healthy weight.

Associations of BMI with cardiometabolic disorders

The figure illustrates the central role of obesity (excess fat tissue) in cardiovascular-kidney-metabolic health.[41]

(Afib: atrial fibrillation; ASCVD: atherosclerotic cardiovascular disease; CHD: coronary heart disease (e.g. heart attack); CKD: chronic kidney disease; CKM Cardiovascular-Kidney-Metabolic Health; HF: heart failure; PAD: peripheral artery disease).



Increased adiposity is associated with increased plasma levels of several key cardiometabolic conditions, including insulin, blood glucose, A1c (a marker of blood glucose levels over the past 3 months), LDL-cholesterol, uric acid, HBP, and CRP (CRP is a blood marker of inflammation and a CVD risk factor). These cardiometabolic disorders share pathophysiologic mechanisms, e.g. via dysregulated adipokine secretion, subclinical inflammation, and increased release of fatty acids into the circulation.

[41] Ndumele CE et al. Cardiovascular-Kidney-Metabolic Health: A Presidential Advisory from the American Heart Association. *Circulation* 2023;148:1606–35. PubMed

Table 6.6 Mean blood pressure and plasma levels of cardiometabolic risk factors according to BMI categories

	N	Waist (cm)	Systolic BP	Diabetes (%)	Insulin (µIU/ml)	Glucose (mmol/l)	A1c (%)	LDL-C (mmol/l)	HDL-C (mmol/l)	Trigly (mmol/l)	CRP (mg/l)	Uric acid (mmol/l)
BMI<18.5	36	68	120	**0**	**4.5**	4.71	5.12	2.35	1.62	0.86	4.86	0.31
BMI18.5-24.9 (normal)	297	80	125	**0.8**	**6.6**	5.39	5.57	3.07	1.60	0.85	3.60	0.33
BMI25-29 (overweight)	380	92	131	**16.8**	**11.2**	5.59	5.73	3.49	1.46	1.17	4.15	0.35
BMI 30-39 (obese)	397	105	135	**23.2**	**15.4**	6.14	6.12	3.56	1.36	1.30	5.26	0.36
BMI ≥40 (obese severe)	95	119	138	**25.3**	**20.2**	6.11	6.18	3.26	1.36	1.07	8.17	0.37
Sex and age adjusted RC/OR		19.4	6.8	**2.0**	**7.0**	0.43	0.31	0.23	-0.18	0.21	1.8	0.04
P-value fir difference		***	***	***	***	***	***	***	***	***	***	***

LDL-C: LDL-cholesterol; HDL-C: HDL-cholesterol; trigly: triglyicerides; CRP: C-reactive protein; A1c: glycated haemoglobin. BP: blood perssure.
RC/OR: Age and sex adjusted regression coefficient (or odds ratio for diabetes: yes/no) of BMI (BMI/10) on the variables of interest. P value: ***: <0.001.
For example, the RC of 7.01 for insulin means that an increase of 10 units of BMI is associated with an increase of 7.01 units of insulin plasma level.

Comments

- Increased BMI was associated with increased levels of several cardiometabolic variables, including insulin, A1c (a marker of increased blood glucose), blood glucose, LDL-cholesterol, triglycerides, uric acid, CRP (inflammation) and high BP.
- The association of a higher BMI with a lower blood HDL-cholesterol levels is also unfavourable as a low HDL-cholesterol is associated with a higher CVD risk.
- The findings, together with the very high prevalence of obesity in Seychelles, re-emphasize the central role of obesity as a leading cause of ill health (e.g. diabetes, high blood pressure, dyslipidaemia), also considering that obesity is an important cause of several cancers, morbidity (e.g. musculoskeletal disabilities), and social and psychological distress.

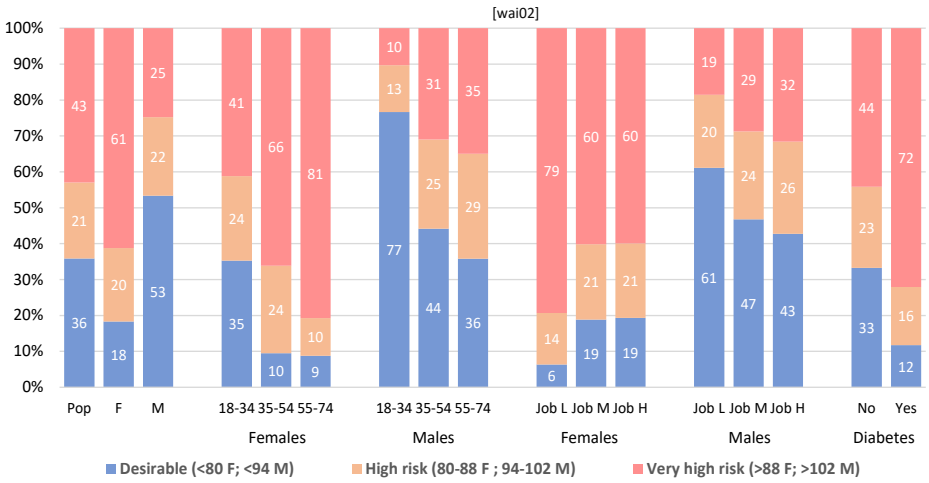
Waist circumference

Waist circumference (WC) is also often used to assess adiposity (alone or with BMI). Because it represents mainly abdominal adiposity, which is the fat type that is more metabolically active, WC is often considered to be associated more strongly than BMI with cardiometabolic risk factors (particularly diabetes).

WHO cut-off points for WC and risk of metabolic complications in adults are different in males and females:[42]

<94 cm (females) / <80 cm(males):	Desirable
94-101 cm (males) / 80-88 cm (females):	Increased risk of metabolic complications
>102 cm (males) / >88 cm (females):	High risk of metabolic complications

Figure 6.2 Prevalence of waist circumference by sex, job, and diabetes categories



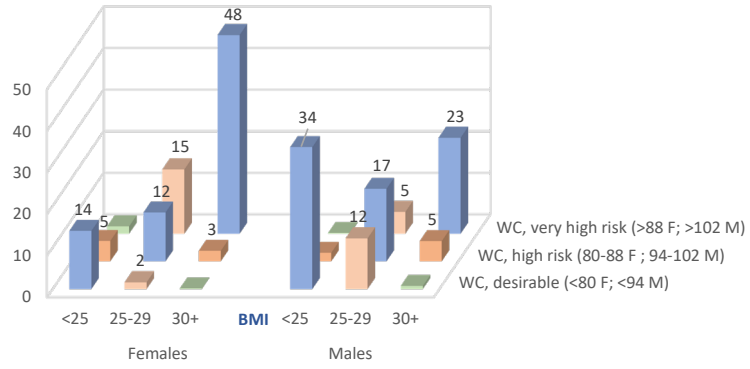
[42] Assessing Your Weight and Health Risk. NIH, web link

Comments

- The distribution of WC categories (desirable, at risk, at high risk) in the population showed similar patterns as compared to those observed for BMI (**Figure 6.1**).
- WC was higher in females and in persons with diabetes.

Correlation between waist circumference and raised body mass index

Figure 6.3 Relation between raised WC and raised BMI in females and in males



Comment

- Categories of desirable, at risk, and high-risk WC corresponded well with categories of increased BMI (i.e. most people with 'normal BMI' had a 'desirable WC', those with 'overweight' had a 'WC at risk', and those with 'obesity' had 'WC at high risk'). These joint WC/BMI categories are highlighted in blue in the Figure.
- This means that raised WC is a good proxy for raised BMI and inversely.
- However 15% of females with 'only' overweight (BMI 25-29) had a WC at '*high* risk'.
- Among males, 12% with 'overweight' (BMI 25-29) had a '*normal* WC', which may partly reflect that some men have a heavy weight due to a muscular body build with a normal WC (i.e. no excess adiposity).

The ***correlation coefficients*** between BMI and WC (range 0-1) were 0.87 in males and 0.89 in females, indicating that both indicators are highly correlated and can be used nearly interchangeably. However, as mentioned earlier, BMI and WC provide slightly different information on adiposity at the individual level (e.g. muscular persons can have a large BMI with no abdominal adiposity or, inversely, persons with a low muscular mass and low BMI can have large abdominal adiposity).

Interventions for prevention and control of obesity

Also see interventions mentioned in the sections on physical activity and diet.

Population level

- Awareness programmes should continue to educate the public (including children in schools) on the definition and importance of a healthy weight, the components of a healthy diet, including the need to avoid excess consumption of calories, and the importance of regular physical activity.
- Awareness campaigns about a healthy body weight (e.g. "Know your values") can help promote knowledge in the population about a healthy weight.
- However, there is a need to shift from reliance on behaviour change for persons with obesity toward interventions that address the structural causes of the obesogenic environment (e.g. policies around the production and availability of healthy vs unhealthy foods).
- Ensure full implementation of the nutrition labelling regulation in Seychelles, which requires displaying, in a local language, the contents in fat (& saturated fat), carbohydrate (& sugar), protein, salt, and calories.
- Develop and implement front-of-package nutritional labelling that includes users-friendly warnings about fat, sugar and salt content, which better enables consumers to choose healthy over less healthy foods.

- Create a healthy meal certification label (e.g. 'green fork' label in several countries) and mandate food providers, including tuck shops and schools and work canteens to sell ≥1-2 menus that comply with the set standard.
- Promote trade, fiscal and other incentives in multiple sectors that incentivise local production and availability of healthy foods (e.g. vegetables, fruits, etc).
- Ban or limit advertisement and promotion of sugary beverages and junk food in public areas and in the media.
- Increase the excise tax on sugary beverages (currently at 4 SCR per litre for drinks with ≥5 gram of sugar/100 ml as per the 2019 Imposition of Sugar Tax on Drinks Regulations).
- Deploy water fountains in workplaces, canteens, and schools (some are already placed in schools and workplaces).
- Apply fiscal or other incentives that ensure that the cost of water bottles is markedly cheaper than the cost of soft drinks to incentivise people to switch from sugary beverages to water drinking (including tap water).
- Regular physical activity is an important component for health in general and for maintenance of healthy body weight: 'better fit overweight than slim inactive' (see section on physical activity.

Health care level

- Effective treatments include lifestyle modification and adjunctive therapies such as anti-obesity medications and metabolic and bariatric surgery.[43]
- Integrate weight control in primary health care with provision of lifestyle modification (e.g. prescriptions on diet and/or physical activity) and effective pharmacological anti-obesity treatments, including highly effective GLP-1 agonists (i.e. hormones that act on the brain and gut to decrease hunger and food cravings) and bariatric surgery in selected cases of severe obesity.[44,45]

- Interventions for the prevention and control of obesity are described in the Seychelles NCD Strategy 2016-2025. A national strategy to address obesity in Seychelles was issued in 2023.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (Obesity, Diet, Dietary sugar, Food reformulation, Food labelling, Physical activity).

[43] Gilden AH et al. Obesity. *Annals of Internal Medicine*, 2024 (in press). PubMed
[44] Yanovski SZ et al. Approach to obesity treatment in primary care: a review. *JAMA Intern Med* 2024 (in press). PubMed
[45] Shi Q et al. Pharmacotherapy for adults with overweight and obesity: a systematic review and network meta-analysis of randomised controlled trials. *Lancet* 2024; 403: e21–31. PubMed

7. High blood pressure

Introduction

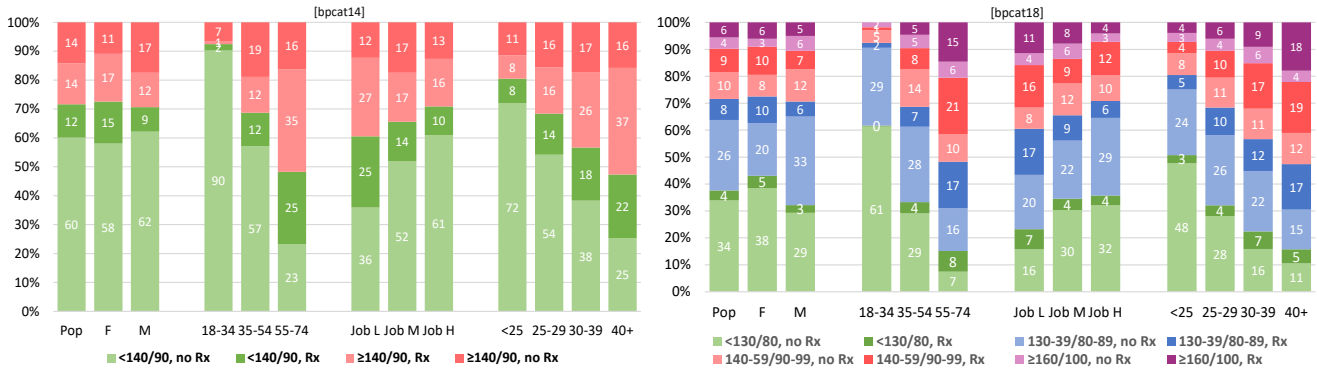
High blood pressure (HBP) affects 1 billion people worldwide and causes ~11 million deaths attributable mainly to cardiovascular disease (heart attack, stroke) and kidney failure. BP gradually increases CVD risk from low levels (e.g. ≥110/70 mmHg). The BP threshold of 140/90 (which defines hypertension stage 2) is often used to identify 'high BP' for simplicity. HBP is attributable to multiple causes, including salt consumption, harmful use of alcohol, obesity, diabetes, and in some instances medical causes such as chronic kidney disease and hyperaldosteronism. HBP does not cause symptoms, which highlights the need for screening (e.g. once every few years in adults). A healthy lifestyle helps maintaining low BP, but medications are most often required among hypertensive persons, with the target to reduce BP to <140/90 mmHg (or less in persons at risk of CVD and/or diabetes). Treatment must often include several BP-lowering drugs and that need to be taken for years.

BP tends to vary largely from a moment to the next one. In addition, BP measured in the clinical setting often overestimates the true BP level (due to 'white coat effect', i.e. raised BP due to anxiety of patients in medical settings). Hence, self-measured BP at home is recommended for reliable diagnosis, monitoring, and treatment (e.g. recording 5-6 BP values throughout the day and evening on 1-2 days every 3 months).

Up to 6 BP readings were made over 2-3 hours to mitigate the anxiety-related raise of BP at the study centre. Yet, several participants with high BP values measured at the study centre reported that their BP measured at home was normal (re-emphasizing the importance of home BP monitoring to assess the true BP levels).

Prevalence of high blood pressure

Fig 7.1 Prevalence of HBP by sex, age, job, and BMI categories. The right panel shows additional BP categories, including normal or borderline high BP (<130/80 mmHg)



Comments

- 40% of adults aged 18-74 years had HBP (BP ≥140/90 mmHg or treated).
- The prevalence was slightly larger in males and increased with age (10% at age 18-34 vs 77% at age 55-74).
- There was a strong association of HBP with a higher BMI (large and extra-large cuffs were used in those with high BMI so cuff size is not confounding the results).
- The prevalence of HBP was higher in persons with a lower SESs, possibly due to healthier lifestyle and/or higher uptake of and/or better adherence to medication in the latter than the former.

Proportions aware, treated, and controlled

The proportions of individuals with hypertension who were aware, treated, and controlled to adequate BP target are displayed in section 10 (**Table 10.1**) and implications for prevention and health care discussed there. However, **Figure 7.1** shows that a large proportion of individuals with HBP were treated, but their BP level was not controlled to treatment target (e.g. BP <140/90).

Knowledge and practices on HBP

Table 7.1 Knowledge and practices on HBP in the population and associations with selected variables

	Prevalence in population (%)				Associations (odds ratios)											
					Sex (F vs M)		Age (18-35 vs other)		Job (high vs other)		BMI (obese vs not)		Rx for HBP (yes vs no)		Rx for DM (yes vs no)	
Domain	Yes	No		DNK	OR	*P*	OR	*P*	OR	*P*	OR	*P*	OR	*P*	OR	*P*
Has heard of HBP	96	5			0.81	ns	0.62	ns	1.41	ns	1.55	ns	13.2	*	-	
Knows 1 or 2 values for own BP	45	55			2.04	***	0.99	ns	2.70	***	1.34	*	2.24	***	1.25	ns
Knows 1 or 2 values for normal BP	44	56			2.12	***	0.72	*	2.50	***	1.33	*	1.54	**	1.19	ns
Thinks one can feel when BP is high	60	17		23	0.86	ns	0.60	*	1.31	ns	1.71	**	1.62	**	0.76	ns
	Days	**Months**	**Years**	**DNK**												
How long HBP Rx should be taken	9	7	50	34	1.62	***	0.48	***	1.19	ns	1.16	ns	5.18	***	1.27	ns
	<1 yr	**1-5 yrs**	**>5 yrs**	**DNK**												
Last BP measurement	84	8	2	6	1.50	*	0.87	ns	1.78	**	1.35	ns	7.15	***	1.12	ns

OR: multivariate odds ratio (for outcome that is true or desirable). OR of 1 means no association, OR >1 a direct association, OR <1 an inverse association.
ns: not significant*: P<0.05; **: P<0.01; ***: P<0.001.
DNK: does not know; Rx: medication (treatment). HBP: high blood pressure; DM: diabetes.
Blue: true or desirable response. Red: OR >1.50 or <0.5 (p: <0.001)

Comments

- *Knowledge on HBP.* Less than half of all adults knew a value for their own BP or a value for normal BP (whether reported values were correct or not).
- Women, persons of higher SES status, obese persons and those with treatment had a better knowledge.
- *Knowledge about symptoms and treatment duration*. Less than 20% of persons in the population knew that HBP generally does not cause symptoms.
- Only 50% knew that HBP treatment should be taken for years.
- Better knowledge was noted in females, possibly partly because females tend to be more health conscious than males, and in persons of higher vs lower SES, which may reflect better health literacy among the former vs the latter.
- *Last BP measurement.* Overall, 84% of all adults aged 18-74 years had their BP checked during the past 12 months. This high proportion may relate to the facts that >80% of adults attend a health facility every year (**Figure 19.2)** and that many people have a BP measurement device at home (**Figure 7.3**).

Characteristics of treatment among persons treated for HBP

Table 7.3 Treatment characteristics (prevalence, %) among individuals aged 35-74 treated for HBP

		Sex		Job		
	All	F	M	Low	Mid	High
Provider of treatment (%):						
Government	78	78	77	91	77	62
Private	21	19	23	9	20	37
Both	1	3	0	1	3	1
Followed by same doctor 'often' or 'always' (%):						
Government	20	19	22	17	19	28
Private	82	79	85	70	76	91
Has a BP device at home (%)	65	66	64	51	66	83
Self-reported adherence to Rx (daily vs less)	87	87	87	90	86	86
Number of medications for Rx HBP:						
Government (mean number drugs)	2.1	2.1	2.1	2.1	2.1	2.0
Private (mean number drugs)	1.8	2.0	1.6	2.5	1.7	1.8
≥3 different medications (%)	29	30	28	34	29	23

Comments

- *Health care provider*. Approximately 80% patients treated for HBP attended a government health service and ~20% attended a private provider in the past 12 months, with only few reporting using both services. Use of

private services was larger among persons with a higher SES, but a large proportion of hypertensive patients with a higher SES (62%) also used government services for HBP management.

- *Same doctor on medical visits*. Only around 20% of patients were treated for HBP 'often' or 'always' by the same doctor in government health services vs 80% in private services. Not seeing a same doctor over time may be an barrier to optimal medical follow-up of the patients.
- *Electronic BP device at home*. As many as two-thirds of hypertensive patients had an electronic BP measuring device at home. Having a device at home empowers hypertensive patients to better control their BP. Devices are available in pharmacies (including large cuffs for persons with obesity) at a reasonable cost (~US$40-60).
- *Adherence to medication*. Nearly 90% of adults treated for HBP reported daily adherence to HBP treatment. The high adherence in the survey may be overestimated considering findings in previous studies in Seychelles using objective methods to assess adherence, such as medication electronic monitoring system (i.e. the gold standard to measure adherence) or drug biomarkers,[46,47] consistent with findings in many other countries.[48] For example, several participants who reported high adherence admitted, when further asked about their adherence, that they did not take the prescribed furosemide because of frequent micturition (furosemide is not indicated for hypertension treatment in most cases, but is still largely prescribed).
- *Number of medications for treatment.* Individuals treated for HBP took on average ~2 medications, with no marked difference according to government vs private provider, sex, or SES categories. Around 30% took ≥3 medications. Guidelines recommend using several blood pressure lowering medications at small or moderate doses vs fewer drugs at larger doses, including fixed-dose BP-lowering therapy (e.g. up to 3 different medications in 1 pill), which simplifies treatment, minimizes side effects, and improves treatment efficacy and adherence.

Associations between systolic BP and selected variables

Table 7.2 Associations between systolic blood pressure and selected variables

	Reg coef	*P*
Male sex	5.57	***
Age (10 years)	5.49	***
Job low (ref)	1.0	
Job mid	-1.75	ns
Job high	-3.78	**
BMI (10 kg/m^2)	6.58	***
Fruit (days/wk *portions/d)	-0.16	*
Alcohol (>P80 vs. less)	0.46	ns
Diabetes (yes vs no)	5.09	***
Blood creatinine (10 µmol/l)	0.18	*

Reg coef: multivariable regression coefficient.
P : ns: not significant; * <0.1; ** <0.01;.*** <0.001;
For example, the RC of age of 4.84 means that a change of 10 years is associated with in BP change of 4.94 mmHg.

Comments

- BP was associated strongly with *age* (an increase of 5.5 mmHg per 10-year increase in age).
- The association with *male sex* relates to different factors, including, larger muscular mass in males vs females.
- The strong association with *BMI* (a 6.58 mmHg BP increases per 10 units BMI increase) emphasizes the importance of weight control for prevention and control of HBP.
- The associations with *diabetes* and *impaired kidney function* are well known. This emphasizes the importance of medications that have kidney protection properties (e.g. ACE-inhibitors or angiotensin receptor blockers).

[46] Bovet P, Madeleine G, et al. Monitoring one-year compliance to antihypertension medication in the Seychelles. *Bull WHO* 2002;80:33-9. PubMed
[47] Hungerbuhler P, Bovet P, Shamlaye C, et al. Compliance with medication among outpatients with uncontrolled hypertension in the Seychelles. Bull WHO 1995;73:437-42. PubMed
[48] Burnier M et al. Adherence in hypertension. *Circ Res* 2019;124:1124–40. PubMed

- There was a weak but significant BP association with *fruit intake*. Fruits are rich in potassium, with potassium having BP-lowering properties. This emphasizes the importance of a healthy diet, particularly fruit and vegetables.
- BP is known to be associated with a high *alcohol intake*, but this association was not apparent in the survey.
- Higher *SES* was associated with lower BP, possibly partly due to differences in access to health care, adherence to treatment, and overall healthier diet among persons with a higher vs lower SES.

Interventions to prevent and control HBP

Population level

- Public health measures targeting the general population are important to decrease BP levels in the population (i.e. healthy diet, physical activity, weight control). Interventions are mentioned in the sections in this report on these risk factors.
- Develop awareness campaigns on hypertension ('know your numbers', absence of symptoms, long term treatment, etc.).

Health care level

- Electronic medical records are helpful to be monitor BP and other risk factors over time and can improve case management.
- An electronic appointment system can help reduce patients' waiting time, improve follow-up (3-4 consultations per year are usually needed) and improve long-term adherence to treatment.
- Ensure that patients are seen, as often as possible, by a same doctor (or a same nurse practitioner when applicable) to improve medical follow-up and adherence to treatment (electronic medical records can makes this easier to implement).
- Procure and prescribe antihypertensive combinations more often (e.g. pills that include 3-4 different BP medications) to simplify treatment and improve adherence to treatment, as demonstrated in many studies.[49]
- Regularly update hypertension guidelines used at primary health care level, based on the latest best practices (including prescribing furosemide only to patients with CKD/heart failure).
- Strengthen weight control as a key component of BP treatment, including with effective therapies (GLP-1 agonists, bariatric surgery) in selected cases with severe obesity, diabetes, and high CVD risk.
- Further promote the use of home BP monitoring and encourage patients to record their values (e.g. 5-6 readings throughout a day on 1-2 days every 2-3 months) to help practitioners titrate their BP treatment.
- Monitor, based on EMR, the proportions of treated hypertensive patients at primary health care who achieve good BP control (BP <140/90 mmHg) as a main indicator of hypertension treatment quality (and of health system performance), possibly linked to reward to health centres/doctors who perform best (as done in several Health Maintenance Organisations, e.g. RAND).

- Interventions to prevent and control HBP are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions are listed in **Appendix 12** and discussed, for example, in *Noncommunicable diseases: A Compendium*, Routledge 2023 (High blood pressure, Dietary salt, Health systems and NCDs).

[49] Wang N et al. Efficacy and safety of low-dose triple and quadruple combination pills vs monotherapy, usual care, or placebo for the initial management of hypertension: a systematic review and meta-analysis. *JAMA Cardiology* 2023;8:606. PubMed

8. Diabetes

Introduction

Type 1 diabetes and type 2 diabetes. There are 2 main types of diabetes (DM). Type-1 diabetes (T1D) often develops at an early age (e.g. childhood), is related to immunological disorders, and always requires treatment with insulin injections. Type-2 diabetes (T2D) develops more gradually and may require insulin treatment after several years of evolution. It is therefore difficult to distinguish unambiguously T1D and T2D based on the sole measurements of fasting blood glucose (FBG) and/or A1c (glycated haemoglobin) measured in the survey. T2D generally accounts for >95% of all DM cases in the population. DMs leads to 'macrovascular' complications involving large arteries and is a main cause of heart attack, stroke, hypertension and peripheral artery disease and 'microvascular' complications involving small arteries, which cause retinopathy (e.g. blindness), nephropathy (e.g. kidney failure), and neuropathy (e.g. foot/leg amputations). T2D is strongly associated with age and adiposity. A significant weight loss (e.g. >10-15 kg loss) in obese diabetic persons markedly reduces FBG, can result in DM remission in instances, and reduces diabetes complications.[50,51,52]

Assessment of diabetes. Diabetes is defined as raised FBG (≥7.0 mmol/l) and/or raised glycated haemoglobin (A1c ≥6.5). A1c represents mean blood glucose during the past 3 months and can be done on non-fasting blood.

Impaired fasting glucose (IFG), also called 'pre-diabetes', is defined as FBG between 5.6 and 6.9 mmol/l or A1c between 5.7 and 6.4. IFG is also associated with cardiometabolic disorders and is a risk factor for DM, although not all persons with IFG will develop DM over time.

Prevalence of impaired fasting glucose and diabetes

Most epidemiological studies report the prevalence of DM based on FBG, partly because A1c is more expensive and not done in all surveys.

Figure 8.1 Prevalence of diabetes and IFG based on FBG by sex, job, and BMI

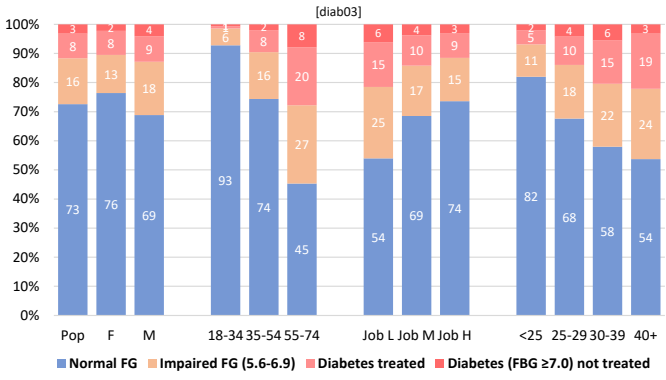
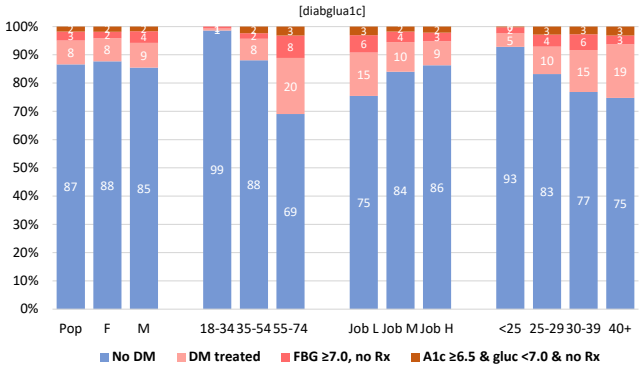


Figure 8.2 Prevalence of diabetes based on FBG or A1c by sex, job, and BMI (IFG is not displayed)



[50] Courcoulas AP et al. Long-term outcomes of medical management vs bariatric surgery in type 2 diabetes. *JAMA* 2024;331:654-664. PubMed

[51] Lean MEJ et al. 5-year follow-up of the randomised Diabetes Remission Clinical Trial (DiRECT) of continued support for weight loss maintenance in the UK: an extension study. *Lancet Diab Endocrinol* 2024:S2213-8587(23)00385-6. PubMed

[52] Gregg EW et al. Impact of remission from type 2 diabetes on long-term health outcomes: findings from the Look AHEAD study. *Diabetologia* 2024;67:459-469. PubMed

Table 8.1 Prevalence of diabetes and impaired fasting glucose based on FBG alone or FBG & A1c at ages 18-74 and 35-74

			Diabetes based on FBG only			Diabetes based on FBG & A1c	
	Normal (FBG <5.6)	Impaired FG (FBG: 5-6-6.9)	DM treated	FBG ≥7.0, no Rx	**Total** (FBG ≥7.0 or Rx)	A1c ≥6.5 & FBG <7 & no Rx	**Total** (FBG ≥7.0 or A1c≥6.5 or Rx)
Age 18-74 yrs							
Females	76.4	13.1	8.2	2.2	**10.5**	1.9	**12.3**
Males	68.8	18.3	8.7	4.1	**12.8**	1.7	**14.5**
All	72.6	15.7	8.5	3.2	**11.7**	1.8	**13.4**
Age 35-74 yrs							
Females	66.2	18.3	12.4	3.1	**15.5**	2.9	**18.4**
Males	58.1	23.2	12.9	5.8	**18.7**	2.6	**21.3**
All	62.1	20.7	12.6	4.5	**17.1**	2.7	**19.8**

Comments

- *Prevalence of diabetes*. Based on FBG only, the age-standardised prevalence of DM was 11.7% in the population aged 18-74 years and 17.1% in the population aged 35-74 years.
- Based on raised level of either FBG or A1c, the prevalence of DM was 13.4% in the population aged 18-74 and 19.8% in the population aged 35-74.
- The prevalence of DM increased sharply with age and BMI, starting from the lowest BMI categories (BMI <25), consistent with evidence that a lean body weight (BMI <25) is desirable for optimal prevention and control of T2DM.
- The prevalence of DM was lower in persons with a higher vs lower SES, which may partly relate to overall healthier lifestyle and diet in the former than the latter.
- The prevalence of IFG was 15.7% at age 18-74 and 20.7% at age 35-74 and higher in males vs females.
- *Comparison with other countries.* The prevalence of DM is higher in Seychelles than in several other high-income countries (e.g. <6% in several high-income countries (e.g. western Europe) and some low-income countries, particularly those countries where the prevalence of obesity is low (Ethiopia, etc).
- On the other hand, the prevalence of DM was lower in Seychelles than in some countries with a high prevalence of obesity, including small island states (Nauru, French Polynesia, etc.) and other countries with high prevalence of obesity (e.g. Mexico, Kuwait, Pakistan, etc).
- *Awareness treatment and control rates*. Awareness, treatment, and control rates are displayed and discussed in section 10 (**Table 10.1**).
- It can be seen from the figures above that a large majority of individuals with DM were treated, consistent with the fact that >80% of adults attend a health service every year (**Table 19.2**).

Association between elevated fasting plasma glucose and elevated A1c

Table 8.2 Relation between elevated fasting plasma glucose (FBG) and elevated A1c

	A1c (%)		
FBG (mmol/l	<6.5	≥6.5	Total
<7.0	1012	**48**	1 060
≥7.0	**26**	**109**	135
Total	1 038	157	1 195

All cases with DM = 109 + 48 + 26 = **183.**
Proportion with A1c ≥6.5 from all DM cases: 157/183 = **86%**.
Proportion with gluc ≥7.0 from all DM cases: 135/183 = **74%**.
All cases with diabetes, including with FBG controlled: **212**.

Comments

- Among the 183 persons with elevated FBG or elevated A1c (n=183) in the survey, 25% (48/183) had elevated A1c & FBG <7.0, 14% (26/183) had elevated fasting blood glucose & A1c<6.5, 73% had FBG ≥7, and 60% (109/183) had both elevated FBG & elevated A1c (analysis in 1195 persons due missing A1c in 10 persons).
- This emphasizes the utility of both tests to best assess the presence of diabetes.

- The correlation coefficient between plasma glucose and A1c was very high at 0.87 (similar in males and females).

Screening and treatment characteristics of diabetes

Table 8.3 Knowledge on, and screening of, diabetes in the whole population and in adults treated for DM and characteristics of treatment by sex, age, and job categories

		Sex		Females			Males			Job		
	All	F	M	18-34	35-54	55-64	18-34	35-54	55-64	Low	Mid	High
In the general (whole) population (sample: 1205)												
Has heard of diabetes	97	97	97	96	98	97	97	97	97	94	97	97
Screened for diabetes												
<1 year ago	72	77	68	71	77	84	62	67	77	77	71	79
1-5 years ago	13	12	15	9	13	14	16	14	14	11	14	14
Among those treated for DM, age 35-74 (sample: 130)												
Provider of treatment												
Government	81	86	75		88	85		79	70	91	84	58
Private	19	14	25		13	15		21	30	9	16	42
Both	0	0	0		0	0		0	0	0	0	0
Has a glucometer at home	70	68	71		75	58		79	59	33	63	80
Reports daily adherence to medication (vs less often)	84	84	84		81	88		79	93	91	81	87

Comments

- *Having heard of DM*. Nearly all adults (97%) had heard of DM.
- *Screening for diabetes*. As many as 72% of all adults had a diabetes screening test performed in the last 12 months, with no marked difference by sex, age, and job categories. This is consistent with the fact that >80% of all adults attended a health service in the past 12 months (**Table 19.2**).
- *Government vs private care for diabetes*. Around 80% persons with DM sought health care from government health services and ~20% from private practitioners.
- More females than males sought DM care from private providers (86% vs 75%) and markedly more persons of higher vs lower SES (42% vs 9%, respectively).
- *Glucometer at home*. A large majority of persons with DM had a glucometer at home.
- The proportion having a glucometer was higher in younger vs older diabetic persons (75% vs 58% respectively) and in persons with a higher vs lower SES (80% vs 33%). Self-monitoring of blood glucose using portable a glucometer at home enables to empower patients and help them adjust their treatment.
- *Adherence to treatment*. Self-reported adherence to treatment was high. However, self-reported adherence is often overestimated (e.g. social desirability).
- Diabetes treatment and control are displayed in section 10 (**Table 10.1**).

Associations between diabetes and selected variables

Table 8.4 Associations of diabetes with selected variables

	Categories	OR	*P*
Sex	Male	1.4	*
Age	18-34	1	-
	35-54	5.9	**
	55-74	15.2	***
Job	Low	1	-
	Mid	0.71	ns
	High	0.67	*
BMI	<25	1	-
	25-29	2.1	ns
	30-39	3.2	**
	≥40	3.9	
GFR	Kidney impairment	1.6	*
SBP	Systolic BP (10 mm)	1.22	***

Multivariate logistic regression; OR: odds ratio.
Kidney impairement: MDRD GFR stage ≥3.
P value: ns; * <0.1; ** <0.01; *** <0.001.

Comments

- DM was strongly associated with an age, BMI, HBP and, less strongly, with impaired kidney function, male sex, and a lower SES.
- The findings stress the importance of weight control and BP control for DM prevention and control.

Interventions for prevention and control of type 2 diabetes

Population level

- interventions promoting a healthy diet, physical activity, and a lean body weight are crucial (interventions are mentioned in sections on diet, physical activity, and obesity).

Health care level

- Adequate weight control should be a central component of treatment in diabetic patients with obesity, including effective weight-lowering treatment (e.g. GLP-1 medications, bariatric surgery) in selected patients with severe obesity and high CVD risk.
- Multiple medications are often necessary to control FBG and other CVD risk factors (e.g. HBP, dyslipidaemia). Treatment should include medications that have kidney and/or CVD protective properties, e.g. SLGT-2 inhibitors [dapagliflozin] for diabetes and/or ACEI/ARBs for HBP.
- A total risk approach (targeting DM, HBP, and dyslipidaemia) is essential and treatment targets set accordingly in persons at increased CVD risk (e.g. BP <130/80, LDL-cholesterol <3.0 mmol/l).
- Treatment and control rates of diabetes and other risk factors (e.g. FBG <7 mmol/l, BP <140/90, LDL-C <3 mmol/l) are good indicators of the quality of treatment among patients and health care performance of patients at risk overall. Electronic medical records can also automatically alert doctors and patients alike when risk factors are not treated to treatment targets.

- Interventions to prevent and control diabetes (e.g. healthy diet, physical activity, weight control) are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (e.g. Diabetes, Obesity, Diet, Dietary sugar, Physical activity, Health systems and NCDs).

9. High blood cholesterol and blood lipids

Introduction

Blood cholesterol and health risk. Blood cholesterol is a main modifiable CVD risk factor. Raised cholesterol causes atherosclerosis, i.e. the narrowing of the arteries, which causes heart attack, stroke, and peripheral artery disease. Raised blood cholesterol largely results from dietary consumption of saturated fats (e.g. meat, dairy products, and vegetable oils such as palm oil and coconut oil), dietary trans fat (e.g. foods made with hydrogenated oils: cookies, deserts, pizzas, etc), and genetic causes (e.g. familial hypercholesterolaemia).

LDL-cholesterol. One component of all 'total cholesterol' circulating in the blood is 'LDL-cholesterol'. LDL-cholesterol predicts CVD better than total cholesterol. It is the marker used in clinical practice to assess CVD risk.

Management of raised blood cholesterol. Non-pharmacological management relies on a diet poor in saturated fats (i.e. limiting animal products, dairy products, coconut oil and palm oil) and rich in vegetables. Sunflower, soja, and other oils with unsaturated fats do not raise blood cholesterol. However, a healthy diet alone may reduce blood cholesterol by <5% in most cases. Medications such as statins can reduce blood cholesterol by up to 40-60%. Statins are widely available in Seychelles and relatively inexpensive (e.g. ~SCR0.10 per day). Other medications may be needed to reach treatment targets (e.g. ezetimibe, monoclonal antibodies or iRNA therapies such as PCSK9 inhibitors), particularly if statins are not tolerated (e.g. muscle pain in <5% of patients). Cholesterol treatment targets depend on an individual's overall CVD risk, i.e. presence of other risk factors. Calculators and risk charts are used to assess total CVD risk (e.g. the risk of developing CVD in the 10 next years).

For example, the European Society of Cardiology recommends an LDL-C target of <3.0 mmol/L (<116 mg/dL) if CVD risk is low; <2.6 mmol/L (<100 mg/dL) if CVD risk is moderately high; <1.8 mmol/L (<70 mg/dL) if CVD risk is high; and <1.4 mmol/L (55 mg/dL) if CVD risk is very high.

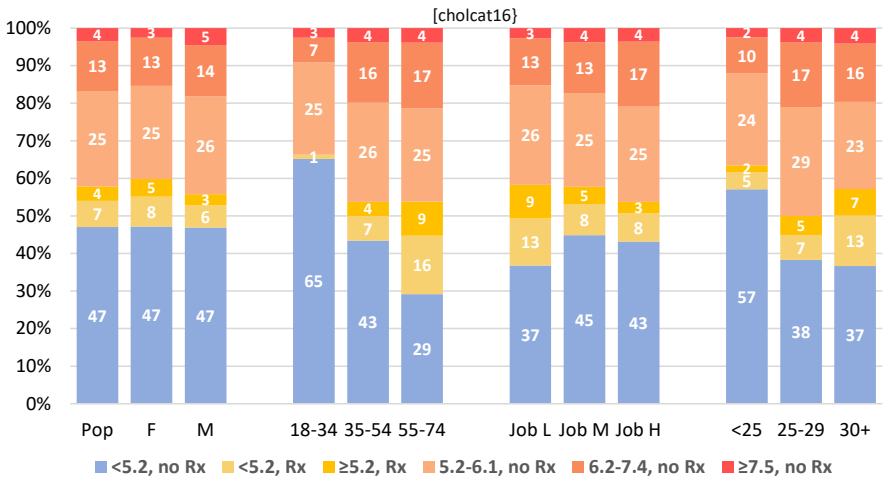
Table 9.1 CVD risk categories associated with selected blood lipid levels (mmol/l; mg/dl in parentheses)

CVD risk category	Total cholesterol	LDL-cholesterol	HDL-cholesterol	Triglycerides
Desirable/optimal	<5.2 (<200)	<2.6 (100)	High >1.6 (60)	<1.7 (150)
Near or above optimal		2.6-3.3 (100-129)		
Borderline high	5.2-6.2 (200–239)	3.3-4.1 (130-159)		1.7-5.7 (150-499)
High	≥6.2 (240)	4.1-4.9 (60-190)		5.7-11.4 (500-999)
Very high	≥7.5 (290)	>4.9 (190)	Low <1.0 (40)	≥11.4 (1000)

Source: *Noncommunicable Diseases: A Compendium* (Routledge, 2023). Chapter on blood lipids.

Prevalence of raised cholesterol

Figure 9.1 Prevalence of raised cholesterol by sex, age, job, and BMI (Rx: cholesterol-lowering treatment)



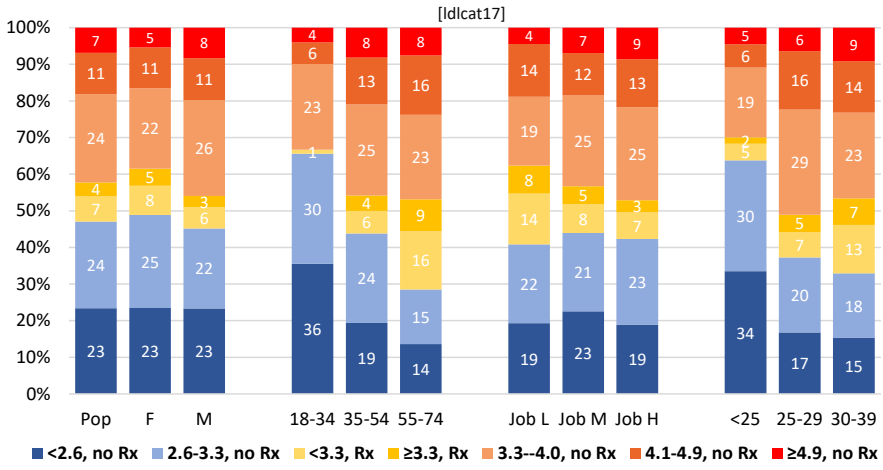
Comments

- Around 50% of the population aged 18-74 years had raised blood total cholesterol (hence a raised CVD risk).
- Approximately 17% had a high cholesterol level (≥6.2 mmol/l), i.e. a level associated with a 'high' CVD risk.
- The prevalence with 'very high' total cholesterol (≥7.5 mmol/l) was substantial (4%, i.e. ~2800 adults aged 18-74), with no substantial difference by sex and age.
- Very high cholesterol levels may suggest an underlying genetic cause in some cases, such as autosomal familial hypercholesterolemia (FH) or other monogenic or polygenic dyslipidaemias, which cause heart attack at a young age if untreated. Several families in Seychelles are known to have familial hypercholesterolemia.
- The prevalence of raised cholesterol was associated with age (e.g. >70% at aged 55-74 years) and BMI.
- Rates of awareness of having high cholesterol, treatment and control are displayed and discussed in another section (**Table 10.1**). It can however be seen from **Figure 9.1** that a large proportion of individuals treated had blood cholesterol levels not controlled to adequately low treatment targets.

Prevalence of raised LDL-cholesterol

While data on total cholesterol are useful in epidemiological population surveys, LDL-cholesterol, which is a more expensive test, is the most suitable blood marker for diagnosis and treatment of hypercholesterolaemia at the individual level.

Table 9.2 Prevalence of raised LDL-cholesterol by sex, age, job, and BMI (Rx: cholesterol-lowering treatment)



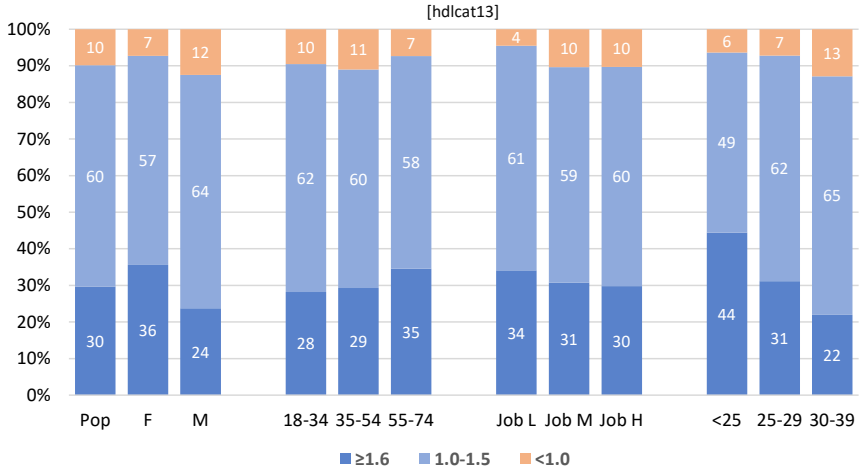
Comments

- The findings for LDL-cholesterol are consistent with the findings for total cholesterol (**Tables 9.1** and **9.2**), with associations with sex, age, and BMI.
- However, the findings for LDL-cholesterol show a more detrimental situation than described for total cholesterol.
- Only 23% of the whole population aged 18-74 years had an 'optimal' LDL-cholesterol level (LDL-cholesterol <2.6 mmol/l), particularly when considering that a lower cut off (e.g. <2.6 mmol/l), which is recommended for the many individuals with high CVD risk due to diabetes, hypertension, history of CVD, etc.
- The prevalence of very high LDL-cholesterol (≥4.9 mmol/l) was substantial (e.g. 7% in the population aged 18-74 years) with no marked difference by age. This, again, suggests a genetic cause of high LDL-cholesterol for some of them.
- Rates of awareness, treatment and control are shown and discussed in section 10 (**Table 10.1)**.

Prevalence of low HDL-cholesterol

HDL-cholesterol (i.e. cholesterol linked to apolipoprotein A) is the 'good' cholesterol component of blood total cholesterol: the *higher* HDL-cholesterol, the *lower* CVD risk. HDL-cholesterol can be seen as useful to clear the 'bad' LDL-cholesterol from the blood. A higher (favourable) HDL-cholesterol level is associated directly with physical activity and alcohol use, and inversely with a BMI and smoking. Yet, clinical trials of drugs that increase blood HDL-cholesterol have failed to show a reduction in CVD risk.

Table 9.3 Prevalence of low HDL-cholesterol by sex, age, job, and BMI categories



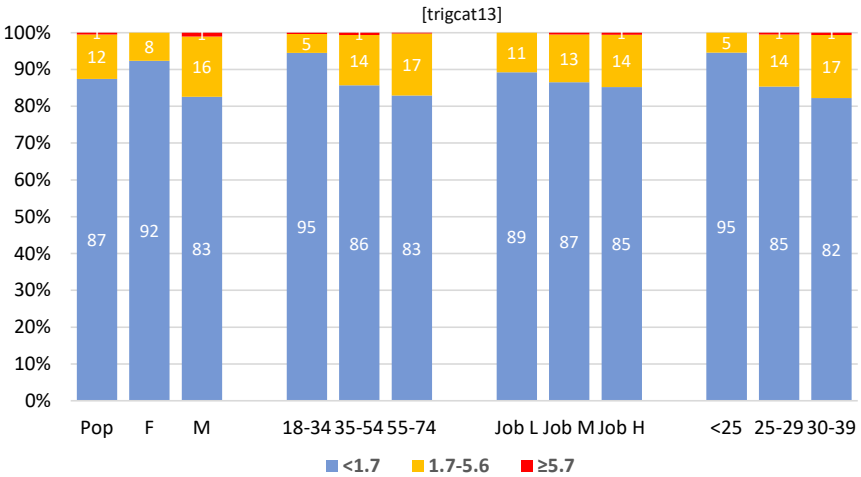
Comments

- High proportions of individual (30% at age 18-74) had favourably high HDL-cholesterol (≥1.6 mmol/l).
- Around 10% of the population aged 18-74 years had low (unfavourable) HDL-cholesterol (<1.0 mmol/l).
- The prevalence of low (unfavourable) HDL-cholesterol was associated with male sex, higher SES, and BMI.

Prevalence of raised triglycerides

Most of the fats we eat are in the form of triglycerides. Triglycerides are carried in the blood and provide and store energy. Triglycerides are also produced by the body adipose cells from excess calorie intake, particularly alcohol, carbohydrates, and sugar. A high blood triglycerides level moderately increases CVD risk and very high levels can result in acute pancreatitis.

Table 9.4 Prevalence of raised blood triglycerides by sex, age, job, and BMI categories



Comments

- Around 13% of the total population had increased blood triglyceride levels (i.e. ≥1.7 mmol/l).
- A higher triglyceride level was associated with older age, higher BMI, and male sex.

Associations of LDL-cholesterol, HDL-cholesterol, and triglycerides with selected variables

Table 9.2 Multivariate associations of LDL-cholesterol, HDL-cholesterol, and triglycerides with selected variables

	LDL-cholesterol		**HDL-cholesterol**		**Triglycerides**	
	R^2: 0.10		R^2: 0.15		R^2: 0.13	
	RC	*P*	RC	*P*	RC	*P*
Male sex			-0.21	***	0.30	***
Age (10 yrs)	0.14	***	0.04	***	0.06	**
Overweight	0.47	***	-0.19	***	0.35	***
Obese	0.55	***	-0.33	***	0.49	***
Smoking cigarettes			-0.06	(0.097)	0.26	***
Job high	0.19	*			0.17	*
High alcohol intake			0.16	***	0.12	(0.096)
Cholesterol treatment	-0.51	***				

RC: multivariate linear regression coefficient. Not shown if P >0.1.

*: <0.05; **: <0.01; ***: <0.001. R^2: R squared.

No significant association with vegetables, fruits, a dietary index of animal foods, fish, sugary drinks, take-away food, and physical activity.

In blue: inverse associations.

Comments

- *LDL-cholesterol*. A higher LDL-cholesterol level (high LDL-C increases CVD risk) was strongly associated with age and BMI. The association with a higher SES may be partly related to a higher intake of saturated fats (e.g. animal products such as dairy products, meat, etc.) in these persons.
- *HDL-cholesterol*. A higher HDL-cholesterol level (high HDL-C decreases CVD risk) was associated inversely with male sex, a raised BMI, and cigarette smoking, and directly with alcohol intake.
- *Triglyceride*s. Higher triglycerides level was associated with male sex and raised BMI.
- *Nutrition*. No significant association was observed between LDL-cholesterol or triglycerides and several dietary markers that are known determinants of dyslipidaemias. This is not unexpected as these associations are small when correlated with food items in isolation.

Interventions to prevent and control dyslipidaemias

Population level

- Measures in various sectors can promote a healthy diet, including:
  - Ensure that oils rich in saturated fats (e.g. palm oil) are not imported in the country (e.g. Mauritius).
  - Ensure that all commercial foods, including oils and dairy products, bear food content label displaying saturated fats content (and consider development of an interpretative labelling system), to enable consumers to better select the foods they buy.
  - Ban trans fats (a WHO best buy), e.g. ban importation of foods and oils that have a trans fat content ≥0.5%.

Health care level

- Ensure that cholesterol treatment guidelines at primary health care level align with recommendations for the management of dyslipidaemias and are implemented (e.g. treatment targets proportional to CVD risk).
- Screen family members of individuals with a very high cholesterol (e.g. ≥8 mmol/l) for familial (genetic) forms of hypercholesterolemia, which carry a very high risk of premature heart attack.
- Consider developing a specialist clinic for management of dyslipidaemias, including to identify genetic forms of hypercholesterolemia and c introducing additional cholesterol-lowering drugs (e.g. ezetemide).

- Interventions to prevent and control dyslipidaemias (e.g. healthy diet, physical activity, and weight control in the population) are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (e.g. Cholesterol, triglycerides and trans fat, Food reformulation, Food labelling, Obesity, Diet, Dietary sugar, Health systems and NCDs).

10. Awareness, treatment and control rates for hypertension, diabetes, and high cholesterol

Introduction

Control of main CVD risk factors with lifestyle counselling and pharmacological therapy is a main approach for reducing CVD in high-risk individuals (i.e. individuals with raised levels of BP, blood sugar, and/or cholesterol).

Insufficient control of these risk factors relates to many issues, including lack of diagnosis, barriers in access to health care level, such as long waiting time, lack of continuity of care visits, insufficient medication dosage, poor adherence to treatment, etc. In Seychelles, government health services medications provide medications at no cost to all nationals. Yet, adherence is typically fairly low (e.g. 50% of so) for treatment of *asymptomatic* chronic conditions such as hypertension, diabetes and hypercholesterolaemia,[53] which limits the efficacy and impact of treatment strategies for these conditions.

Findings in the table are limited to individuals aged 45-74 years considering that indications for pharmacological treatment should be prescribed according to other risk factors, particularly a raised total CVD risk, which largely increases with age and total CVD risk. The targets for treatment used in the table are conservative and lower treatment targets (e.g. BP<130/90, LDL-cholesterol <2.8 mmol/l or total cholesterol <4 mmol/l) are recommended in individuals with a high CVD risk.

Awareness, treatment, and control rates for HBP, diabetes, and high cholesterol

Table 10.1 Screening and awareness, treatment, and control rates for HBP, diabetes, and high cholesterol by sex (age 45-74 years)

	High BP		Diabetes		High total chol	
	F	M	F	M	F	M
In whole population:						
Has heard of the risk factor (%)	98	98	97	97	98	97
Has been screened for the RF:						
<1 year ago (%)	93	83	83	74	NA	NA
1-5 years ago (%)	5	8	12	14	NA	NA
In individuals with raised RF:						
Criterion for defining the RF:*	*BP ≥140/90 or Rx*		*FBG ≥7.0 or Rx*		*Tot chol ≥6.2 or Rx*	
Criterion for control of the RF:*	*BP <140/90*		*FBG <7.0*		*Tot chol <5.2*	
Prevalence of RF in population, age 45-74 yrs (%)	72	64	21	24	47	39
Proportion aware of having the RF, from all (%)	88	75	81	81	64	54
Proportion treated, from all aware (%)	88	83	89	80	65	59
Proportion controlled, from all treated (%)	46	38	33	33	62	72
Proportion controlled, from all with RF in population (%)	36	24	24	22	26	23

Rx: treatment for the condition. NA: non available. FBG: fasting blood glucose. RF: risk factor. Chol: cholesterol.
Green: high proportion ≥70%; red: low proportion <70% (arbitrary thresholds).

Comments

Screening

- Screening for the main modifiable risk factors was very high (~80% individuals at age 45-74 years).
- This reflects that that these risk factors are checked at the primary health care level with, for example, > 80% of adults aged 18-74 years attending a health care provider at least once per year (**Table 19.2**).

Awareness of having CVD risk factors

- As many as ~70-90% of adults aged 45-74 years with hypertension or diabetes were aware of having raised levels of these risk factors.
- The proportion was lower (~60%) for raised blood total cholesterol.

[53] Bovet P, Madeleine G et all. Monitoring one-year compliance to antihypertension medication in the Seychelles. *Bull WHO* 2002;80:33-9. PubMed

Treatment of main CVD risk factors

- More than 80% of individuals aware of having hypertension, diabetes or dyslipidaemia reported taking a medication, consistent with e provision of medications at no cost to Seychelles nationals in public health services, and relatively low prices of generic medications for those seeking health care from private providers.

Control of main CVD risk factors among persons treated

- The proportions of persons treated who had their raised risk factors treated to recommended targets ('controlled') were lower, at ~40% for HBP, ~30% for diabetes, and ~60% for raised cholesterol.
- This can relate to the limited adherence to treatment for these *asymptomatic* conditions and that several medications are needed to effectively lower risk factors.

Control of main CVD risk factors as proportion of all individuals in the population with raised risk factors

- Control of risk factors depend on achieving good rates in all the steps of the *cascade* from 'being aware of a raised risk factor', to 'receiving a treatment' and to 'taking treatment that reduces raised risk factors to the recommended treatment targets'.
- When relating control rates to all individuals in the population with a raised risk factor, less than a third of individuals with raised risk factors had these risk factors 'controlled' to treatment targets.
- Overall, there is a large potential for improved risk factor control through improved diagnosis and treatment of the main modifiable CVD risk factors, i.e. a large potential to lower the CVD burden in the population.

Interventions for of risk factor control in individuals at high CVD risk

- As obesity is both a main cause of raised BP, cholesterol and diabetes and a factor limiting the efficacy of treatment (due to insulin resistance), weight control is a crucial measure to improve CVD risk factor treatment. This may require bold interventions, such as bariatric surgery and/or GLP1 agonists (semaglutide, etc.) in selected patients with severe obesity, type-2 diabetes, and other risk factors.
- Several interventions can improve different aspects of risk factor management at the health care level, including:
  - Implement an appointment system with automated reminders (this will be facilitated when electronic medical files are implemented) to facilitate follow-up visits, reduce waiting time for patients, and loss of follow up of patients.
  - Ensure that patients are seen, as far as possible, by a same doctor to improve the doctor-patient relationship and better empower patients to adhere to their treatment.
  - Update CVD risk factor treatment guidelines to the latest best practices, including sufficiently low treatment targets among high-risk individuals.
  - Procure a broader choice of fixed-dose medications combinations (e.g. pills containing 2-4 different drugs at low or moderate doses) for HBP and diabetes treatment. This has been consistently shown to simplify treatment, reduce side effects, increase adherence to treatment, and improve risk factor pressure control.
  - Ensuring that the electronic medical record system (which is being implemented) automatically displays patients' risk factor levels over time and issues warning messages to doctors and the patients when risk factors are not treated to targets.
  - Monitoring doctors' and health centres' performance based on rates of patients having their risk factor levels controlled, possibly linked with incentives health providers proportional to rates of patients reaching treatment targets. This was shown to improve factor control in several health maintenance organisations (e.g. Rand Corporation).

- Interventions to prevent and control hypertension, diabetes, and dyslipidaemia (e.g. healthy diet, physical activity, and weight control) are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO to prevent and control hypertension, diabetes, and dyslipidaemia, are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (e.g. Hypertension, Diabetes, Cholesterol, triglycerides and trans fat, Health systems and NCDs).

11. Clustering of raised major cardiovascular risk factors

Introduction

Total CVD risk exponentially increases if several major modifiable CVD risk factors are raised. The major modifiable CVD risk factors include high BP, high blood cholesterol, diabetes, and cigarette smoking.[54] Persons with 0 risk factor have a very low risk to develop CVD (e.g. <5%) while those with 3-4 elevated main risk factors have a 30-40% risk to develop a CVD event over the next 10 years, and a 70-80% risk to develop a CVD event over the next 30 years.[55]

This emphasizes the need to assess 'total' CVD risk in individuals, calculated from the levels of all main risk factors (including sex and age), for example by using CVD risk charts (or done automatically in EMRs), with treatment adjusted to total CVD risk.

Prevalence of combinations of raised CVD risk factors

Fig 11.1 Prevalence of clustering of raised major CVD risk factors by age, job, and BMI categories
(BP ≥140/90, FBG ≥7.0 mmol/l, total cholesterol ≥5.2, smoking)

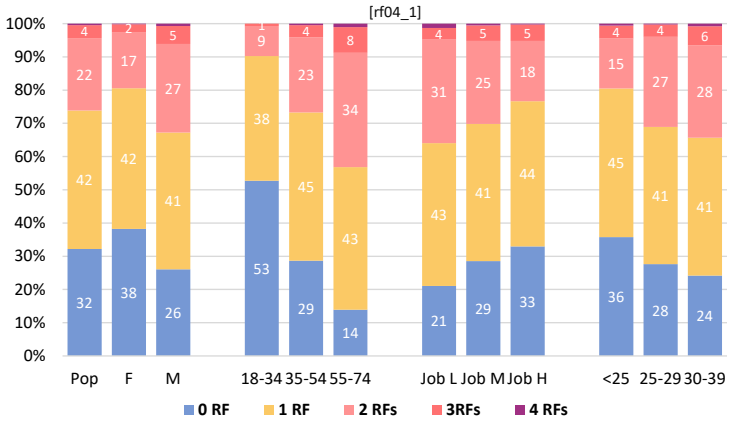


Table 11.1 Multivariate associations between having ≥2 raised modifiable RFs and sex, age, job, and BMI
(BP ≥140/90, FBG≥7.0, total cholesterol ≥5.2, smoking)

	OR	*P*
Male sex (vs F)	2.1	***
Age (vs 18-34)	1	
Age 35-54	2.5	***
Age 55-74	6.0	***
Job (vs high)	1	
Job mid	1.2	ns
Job low	1.5	*
BMI (vs <25)	1	
25-29	1.3	ns
30-39	1.6	*
40+	2.4	**

P: ns: >0.05; *: <0.05; ** <0.01; ***: <0.001.
4 RFs: BP ≥149/90; TC: ≥5.2; FBG ≥7.0; smoking.
OR: multivariate logistic odds ratio (~relative risk).

Comments

- Approximately two thirds of all adults aged 18-74 years had raised levels of ≥1 major modifiable risk factor.
- Around a quarter of adults aged 18-74 had ≥2 (out of 4) raised major risk factors.
- The prevalence was ~40% for individuals with ≥2 raised risk factors at age of 55-74.
- Clustering of several raised CVD risk factors was larger in males than females, increased markedly with age and BMI, and was larger in individuals with lower vs higher SES.

Interventions to prevent and control raised risk factors

Population level

- Interventions in multiple sectors can help prevent and control HBP, diabetes, raised blood cholesterol and smoking are available and are described in the corresponding sections in this report.
- The importance of obesity as a main cause of raised risk factors, and an obstacle to adequate risk actor control (e.g. insulin resistance), emphasise the central role of weight control, including the need for stringent measures in selected persons with severe obesity and risk factors (e.g. GLP-1 agonists or bariatric surgery).

Health care level

- Interventions to improve the control of the main CVD risk factors are described in the sections on the major risk factors and in Section 10 on treatment and control of major CVD risk factors.

[54] Diallo AO et al. Multiple Cardiovascular Risk Factor Care in 55 low- and middle-income countries: A cross-sectional analysis of nationally representative, individual-level data from 280,783 adults. *Lancet Global Health* 2024;4:e0003019. PubMed
[55] Pencina MJ. Predicting the 30-year risk of cardiovascular disease: the Framingham Heart Study. *Circulation* 2009;119:3078-84. PubMed

- Several issues related to staff capacity need to be considered, including developing task shifting/sharing for NCD care (e.g. NCD nurses) for tasks such as polypharmacy handling, risk stratification, renewal of prescriptions, and treatment adjustments.

- Interventions to prevent and control hypertension, diabetes, and dyslipidaemia in the population (e.g. healthy diet, physical activity, and weight control) are described in the Seychelles NCD Strategy 2016-2025.
- Priority interventions advocated by WHO are listed in **Appendix 12** and are discussed, for example, in several chapters of *Noncommunicable Diseases: A Compendium*, Routledge, 2023 (e.g. Hypertension, Diabetes, Cholesterol, Health systems and NCDs).

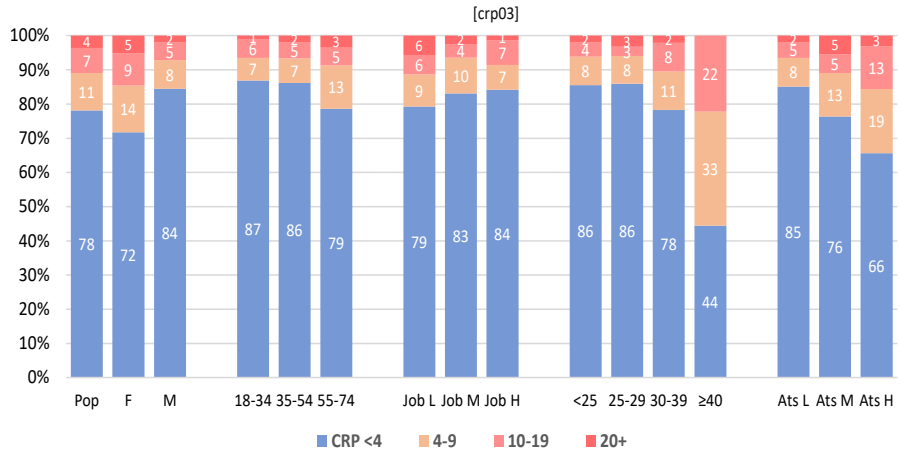
12. Raised blood levels of C-reactive protein and uric acid

C-reactive protein (CRP)

Introduction

C-reactive protein (CRP) is a protein found in blood plasma, whose circulating concentrations rise in response to acute or chronic inflammation. CRP is synthesized by the liver in response to factors released by macrophages, T cells, and fat cells (i.e. adipocytes, obesity).[56] CRP concentration associated with obesity, risk of coronary heart disease, ischaemic stroke, vascular mortality, several cancers, and chronic respiratory disease. While markedly increased CRP levels are often caused by infection, levels ≥10 mg/dL are a marker of increased CVD risk.

Figure 12.1 Prevalence of raised CRP blood level by sex, age, job, BMI, and carotid atherosclerosis categories



Comments

- High CRP concentration was associated with female sex, age, BMI, and carotid atherosclerosis (Ats L: no plaque or plaque <1.2 mm thickness; Ats M: plaque(s) with 1.2-1.5 mm thickness; AtsH: plaque(s) ≥1.5 mm, as measured by ultrasound).
- The higher prevalence of high CRP in females (particularly in the younger ones) may partly relate to subclinical gynaecological infections.
- The association of CRP with BMI partly reflects that adipose tissue is associated with systemic inflammation, which itself is a driver of cardiometabolic disorders.
- Systemic chronic inflammation is an important mechanism contributing to the development of atherosclerosis plaques, which narrow the arteries and can result in heart attack or stroke.

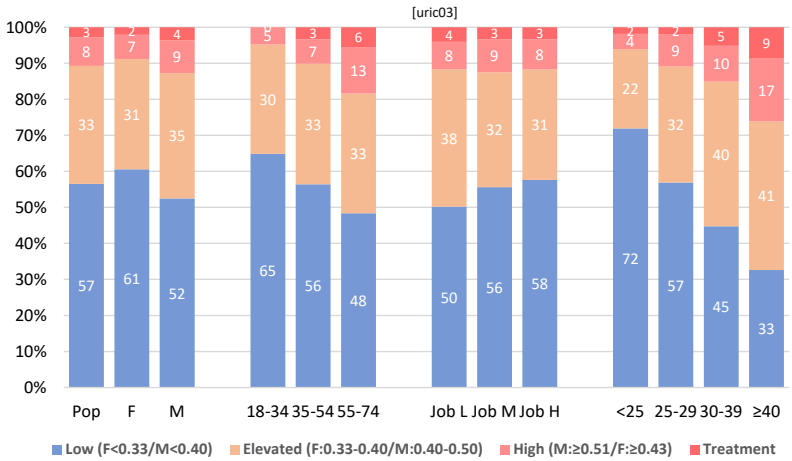
Uric acid

Introduction

Uric acid is a product of the metabolic breakdown of purine nucleotides (purines are major energy carriers and building blocks of nucleic acids) and a normal component of urine. Foods such as meat and seafood contain high levels of purine (e.g. mussels, mackerel, tuna). A diet rich in high-fructose corn syrup, sucrose, and alcohol, and certain drugs (e.g. thiazide diuretics) can also elevate serum urate levels. However, genetic variation is a much greater contributor to raised serum uric acid levels. High blood concentrations of uric acid can lead to gout and other medical conditions, including cardiovascular disease and kidney stones. Of note, gout can occur at low acid uric levels and some individuals with high uric acid levels may not develop gout. High acid uric levels can be reduced with allopurinol.

[56] Lau DCW et al. Adipokines: molecular links between obesity and atherosclerosis. *Am J Physiol Heart Circ Physiol* 2005;288:2031-41. PubMed

Figure 12.2 Prevalence of raised blood level of uric acid, by sex, age, job, and BMI categories



Comments

- Raised blood uric acid was associated with male sex, age, low SES, and high BMI.
- The strong association of blood uric acid with high BMI underlies the metabolic impact of adiposity and the role of weight control as part of treatment of hyperuricaemia and for prevention of CVD and gout.
- Treatment (allopurinol) was taken by 3% of adults aged 25-74 years and by 9% of individuals with BMI ≥40.

Table 12.1 Associations of raised uric acid (M: >0.51m/F: >0.43) with selected medical conditions and behaviours

	Odds ratio	P-value
Male sex (vs F)	1.29	ns
Age (18-34, ref)	1	
35-54	1.05	ns
55-74	1.87	ns
BMI (<25, ref)	1	
25-29	2.10	*
30-39	2.72	**
≥40	6.33	***
A1c (%)	0.84	*
LDL-cholesterol (mmol/l)	0.97	ns
Systolic BP (10 mmHg)	1.16	*
Treatment for BP	1.38	ns
Moderate or severe CKD	3.23	***
Cigarette smoking	1.42	ns
Heavy alcohol intake (>p80)	3.60	***
Softdrinks (n/wk)	1.00	ns
Fish intake (times per week)	0.99	ns
Meat processed (days per week)	1.02	ns
Fresh meat (days per week)	0.81	ns

CKD: moderate or severe impaired kidney function (MDRD stage ≥3).

P: *: <0.07; **: <00.1; ***: <0.001.

Comments

- Raised blood uric acid was associated with high BMI, chronic kidney disease, and heavy alcohol intake.
- No significant associations were found for several dietary foods.
- The small, yet not significant, association of uric acid with BP treatment may be linked with thiazide diuretics.

Interventions for prevention and control of raised levels of CRP and uric acid

- The findings stress the importance of weight control to reduce blood levels of CRP and uric acid.
- The absence of associations of uric acid with foods known to increase uricemia in the survey does not lessen the importance of a heathy nutrition as a mean to prevent high blood uric acid.
- The association of thiazide diuretics with blood uric acid is not a contraindication for their use in HBP treatment as diuretics are a cornerstone component of BP treatment with demonstrated net benefits.

13. Prevalence of CVD, cancer, chronic kidney disease, and carotid atherosclerosis

Introduction

The prevalence of major CVD (heart attack, ischemic heart disease, stroke), cancer was based on self-reported history. Of note, *prevalence* of NCDs does not inform well on the incidence of the diseases with high case-fatality rates. For example, up to a third of all heart attacks occurring in the population result in 'sudden death' within minutes, most often before a person can reach a health care facility. This also partly applies to stroke and several cancers that have rapidly fatal evolution.

Given that the number of participants with a history of major NCD was small, there can be imprecision in extrapolating survey estimates to the whole population. It is reassuring that the number of participants in the survey on haemodialysis (n=4), i.e. with end-stage chronic kidney disease, extrapolates to 211 in the whole population, i.e. quite close to the actual number of persons on haemodialysis in Seychelles (230 in 2023). This supports the random nature of the sample used for the survey and, indirectly, the validity of estimates for other conditions inferred from the survey to the whole population.

Prevalence of history of CVD, cancer, and chronic kidney disease

Table 13.1 Prevalence of self-reported history of CVD, cancer, and chronic kidney diseases

Disease	In the survey sample			Inferred to whole population		
	18-34 (N)	35-54 (N)	55-74 (N)	18-74 (N)	35-44 (%)	55-74 (%)
Hx of heart attack (myocardial infarction)		6	12	810	1.3	2.6
Hx of stent or bypass of coronary arteries	0	1	7	325	0.2	1.5
Hx of MI, stent or bypass of coronary arteries (IHD)	0	7	19	1 135	1.5	4.2
Hx of stroke		9	19	1 253	2.0	4.2
Hx of both MI & stroke	0	5	5	485	1.1	1.1
Hx of rheumatic heart disease	1	1	1	97	0.2	0.2
Hx of cancer	2	10	27	1 616	2.2	5.9
Haemodialysis (1 with ADPKD)	0	1	4	211	0.2	0.9
Hx of polycystic kidney disease (ADPKD)	0	1	1	97	0.2	0.2

Hx: personal history of the disease. Grey: the question was not asked only in participants aged <45 years.

IHD: ischemic heart disease.

Inference to total population using population/sample ratios of total pop size/sample size (resp. 88, 53 and 38).

Population (nationals) aged 18-75 yrs: ~70'000 , population 35-74 yrs: ~45'000.

Comments

Ischemic heart disease (IHD)

- Estimates of IHD were based on self-reported history of heart attack and/or heart interventions (stent or coronary artery bypass), i.e. evens that people would remember.
- Data on angina pectoris (which is a clinical form of IHD) were not considered as reliability of history of angina history (i.e. temporary pain in the chest caused by a physical effort) seemed questionable. Indeed several persons reporting angina did not report trinitrine treatment, while trinitrine would be routinely prescribed in such cases. Estimates of IHD may therefore be underestimated.
- The prevalence of self-reported IHD reached 4% at age 55-74 (i.e. >1100 persons in the population).

Stroke

- The prevalence of history of stroke was 4% at age 45-75 (i.e. >1100 persons in the population).
- It is likely that some eligible participants with severe disability (due to stroke) did not attend the survey due to stroke-related disability and the estimate from the survey are therefore under-estimated.

Rheumatic heart disease

- Only 3 persons (<0.2%) reported a history of rheumatic heart disease (RHD).
- RHD often develops in childhood following rheumatic fever due to throat infection with group A streptococci.

Cancer

- Around 2% of persons aged 35-54 and 6% of persons aged 54-74 reported a history of cancer (i.e. ~2000 cases in the whole population, not including cancer cases at age ≥75 years not considered in the table).

Haemodialysis

- The survey identified ~200 persons treated with haemodialysis for end-stage kidney failure, which matches with the actual number of cases in the population (230 cases in 2023).
- The prevalence is high compared to many other countries.[57] Persons on haemodialysis generally need ~3 sessions per week (at a cost of ~220 US$ per session, a total of ~US$ 7 million per year).
- The large prevalence of end-stage chronic kidney failure (on haemodialysis) is consistent with the large prevalence of hypertension and diabetes in the population (which are main causes of CKD), with substantial proportions of them not treated to recommended targets (**Table 9.1**).

Polycystic kidney disease

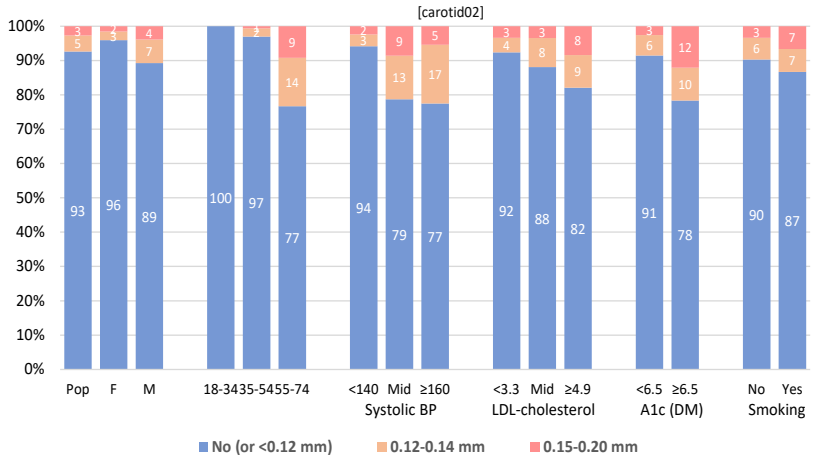
- Autosomal dominant polycystic kidney disease (ADPKD) is a genetically transmitted disease that often evolved to chronic kidney disease. A previous study estimated its prevalence at 57 cases per 100'000.[58]
- The table suggests that ~100 persons had ADPKD in 2023.
- Although this number seems small, many of them will develop end-stage kidney failure, implying that ADPKD contributes a substantial share of all CKD cases in the population requiring haemodialysis.

Carotid atherosclerosis measured by ultrasound

Carotid atherosclerosis is defined based on the presence of atherosclerosis plaques in the carotid arteries and represents a *subclinical vascular disease* (i.e. not just a risk factor). Carotid atherosclerosis is often associated with atherosclerosis (plaques) in the heart coronary arteries, causing 'artery narrowing' (i.e. ischemic heart disease). Atherosclerosis is mainly caused by raised blood LDL-cholesterol (which itself is caused by high dietary intake of saturated fat and/or genetic causes of hypercholesterolemia), but also smoking, HBP, and diabetes.

The presence of carotid atherosclerosis plaques was assessed using ultrasonography (Philips Lumify with a linear transducer) and plaques defined as artery intima media thickness ≥0.12 mm in the right or left carotid arteries.

Figure 13.1 Prevalence of carotid atherosclerosis by sex, age, BP, LDL-cholesterol, diabetes, and kidney function categories



Comments

- 7.4% of adults aged 18-74 years had ≥1 atherosclerosis plaques in their right and/or left carotid arteries.
- The prevalence of carotid atherosclerosis markedly increased with age (23% at age 55-74 years), systolic BP, LDL-cholesterol, A1c (i.e. a marker of diabetes), and cigarette smoking.

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[57] Bello AK et al. An update on the global disparities in kidney disease burden and care across world countries and regions. *Lancet Glob Health* 2024;12: e382–95. PubMed

[58] Yersin C, Bovet P et al. Frequency and impact of autosomal dominant polycystic kidney disease in the Seychelles. *Nephrol Dial Transplant* 1997;12:2069-74. PubMed

Table 13.2 Associations of carotid atherosclerosis with age and cardiometabolic risk factors

	OR	95%CI	P
Age (10 yrs)	2.88	(2.24-3.72)	***
Systolic BP (10 mmHg)	1.18	(1.06-1.32)	**
LDL-cholesterol (mmol/l)	1.26	(1.06-1.50)	*
A1c (%)	1.20	(1.07-1.35)	**
Cigarette smoking (y/n)	2.38	(1.37-4.15)	**
GFR (kidney function, 5 cat.)	1.50	(1.12-2.00)	**

OR: multivariate odds ratio. P-value: *: <0.05; ** <0.01; *** <0.001. R2: 0.27.

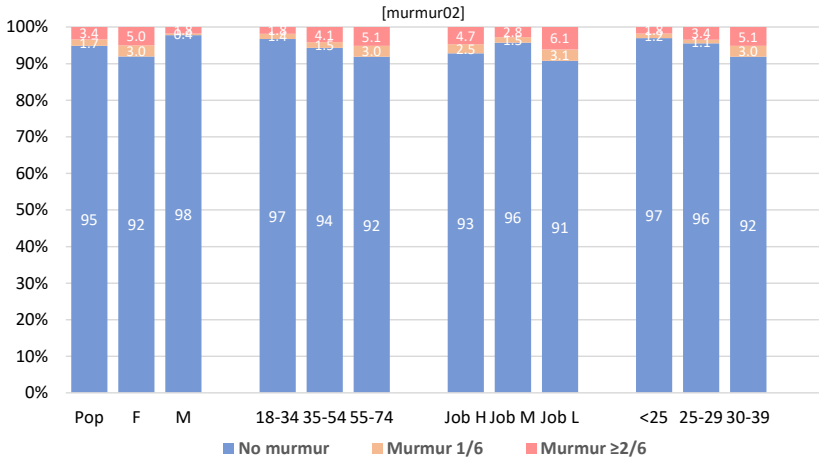
Comments

- The presence of carotid atherosclerosis (yes or no) was associated with several major CVD risk factors.
- For example, the odds ratio (i.e. ~relative risk) of 1.26 for LDL-cholesterol means that the risk of carotid atherosclerosis was 26% larger for every 1 unit (mmol/l) increase in blood LDL-cholesterol.
- The odds ratio of 1.18 for systolic BP means that the risk of carotid atherosclerosis was 18% larger for every 10 mmHg increase in systolic BP.
- Strong associations were also found (as expected) with age and impaired kidney function.
- Of note, cross-sectional analysis underestimates associations since exposures at the time of the survey do not capture past exposures (e.g. past tobacco smoking or HBP that is currently corrected by treatment).

Murmur at heart auscultation

Heart murmurs may be functional (with no or little health impact) or relate to valvular problems (e.g. mitral valve prolapsus, or RHD) or other heart conditions (e.g. heart dilatation, aortic stenosis, etc).

Figure 13.2 Prevalence of heart murmur at auscultation by sex, age, job, and BMI categories



Comments

- Around 5% or adults aged 18-74 years had a murmur with around two thirds of ≥2/6 intensity (i.e. easily identifiable by auscultation). The prevalence increased with age and BMI.
- Most participants with a heart murmur did not know about having a murmur.

Heart arrythmia

Arrythmia was assessed by auscultation for 30 seconds. Arrythmia may relate to atrial fibrillation, which may need treatment including anticoagulation, or to premature atrial or ventricular contractions, which are often benign but may need antiarrhythmic drugs if the arrythmia causes disagreements. A 24-hour electrocardiographic exam (Holter) is useful to assess the nature of the arrythmia, possibly complemented by echocardiography an/or further exams in a cardiac catheterization laboratory.

Table 13.3. Prevalence of heart arrythmia by age categories

Age	18-34	35-54	55-74
Prevalence	0.36	1.96	2.35

Comments

- The prevalence of arrythmia increased from 0.36% at age 18-35 to 2.35% at age 55-74. Most cases related to premature atrial or ventricular contractions.
- A majority of participants with arrythmia did not know about having arrhythmia although some reported they felt heartbeat irregularities.

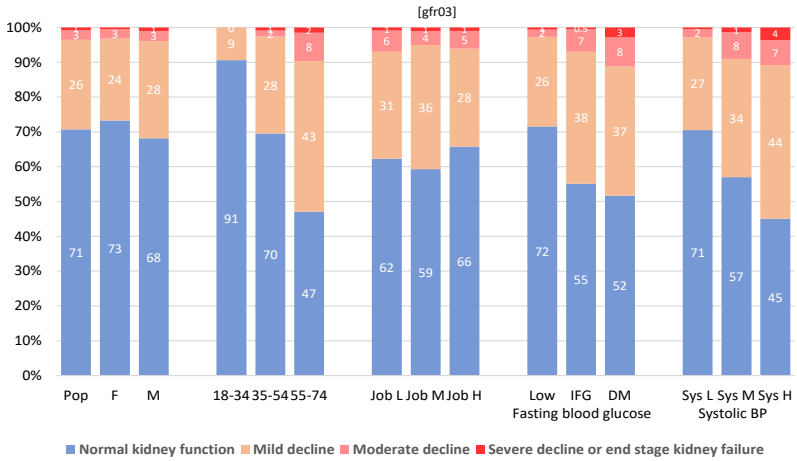
Chronic kidney disease (MDRD)

Renal function was assessed using the estimated glomerular filtration rate (eGFR, mL/min) calculated with the widely-used MDRD formula, which considers serum creatinine, sex, and age.[59] The eGFR expresses the blood volume filtered by the kidney per minute. There are 5 stages of chronic kidney disease (CKD):

Stage 1 (≥90 mL/min): Normal (high glomerular filtration rate; no decline of kidney function).
Stage 2 (60-89 mL/min): Mild decline in kidney function.
Stage 3 (30-59 mL/min): Moderate decline in kidney function.
Stage 4 (15-29 mL/min): Severe decline in kidney function.
Stage 5 (<15 mL/min): Kidney failure or end-stage renal disease (ESRD) requiring haemodialysis.

CKD stage 4 and stage 5 were combined into 1 category because of small numbers.

Figure 13.3 Prevalence of chronic kidney disease (based on MDRD) categories by sex, age, job, HBP, and diabetes categories



Comments

- Approximately 3.6% of individuals aged 18-74 years (i.e. ~2500 persons) had moderate or severe decline of their kidney function or end-stage-kidney failure.
- Persons with advanced or even moderate CKD may need some medications to be titrated to lower doses to avoid medication potential toxicity.
- Persons with chronic kidney disease require medications for hypertension and/or diabetes that have kidney protection properties (e.g. SLGT2 inhibitors such as dapagliflozin for diabetes or ACEIs or ARBs such as ramipril or 'sartans' for hypertension).

[59] MDRD formula: eGFR (with creatinine in µmol/l) = 175 * (serum creatinine*0.0113)^-1.154 * age^-0.203 * 0.742 (if female).

Table 13.4 Associations between chronic kidney disease (MDRD stages) and sex, age, BP, and diabetes

	RC	P
Sex (M vs F)	0.07	*
Age (25-34)		
35-54	0.22	***
55-74	0.47	***
Systolic BP (<140)		
140-159	0.05	ns
≥160	0.18	**
A1c (<5.7)		
5-7-6.4 (pre-diabetes)	0.02	ns
≥6.5 (diabetes)	0.14	*

RC: regression coefficient (GFR in 5 categories)

P: ns: not significant; *: <0.05; **: <0.001; ***: <0.001.

Comments

- CKD was strongly associated with age, HBP, and diabetes.
- Other conditions that lead to kidney failure, include polycystic kidney disease, a familial condition that is frequent in Seychelles (**Figure 11.1**), and other kidney diseases (e.g. kidney stones).

Interventions to prevent and mitigate complications of NCDs

Population level

- Interventions in multiple sectors to prevent and control risk factors in the whole population are described in sections on HBP, diabetes, dyslipidaemias, tobacco use, alcohol, diet, physical activity, and cancer screening.

Health care level

- *For CVD and CRD,* stringent CVD risk factor management is crucial for *individuals at high CVD risk* (e.g. treatment targets of LDL-cholesterol <3 mmol/l, BP <130/80 and blood glucose <7 mmol/l), and other therapies (e.g. beta-blockers, anticoagulation, nitrates, etc).
- Medications with cardiovascular and/or kidney protection properties should be used routinely (e.g. ACEIs and ARBs for hypertension and SLGT2 inhibitors for diabetes) to prevent or delay disease progression.
- Ultrasound assessment of carotid plaques is rapid and inexpensive. This exam could be performed at primary/secondary health care to help identify individuals at high CVD risk. Individuals aware of having plaques may incentivised to adopt a healthy diet and lifestyle.[60]
- For *cancer*, emphasis is increasingly focusing on reducing time gaps between diagnosis and treatment start to optimise treatment efficacy. This implies the need for highly reactive health care services.
- The need for cancer screening programmes should be evaluated carefully for cost-effectiveness, feasibility, and affordability, given large resources needed (e.g. mammography or colonoscopy for thousands of individuals, developing a database for those screened, managing false positive cases, etc.).
- A *genetic counselling programme* should be considered to provide counselling to persons with ADPKD and to their relatives (and for other genetically transmitted diseases, such as familial hypercholesterolemia, cystic fibrosis, or thalassemia).

- Interventions to prevent and control CVD, hypertension, diabetes, dyslipidaemia, and cancer in the population (e.g. diet, physical activity, tobacco use, and weight control) are described in the Seychelles NCD Strategy 2016-2025.

- Priority interventions advocated by WHO for the management of NCDs are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge, 2023 (Priority interventions for CVD, Hypertension, Diabetes, Cholesterol, Cancer, Breast cancer, Cervical cancer, Colon cancer, Prostate cancer, WHO best buys for NCDs, Health check-ups, Digital technologies for NCDs, Genetics and NCDs, Health systems and NCDs).

[60] Bovet P et al. Improved smoking cessation in smokers given ultrasound photographs of their own atherosclerotic plaques. *Prev Med* 2002;34:215-20. PubMed

14. Screening for cancer

Introduction

Population-based screening for cancer is useful when the screened cancer is frequent in the general population, a test reliably identifies the condition at early asymptomatic stages, an affordable and cost-effective treatment is available, and the screening programme can be shown to reduce mortality. However, population-based programmes require large resources because many individuals are examined. They also detect a number of false positive cases (i.e. positive screenees subsequently not diagnosed as cancer). Given the increasing availability of effective treatment for several frequent cancers, a main strategy in cancer detection and treatment, supported by WHO, aims at minimizing time gaps between cancer detection, diagnosis, and treatment initiation.

Of note, self-reported data on cancer screening in **Table 14.1** cannot distinguish if cancer screening was made as part of an organised population-based systematic screening programme (in persons without symptoms), as part of a routine health check-up ('opportunistic screening'), or because a person was seeking health care for symptoms. The word 'screening' in **Table 14.1** includes all detection modes.

Table 14.1 Prevalence of screening for cancer by age and associations with sex and job categories

	Prevalence by age (%)						**Associations** M (vs F)		Job high (vs other)	
	25-34	35-44	45-54	55-64	65-74	All	OR	P	OR	P
Cervix: Pap test, past 10 years (F)										
Never	14	6	13	16	25	15				
1 time	23	29	18	20	18	22			1.1	ns
Several times	52	58	65	62	53	58				
DNK	11	7	4	2	4	6				
Breast: examination by health officer, ever (F)										
Never	25	22	13	14	20	19				
1 time	38	31	28	22	21	28				
Several times	34	43	58	62	54	50			0.9	ns
DNK	3	3	1	2	4	3				
Breast: mammogram or ultrasound, ever (F)										
Never			63	53	58	58				
1 time			30	39	32	33			2.7	***
Several times			7	8	9	8				
DNK			0	0	2	1				
Prostate: PSA blood level, ever (M)										
Never			76	53	37	55				
1 time			13	23	21	19			2.1	***
Several times			9	22	34	21				
DNK			2	3	8	4				
Colon: blood in feces or endoscopy, ever (M & F)										
Never			87	82	77	82				
Blood in feces			5	4	5	5				
Endoscopy			5	10	11	9	2.2	***	1.2	ns
Both			2	3	3	3				
DNK			2	1	4	2				

P values: ns: not significant; *: p<0.05; **: <0.01; **: p<0.001.
Prevalence in all: not adjusted for age. DNK: does not know. M: males, F: females. OR: odds ratio.

Comments

Cervical cancer

- Nearly 80% of women reported a Pap test (a test that can identify abnormalities of the uterus cervix) in the past 10 years, with no marked difference by age and job categories.
- This is consistent with guidelines recommending that women undertake a Pap test every few years or so from early adulthood (e.g. every 3 years from age 21).
- A lower test frequency may be needed for newer screening tests such as HPV genetic testing.

Breast cancer

- 50% of women of all ages reported breast *palpation* performed several times by a health professional, with no marked difference by age and job category.

- This examination is not highly reliable for screening breast cancer, but its simplicity makes it easy to perform at routine visits to a gynaecologist or medical officers and by family-planning nurses.
- Around 40% of women aged ≥45 years reported ≥1 *mammography* (or a breast ultrasound) ever, with a higher frequency in women with a higher vs lower socio-economic status.

Prostate cancer

- Around 45% of men aged ≥45 years reported PSA screening ever, a blood marker of prostate hyperactivity and, indirectly but not specifically, prostate cancer.
- Screening frequency was larger in men of higher SES.

Colon cancer

- Around 80% of men and women had never undergone a colon cancer screening test.
- There was no marked difference according to socio-economic status.

Issues and recommendations around cancer screening

- *Population-based screening programmes*. The sustainability of population screening programmes should be carefully evaluated by ensuring that a sufficiently large and qualified work force and adequate equipment are available to perform thousands of exams every year. Screening programmes in healthy individuals also pose several challenges, including the management of false positive cases and associated potential harms.
- *Cervical cancer.* Women are advised to regularly undergo Pap tests starting from an early age to detect the presence of cervix cancer and enable early treatment. Screening frequency may need to be reviewed in the light of new developments (e.g. HPV vaccines, genetic tests for HPV that need fewer repeat tests, etc.).
- *Breast cancer.* Women are advised to undertake a mammography at regular intervals, e.g. biennial screening mammography between age 40-74.[61] Yet, the evidence of the benefits vs harms of breast screening programmes may not be easily demonstrated unambiguously: a key problem is that we are unable to diagnose evolutive vs. non evolutive tumours detected at screening. An advantage of an organised screening programme is that it allows to standardise the procedures (e.g. quality of mammography readings, starting age, and intervals between screening tests).
- *Colon cancer.* A colonoscopy or test to screen for occult blood in faeces is advised in healthy adults from an age of 45 or so. Population-based screening programmes can be cost-effective under certain assumptions. An advantage of colonoscopy is that benign or malignant polyps can be removed at the time of the procedure.
- *Prostate cancer*. Systematic screening with PSA is not recommended in low-risk men. Given potentially severe side effects (e.g. impotence, urinary incontinence) of treatment (e.g. surgery and/or hormone therapy) and slow progression of prostate cancer in a large proportion of cases, diagnosis and treatment increasingly relies on active surveillance (PSA and imagery) in individuals presenting with symptoms. PSA testing in asymptomatic men should be decided after discussion on the potential benefits and harms of the procedure.
- Diagnostic investigations are, obviously, always needed in case of symptoms for any suspected cancer.
- A key objective for cancer diagnosis and treatment is to reduce time intervals between screening, diagnosis, staging (metastases, etc.), and treatment initiation. This requires a highly reactive heath care system.
- Capacity building measures, including electronic medical records, can shorten time gaps in the cascade of procedures between a patient seeking a medical appointment, medical appointment is given, diagnosis is completed, and treatment is initiated.
- Time interval between seeking a medical appointment for symptoms and treatment initiation is a useful indicator of health care quality and responsiveness (this interval may be <30-60 days for several cancers).
- The Seychelles cancer registry is an important source of data to guide policy on cancer management.

- Interventions to prevent cancer (e.g. diet, physical activity, tobacco use, alcohol intake, and weight control) are described in the Seychelles NCD Strategy 2016-2025.

- Priority interventions for cancer advocated by WHO are listed in **Appendix 12** and discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (e.g. Cancer, Breast cancer, Cervical cancer, Colon cancer, Prostate cancer, WHO best buys for NCDs, Health check-ups, Health systems and NCDs).

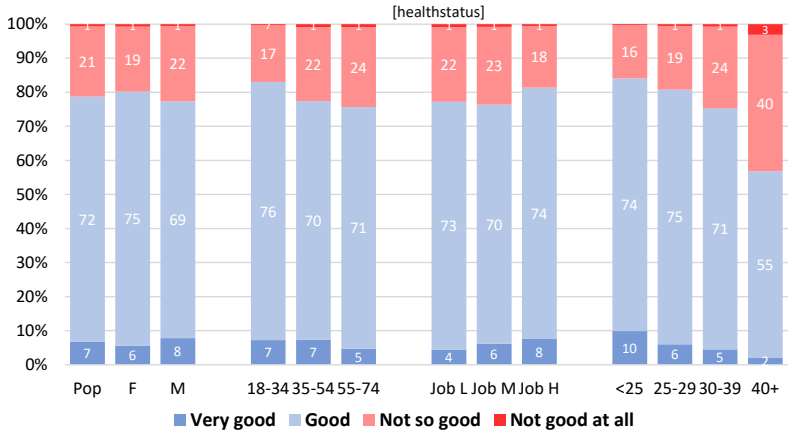
[61] Screening for breast cancer: US Preventive Services Task Force recommendation statement. *JAMA* 2024 Apr 30. PubMed

15. Self-reported health status and disability

Self-reported health status

Health status was assessed with the question 'How do you see your health in general?' with response options: 'very good', good', 'not so good', and 'not good at all'. ('Ki mannyer ou vwar ou lasante an zeneral?' with response options: 'tre bon', 'bon', 'pa tro bon' and 'pa bon ditou').

Figure 15.1 Prevalence of self-reported health status by sex, age, job, and BMI categories



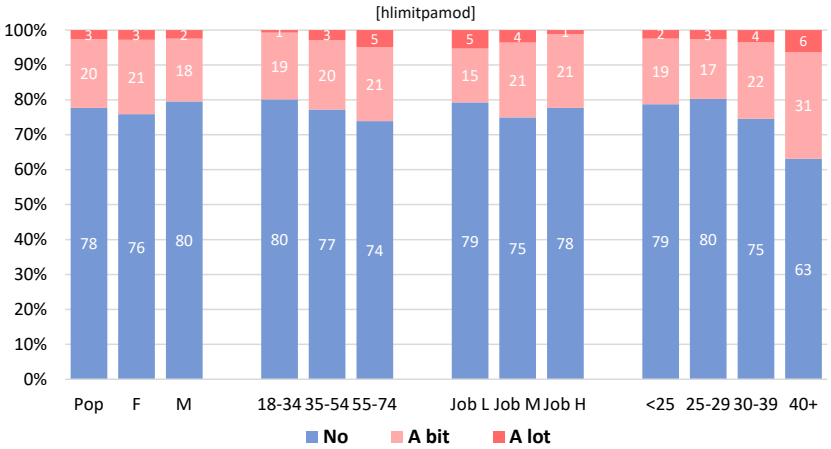
Comments

- A substantial proportion of adults reported that their health status was 'not so good' or 'not good at all' (e.g. 22% in the population aged 18-74).
- There was no marked difference by sex, and surprisingly only a small increase in the prevalence with a 'not so good' or 'not good at all' health status with increasing age.
- The prevalence of non-optimal health was larger among persons with a lower SES and in persons with a high BMI (e.g. 43% among persons with severe obesity).
- These and other associations are analysed in **Tables 15.1** and **15.2**.

Health problems limiting daily physical activity

One question assessed the ability to perform daily physical activities of moderate intensity. The question read: 'Do you have any heath problem that limits you in your daily physical activity of moderate intensity such carrying shopping bags, cleaning the house, etc?' with response options: 'no limitation', 'some light limitation', and 'a lot of limitation'. ('Eski ou annan okenn problenm lasante ki anpes ou fer bann aktivite fizik modere ki ou annan labitud fer pandan en lazourne, parey anmenn sak komisyon, balye lakour, etc?' with response options: 'napa limitasyon', 'en pe limitasyon', and 'en kantite limitasyon').

Figure 15.2 Prevalence of limitation in daily physical activities of moderate intensity by sex, age, job, and BMI categories



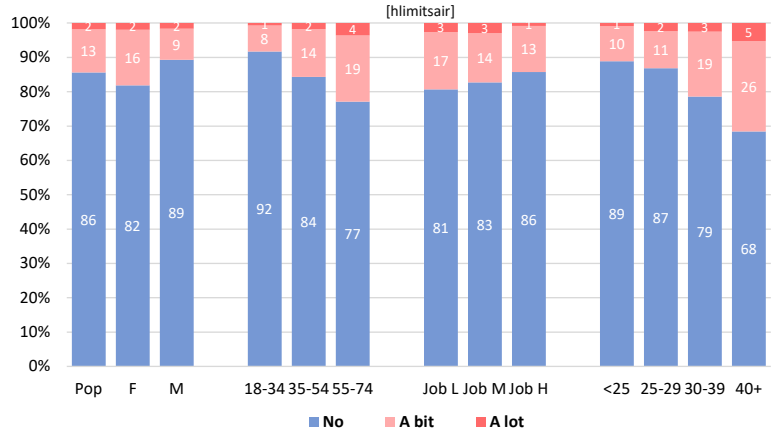
Comments

- 23% of the population aged 18-74 years reported limitation in their ability to perform daily physical activities of moderate intensity.
- The proportion was larger in females, in older persons, in persons with a lower and in these with obesity.
- Although the question did not assess the medical causes of the limitation, they might often relate to musculoskeletal problems and pain, such as back or knee problems due to arthrosis or past accidents, but may also include medical diseases such as stroke, chronic respiratory disease, or heart failure, but also to psycho-somatic reasons.
- Associations with several conditions are analysed in **Table 15.1** and **Table 15.2**.

Health problems limiting capacity to walk up one floor

A question assessed the capacity to walk up one floor: 'Do you have health problem that limit you walk up one floor?' with response options: 'no', 'a little difficulty and I need to go slowly', and 'a lot of difficulty such as breathlessness, I need to go slowly, disability). ('Eski ou annan okenn problenm lasante ki anpes ou mont peron 1 letaz?' with response options: 'non', 'enpe problem, tel ki al dousman' and 'en kantite problenm tel ki mank respirasyon, dezabilite ou douler').

Figure 15.3 Prevalence of reporting difficulty to walk up one floor, by sex, age, job, and BMI categories



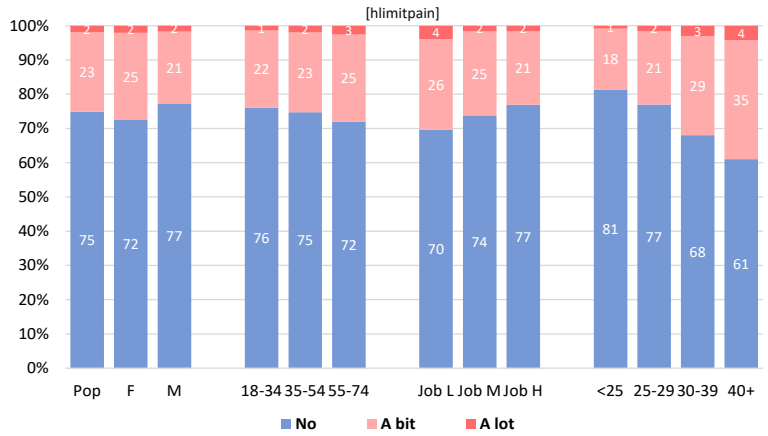
Comments

- 17% of the population aged 18-74 years reported limited capacity to walk up one floor (e.g.).
- The proportion was larger in females, in older persons, persons with lower SES, and those with obesity (31% in persons with severe obesity).
- These and other associations are analysed in **Tables 15.1** and **15.2**.
- Although the question did not assess the causes of the limitations, they may often relate to musculoskeletal problems and pain in the lower limbs, caused by arthrosis or past accidents or -likely less often- breathlessness related to diseases such as stroke, heart failure, or chronic respiratory diseases.

Physical pain related to health problems limiting daily activity

Physical pain was assessed with the question 'Do you have any physical pain that interferes with your daily activities at home or at work'? with response options: 'no', 'yes I have pain that limits me a little', and 'yes I have pain that limits me a lot'. ('Eski ou annan okenn douler fizik ki enterfer avek ou bann aktivite toulezour dan lakour ou dan travay?' With response options 'non', wi, douler fizik ki anpes mwan en pe', and 'wi, douler fizik ki anpes mwan bokou').

Figure 15.4 Prevalence of physical pain related to health problems limiting daily activities at home or at work by sex, age, job, and BMI categories



Comments

- 35% of the population aged 18-74 reported physical pain that interferes with daily activities at home or at work.
- The proportion was slightly larger in females, in older persons, in persons with lower SES and those with obesity (e.g. 39% in persons with severe obesity).
- Associations with different medical conditions are also analysed in **Table 15.1** and **Table 15.2**.
- Although the question did not assess the causes of the pain, it may often relate to musculoskeletal problems, often caused by arthrosis or past accidents.

Associations of self-perceived health status, limitation in mobility, and pain with selected factors

Correlation coefficients (range 0-1) between perceived health status 'not good', limitation in mobility, and pain are shown in Table **15.1.** The indicators are dichotomized as 1 in case of any reported limitation ('a bit' or 'a lot') vs 0 (no limitation).

Table 15.1 Correlation coefficients between self-perceived health, limitation in physical activity of moderate intensity, limitation in walking up one floor, and pain due to a health problem.

	Health status self-reported as not good	Health problem limiting daily PA of moderate intensity	Health problem limiting capacity to walk up one stair	Pain due to a health problem interfering with daily activities
Health problem limiting daily PA of moderate intensity	**0.26**	1		
Health problem limiting capacity to walk up one stair	**0.25**	**0.59**	1	
Pain due to a health problem interfering with daily activities	**0.21**	**0.58**	**0.50**	1

All correlation coefficients with P value <0.001.

Comments

- All correlation coefficients were large and statistically highly significant.
- Corelations were similar in males and females (results not shown).
- Correlation was smaller between perceived health status and physical limitation or pain (0.21-0.26).
- The high and remarkably similar correlation coefficients (0.50-0.59) between these specific indicators may partly reflect that physical limitation and pain often coexist, e.g. in presence of musculoskeletal pathologies such as knee or back problems, which account for a large morbidity burden in all populations and are large public health and social problems.

Table 15.2 Multivariate associations of poor self-reported status, limitation in walking up one floor, and physical pain with selected variables

	Prevalence in survey sample	Health 'not too good' or 'not good at all' (22%) (R^2: 0.13)		Limitation in walking up one floor (18%) (R^2: 0.29)		Pain due to a health problem (26%) (R^2: 0.20)	
	(%)	OR	P	OR	P	OR	P
Male sex (vs F)	56	1.87	***	0.60	*		
Age (vs 18-34)							
35-54	38	1.48	*	2.52	**		
55-74	39	1.62	*	4.73	***	0.63	*
Job (vs high)							
Moderate	51						
Low	19						
BMI (vs <25)							
25-29	32						
30-39	33	1.79	**			1.87	**
40+	8	4.34	***	1.89	*	2.07	*
History of stroke	2.3	2.82	*				
History of cancer	3.2						
History of severe form of COVID (vs not)	17			1.90	*		
Poor self-perceived state of teeth (vs not)	10	1.84	**				
Limitation in walking up 1 floor (vs not)	18	2.48	***			15.6	***
Limitation due to physical pain (vs not)	26	1.59	*	15.9	***		
Psychological disorders (GHQ-12 score >p80)	21	3.10	***				

Odds ratios. P values: *: p<0.08; **: p: <0.01; ***: p <0.001. Only estimates with statistical significance are shown.
Fields in grey: the variable was not considered in the model.

Comments

Health status

- The strongest predictors of self-perceived poor health status included a high BMI (particularly BMI ≥40), limitation in walking up one floor, and psychological stress.
- Other predictors of poor health included older age, self-perceived poor state of teeth, and history of stroke.

Limitation in walking up one floor

- Limitation in ability to walk up 1 floor was strongly related with 'pain due to a medical condition', which suggests the importance of musculoskeletal pathologies (e.g. arthrosis, back or knee problems, etc).
- There were also associations with older age and a higher BMI.
- The association with history of severe COVID (reported by 17% in the study sample) may be partly consistent with 'long COVID' cases, who can present impairments that continue or develop after acute COVID-19 infection and can include chronic pain, shortness of breath, and intense fatigue.

Limitation in physical activity due to pain

- Pain was associated with limitation in walking up one floor, suggesting a role of musculoskeletal pathologies.
- The association with a higher BMI may also be mediated by musculoskeletal conditions arising from heavy weight (knees, back, etc).

Significance for health policy and programmes

- The data emphasize a large burden of diverse health conditions (e.g. poor health status, limitations in doing daily physical activities, pain due to medical conditions), which may not be life-threatening but can significantly reduce a person's quality of life.
- The high burden of these health conditions emphasizes the importance of health care and universal access to health care to help mitigate the impact of these conditions that affect quality of life, and the need for social or other assistance (e.g. health carers helping the individuals with these functional health impairments in their living at home, quality of rehabilitation services, availability of orthotics, modification of home environment).

16. Psychological health, memory, and sleep

Introduction

The relationship between mental health and chronic diseases, particularly cardiovascular disease, is well established.[62] The General Health Questionnaire (GHQ-12) is a widely used screening instrument designed for community surveys to detect primarily psychological distress, and symptoms related to several mental disorders. GHQ-12 covers 3 domains: social dysfunction, anxiety/depression, and loss of confidence. The GHQ-12 has demonstrated cross-cultural validity, and reliability.[63]

The 12 questions from GHQ-12 (shortly summarised in **Table 16.1**) read: 'Over these last months, have you been feeling that…'. Response options included 'Never', 'At times', 'Often' and 'Always or nearly always'. As only very few persons reported 'Always or nearly always', the categories 'Often' and 'Always or nearly always' were merged into one category (referred in the table as 'Often').

One additional question (which is not part of GHQ-12) assessed subjective memory impairment.[64] The question on memory read: 'Compared to years ago, do you have difficulty with your memory, e.g. to remember a phone number or an appointment? with the same 4 response options as for GHQ-12. One other question assessed sleep duration.

Prevalence of psychological distress symptoms items covered by the GHQ-12 and subjective memory impairment

Table 16.1 Prevalence of psychological distress facets assessed by the GHQ-12 questionnaire and subjective memory impairment, and associations with sex, age, and job categories

	Proportions (%)			Multivariable associations*					
				Female (vs M)		Age		Job	
	Never	At times	Often	RC	*P*	RC	*P*	RC	*P*
Global Health Questionnaire (GHQ-12)									
Social function									
[1] Unable to concentrate on what your are doing	61	35	4	0.09	**	0.23	***	0.06	*
[2] Not playing a useful part in things ('dan bann keksoz')	72	25	4	0.06	*	-0.17	***		
[3] Unhappy, all things considered	56	37	7			-0.16	***	-0.06	*
[4] Unable to make decisions about things ('dan bann keksoz')	73	25	2			-0.19	***		
[5] Unable to enjoy normal day-to-day activities	69	25	5			-0.31	***		
[6] Unable to face up problems	73	23	3	0.06	*	-0.19	***		
Anxiety									
[7] Feeling constantly under stress	48	38	13	0.21	***	-0.24	***	0.11	***
[8] Unable to overcome difficulties	72	25	3	0.10	**	-0.23	***	0.06	*
[9] Lost sleep over worry	57	33	10	0.19	***	-0.16	***		
[10] Feeling depressed, all things considered	63	29	8	0.16	***	-0.14	***		
Loss of confidence									
[11] Loosing confidence in yourself	79	17	4	0.10	**	-0.19	***		
[12] Thinking of yourself as a worthless person	88	9	3	0.05	*	-0.14	***		
Memory									
Decline in memory vs years ago	61	33	6	0.09	*	-0.09	***	0.05	*

RC. Regression coefficient. Age and job have 3 categories (from low to high age/job categories).
P: p-value: * <0.05; ** <0.01; *** <0.001. Estimates not statistically significant are not shown.

[62] Gaffey AE et al. Screening for psychological distress and risk of cardiovascular disease and related mortality: a systematized review, meta-analysis and case for prevention. *J Cardiopulm Rehabil Prev* 2022;42:404-15. PubMed
[63] Goldberg et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med* 1997;27:191-97. PubMed
[64] Ferreira D et al. A 'disease severity index' to identify individuals with subjective memory decline who will progress to mild cognitive impairment or dementia. *Sci Rep* 2017 Mar 13:7:44368. PubMed

Comments

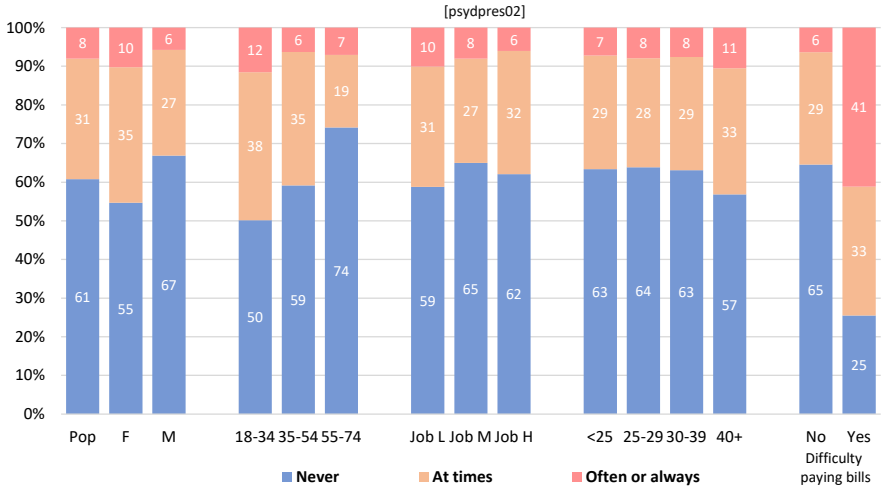
- The proportions of individuals reporting experiencing psychological distress 'often' (which includes the category 'always') were relatively low overall (e.g. <5% for most items and prevalence of 6-13% for 4 items).
- All GHQ-12 dimensions were associated inversely associated with age (i.e. more frequent psychological stress among younger vs older persons), except for 'ability to concentrate on what you are doing over the last months', which was worse in older vs younger participants.
- This may suggest that younger individuals perceive more acutely than older individuals the challenges of modern living related to rapid socio-economic development of the country (e.g. choice of career, choice of a partner, housing, etc) or that the social determinants of mental health exert an age-differential effect in the country, for reasons worth exploring.
- In keeping with this, it may be that the many social services provided in Seychelles may partly mitigate psychological distress as individuals are aging (e.g. free government health care, wide array of social services to assist those in need, and substantial pension for older persons) and still solid social and family cohesion in Seychelles, at least among the older generations.
- Psychological distress was more frequent in women, possibly echoing, among other factors, that women often bear more duties than men, for example in relation to their family in addition to their work for pay.
- The frequency of psychological distress was not markedly different according to SES categories with one exception (persons of high vs low SES felt more constantly under stress).

Memory

- Memory decline was assessed using 1 subjective broad question (i.e. not an objective test).
- The prevalence of subjective cognitive impairment and decline (in recent times vs years ago) was low and, unexpectedly, associated inversely with age. This may be explained in part by anosognosia in individuals with memory deficits.

Depressive symptoms

Figure 16.1 Prevalence of feeling depressed (1 of 12 GHQ questions) by sex, age, BMI, and difficulty in paying routine bills

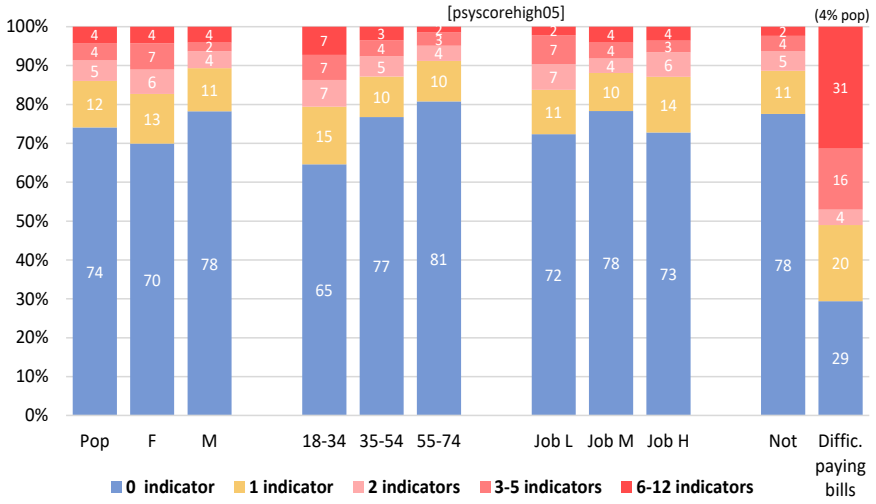


Comments

- The figure shows the distribution of reported depressive symptoms, one of the 12 items explored by the GHQ-12 questionnaire.
- Feeling depressed was associated with female sex, a younger age, severe obesity and, very strongly, difficulty in paying routine bills.

Prevalence reporting several psychological distress symptoms

Figure 16.2 Frequency of reporting 0 or up to 12 psychological distress symptoms based on the GHQ-12 by sex, age, job, and ability to pay routine bills



Comments

- The prevalence of reporting one or several psychological distresses ('often' or 'most of the time') was larger in females and in younger persons.
- No marked difference was apparent according to SES category.
- Multiple psychological distresses were more likely reported by individuals who had difficulty to settle their routine bills (who accounted for 4.2% of the total study sample).
- 8% of the participants reported to have experienced psychological distress in ≥3 domains.
- As mentioned above, data and their interpretation are presented briefly in this preliminary report and will need to be examined in more detail, including in relation to their implications for health and social programmes.

Associations between the 12 items of the GHQ-12 instrument

Table 16.2 Correlation coefficients between the 12 items of the GHQ-12 instrument

	Concentrate	Role	Unhappy	Decision	Enjoy	Face probl.	Stress	Difficulties	Sleep	Depressed	Confidence
[1] Unable to concentrate											
[2] Not playing a useful part	0.59										
[3] Unhappy	0.52	0.53									
[4] Unable to make decisions	0.57	0.63	0.50								
[5] Unable to enjoy activities	0.53	0.52	0.66	0.53							
[6] Unable to face up problems	0.50	0.55	0.58	0.56	0.65						
[7] Feeling constantly under stress	0.40	0.35	0.43	0.37	0.43	0.41					
[8] Unable to overcome difficulties	0.50	0.54	0.54	0.54	0.56	0.69	0.49				
[9] Lost sleep over worry	0.49	0.45	0.56	0.45	0.53	0.51	0.52	0.54			
[10] Feeling depressed	0.48	0.46	0.69	0.45	0.62	0.59	0.54	0.57	0.55		
[11] Loosing confidence in yourself	0.50	0.52	0.48	0.53	0.53	0.60	0.41	0.63	0.47	0.49	
[12] Thinking of a worthless person	0.41	0.45	0.45	0.43	0.49	0.51	0.35	0.50	0.42	0.47	0.65

All correlation coefficients highly statistically signficant with p values <0.001. In red: coefficients ≥0.6, in blue; coefficients <0.4.

Comments

- The 12 items of the GHQ-12 instrument correlated strongly (p <0.001 for all correlation coefficients).
- This is a preliminary confirmation of the internal consistency and convergence of GHQ-12 in the Seychelles.

Associations between the GHQ-12 total score and other variables

We computed a total psychological distress score based on the 12 GHQ-12 items (0-2 points for each of the 12 questions; range 0 - 24). Though reverse causality issues may not be excluded in cross-sectional analyses (e.g. if a high alcohol intake is associated with psychological distress or if psychological distress favours alcohol drinking), the highlighted associations provide important information to inform coordinated public health action targeting multiple mental health determinants and outcomes.

Table 16.3 Associations between the GHQ-12 score and selected variables

	N	RC	P
Socio-demographic variables			
Female (vs male)	672	1.30	***
Age (vs age 55-74)		-	
35-54	460	1.74	***
18-34	277	4.02	***
Job (vs low)			
Mid	613	-0.26	ns
High	364	0.43	ns
Stress paying bills (often or always)	51	5.56	***
Lives alone at home	79	0.03	ns
Behaviours			
Cannabis use	162	1.21	**
Cigarette daily use	165	0.04	ns
High alcohol intake (centile ≥80)	125	0.81	*
Perceived health status			
Health status reported as not good	265	2.08	***
Medical conditions			
Pain due to a physical health problem	313	1.37	***
BMI (vs BMI <25)			
Overweight	380	0.19	ns
Obese	492	-0.17	ns
Diabetes treatment	130	-0.21	ns
HBP treatment	402	-0.23	ns
History of stroke	28	1.20	ns
History of cancer	39	1.60	*

RC: regression coefficient (on psychological score, range: 0-24).

P value: * <0.06, **: <0.01; ***: <0.001.

Comments

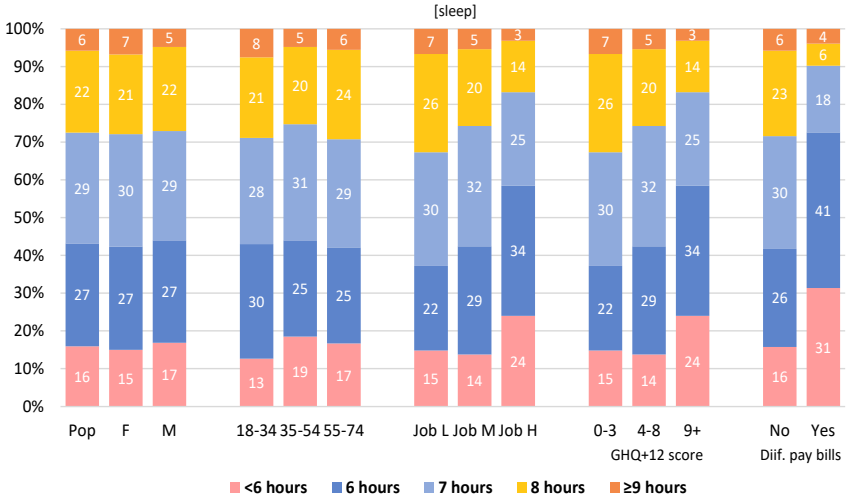
- The GHQ-12 overall score was associated with female sex, younger age, cannabis use, high alcohol intake, health status self-reported as 'not good', pain due a physical health problem, and history of cancer.
- The score was strongly associated with difficulty in paying routine bills.
- There were no significant associations with SES, BMI, diabetes treatment (i.e. persons aware of having diabetes), HBP treatment, and living alone at home.

Sleep

Sleep was assessed with 1 question. Low sleep duration (e.g. <7 hours) is associated with several ill health conditions, including obesity, hypertension, diabetes, and CVD.[65] Of note, irregular sleep is an important aspect of sleep quality but was this not assessed in the survey.

[65] Lloyd-Jones DM et al. Life's Essential 8: Updating and enhancing the American Heart Association's construct of cardiovascular health: a presidential advisory from the American Heart Association. *Circulation* 2022;146:e18-e43. PubMed

Figure 16.3 Prevalence of sleep duration by sex, age, job, psychological health (GHQ-12), and difficulty in paying routine bills



Comments

- 43% reported sleeping <7 hours and 15% <6 hours.
- Sleep duration was not markedly different in males vs females and in older vs younger persons.
- A shorter sleep duration was apparent in individuals with a higher SES, higher GHQ-12 score (i.e. with psychological disorders), and those reporting difficulty in paying their routine bills.

Table 16.4 Multivariable associations of sleep duration with selected health and social variables

	Females (R^2: 0.06)		Males (R^2: 0.09)	
	RC	*P*	RC	*P*
Age (vs 18-34)	-		-	
35-54	-0.23	*	-0.34	*
55-74	-0.20		-0.44	**
Job (vs low)	-		-	
Mid	-0.04		-0.27	
High	-0.10		-0.30	
BMI (vs <25)	-		-	
Overweight	0.05		0.00	
Obese	0.04		-0.13	
Cigarette smoking	0.20		-0.36	**
Canabis use	-0.11		-0.27	*
High alcohol intake (>P80)	-0.03		-0.16	
Health reported as 'not good'	-0.13		0.09	
Pain due to a physical condition	0.09		-0.03	
Difficulty in paying routine bills	-0.70	***	0.08	
ore ≥P80 (psy. health)	-0.37	**	-0.66	***
Lives alone at home	-0.18		0.40	*

RC: regression coefficent on sleep hours (1 unit of a covariate predicts ~1hour sleep).
GHQ: Global Health Questionnaire; >P80: >percentile 80.
P: * <0.05; ** <0.01; *** <0.001.

Comments

- In multivariate analysis, sleep duration was inversely associated with an older age, a higher SES, cigarette smoking, cannabis use, alcohol intake, and psychological distress (GHQ-12 score >P80).
- Sleeping duration was larger in males living alone, but shorter in females living alone.
- Sleep duration was markedly shorter in females having difficulty in paying routine bills, but no significant association was observed in males.

Significance for health policy and programmes

- Data on mental health are presented briefly in this preliminary report and further analysis is needed, including in relation to the implications for health and social programmes.
- Previous research (Seychelles Heart Survey 2013)[66] explored perceived stress along work, social life, financial situation, and environment around home, yet without referring to the psychological domains assessed with GHQ-12. The new measures are robust, valid, and allow comparisons with international data.
- Overall, the findings emphasize the importance of mental health, subjective memory impairment, and sleep quality as both health components and possibly significant determinants of health, and as potential modulators of access to and use of health and social services.
- Although specific mental diseases and dementia (e.g. Alzheimer) were not assessed in the survey, it should be reminded that these diseases share several risk factors assessed in the survey (e.g. particularly harmful alcohol use and tobacco, but also physical inactivity and unhealthy diet), and addressing these risk factors in the population is an important strategy to prevent these diseases.
- The use of a relatively simple yet valid psychological symptoms assessment tool at the primary health care level (e.g. GHQ-12 or other similar instruments which can be administered in only a few minutes) suggests that detection of high-risk individuals is possible and can inform care and treatment consistent with the WHO Mental Health Gap Action Programme (mhGAP) guideline for mental, neurological and substance use disorders.[67]

[66] Chamik T, Viswanathan B, Gedeon J, Bovet P. Associations between psychological stress and smoking, drinking, obesity, and high blood pressure in an upper middle-income country in the African region. *Stress Health* 2018;34:93-101. PubMed

[67] Mental Health Gap Action Programme (mhGAP) guideline for mental, neurological and substance use disorders. WHO, 2023. Web link

17. Oral health

Introduction

Oral health is essential for adequate nutrition and overall good health. Poor oral health, e.g. chronic gingivitis, is associated with several chronic diseases, including CVD.

Self-reported oral health status was assessed with the question 'How would you describe the state of your teeth?' ('ki mannyer ou poui dekrir leta ou ledan') with response options including: 'not good' ('pa bon'), 'quite good' ('ase bon'); 'good' ('bon'), 'very good' ('tre bon'). This 4-caregory variable was used as a continuous variable in multivariable linear regression.

Prevalence of self-reported oral health characteristics

Table 17.1 Prevalence of self-reported oral health characteristics by sex and age

	Females				Males			
	18-34	35-54	55-74	All	18-34	35-54	55-74	All
State of own teeth								
Very good	11	10	6	9	6	7	3	6
Good	45	49	48	47	53	48	41	48
Fairly good	38	36	35	36	35	32	38	35
Not good	6	6	11	8	7	13	17	12
Number of natural teeth								
≥20	90	81	67	81	93	81	68	82
10-19	4	16	28	15	6	18	27	16
0-9	6	3	5	5	2	1	5	2
Puts on a denture								
Yes	1	4	30	10	2	2	10	4
Difficulty to chew								
No	85	85	87	86	84	88	83	85
Yes, but can eat solid foods	12	10	7	10	15	9	9	11
Yes, and avoids solid foods	2	4	7	4	1	3	8	4
Frequency of teeth brushing								
≥3 times per day	9	8	9	9	7	5	10	7
2 times per day	79	84	89	84	76	84	83	81
1 time per day	11	6	2	7	17	11	7	12
Less than once per day	1	1	0	1	1	1	0	1
Makes sure toothpaste used contains fluoride								
Yes	70	83	87	80	57	81	83	73
No	9	5	11	8	13	10	13	12
Does not know	21	11	2	12	30	10	4	15

Comments

- *Self-reported dental health*. The prevalence of individuals reporting that the state of their teeth was 'not good' was relatively small (8%). The prevalence was larger in males and in older persons. Self-reported teeth state is subjective, and an objective examination (not done in the survey) would provide more reliable data.
- *Number of natural teeth*. Around 20% of adults reported having <20 natural teeth (out of a maximum of 32) with no substantial difference by sex, but the prevalence reached a third of adults at age 55-74 years.
- *Putting on a denture*. Putting on a denture (or having one even if not using it) was, as expected, much larger among older persons (e.g. 30% in females and 10% in males aged 55-74 years).
- *Difficulty to chew*. Around 15% of males and females reported chewing difficulty. Chewing difficulty preventing to eat solid foods (implying underlying significant oral health problems) increased largely with age (7% in females and 8% in males aged 55-74 years).
- *Frequency of tooth brushing*. The frequency of tooth brushing <2 times per day was relatively low (8% in females and 13% in males aged 18-74, but markedly more frequent in younger persons (e.g. 12% in females and 18% in males aged 18-34). Around 10% of individuals reported brushing their teeth ≥3 times per day.

- *Using toothpaste containing fluoride*. A large majority of individuals reported paying attention to buying or using toothpastes containing fluoride (fluoride hardens tooth enamel and helps prevent tooth decay). This proportion seems surprisingly large given that this requires reading toothpaste labels displayed in small characters and knowledge that fluoride is important for tooth decay prevention. While no regulation mandates that toothpastes include fluoride, most toothpastes sold in Seychelles do contain fluoride.

Associations of teeth state, chewing difficulty, and tooth brushing with selected variables

Table 17.2 Associations of self-reported teeth state, chewing difficulty, and tooth brushing with selected variables

		State of teeth		Difficulty chewing		Brushing teeth	
	N	RC	*P*	RC	*P*	RC	*P*
Males (vs females)	533	-0.10	*	0.00	ns	-0.05	*
Age (vs age 18-34)							
35-54	460	-0.10	ns	0.04	ns	0.02	ns
55-74	468	-0.28	***	0.12	**	0.11	*
Job (vs high)							
Mid	613	-0.21	***	0.07	*	-0.03	ns
Low	228	-0.34	***	0.17	***	0.02	ns
Brushing teeth <2 times/day	101	-0.15	*	0.07	ns	-	
Sugar from beverages ≥50 g/d	314	-0.10	*	0.08	*	-0.03	ns
Regular cigarette smoker	165	-0.21	**	0.08	*	-0.03	ns
Psychologic problem (GHQ-12 P>80)	250	-0.24	***	0.15	***	-0.02	ns

RC: regression coefficient on tooth sate, chewing difficulty, tooth brushing frequency (4 categories; 0: not good; 4: very good).
A postive coefficient indicates better oral health, a negative coefficient lower oral health on the oral score ranging from 0 to 4.
P values: ns: not statistically significant; *: <0.1, ** <0.01; *** <0.001.

Comments

- *Predictors of poor dentition*. A poorer self-perceived dentition was associated with male sex, older age, lower SES, brushing teeth <2 times per day, sugary beverages, cigarette smoking, and psychological distress (defined as a GHQ-12 score larger than percentile 80,) which includes items such as feeling depressed, lack of self-confidence, etc).
- *Overall.* The findings show that substantial proportions of individuals reported non-optimal dentition and/or unhealthy behaviours (e.g. insufficient tooth brushing, cigarette smoking, and sugar intake). Nonetheless, oral health is likely better in Seychelles than in many other countries, which may relate to free provision of oral health services in government health care services, frequent oral health screening for all school-going children, and the fact that most toothpastes sold in Seychelles contain fluoride.

Implications for health policy and programmes

- The overall fairly good situation of oral health in Seychelles supports the ongoing oral health programmes, which are provided at no cost in government health care.
- Oral health programmes should be done through interprofessional collaboration and the adoption of a common risk factor approach in the population, such as abstaining from smoking and limiting sugar intake (see specific recommendations in the tobacco and diet sections).
- A regulation could be developed to require that all toothpastes sold in Seychelles contain fluoride.
- Remove VAT on fluoridated products (e.g. toothpaste, mouthwash) and dental floss and toothbrushes.
- The reasons for the higher frequency of chewing problems preventing eating solid foods in younger vs older persons should be studied further, including through objective dentist examination.
- Substantial proportions of adults brushed their teeth less frequently than twice per day. This should be studied further and addressed accordingly (e.g. health education programmes in the mass media).
- It would be useful to develop a national oral health strategy and action plan (vs stand-alone oral health programmes), including guidance on systematic oral health surveillance in children and adults, and ensure that the strategy is integrated in other relevant health policy.

18. COVID-19

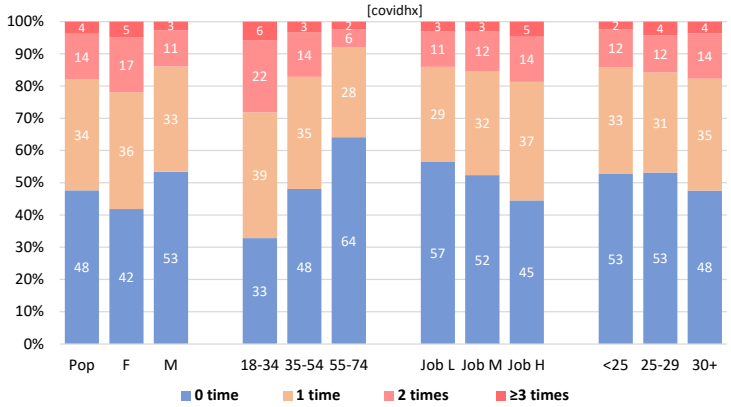
Introduction

COVID-19 has caused directly or indirectly 16 million deaths in 2020-2021.[68] The epidemic of COVID-19 reached Seychelles in March 2020. A mass vaccination campaign was started in January 2021. By the end of 2021, 24'788 cases were recorded but modelling by WHO suggested that due to under-reporting the true number of infections was ~75'524 by the end of 2021.[69] By the end of 2022, 52'359 cases were recorded with 172 deaths.[70,71]

Given that the virus is transmitted by air and transmission starts before symptoms appear, it is estimated that most people had developed COVID-19 with or without symptoms by the end of the epidemic in most populations. The risk of developing harmful forms of COVID-19, increases with age and in people with heart or lung diseases, weak immune system, obesity, and diabetes. A minority of cases (<10%) can develop 'long COVID' with symptoms that can last for months or years, including damage to organs such as brain and blood vessels.

Prevalence of self-reported history of COVID

Figure 18.1 Prevalence of self-reported history of COVID-19 by sex, age, job, and BMI categories

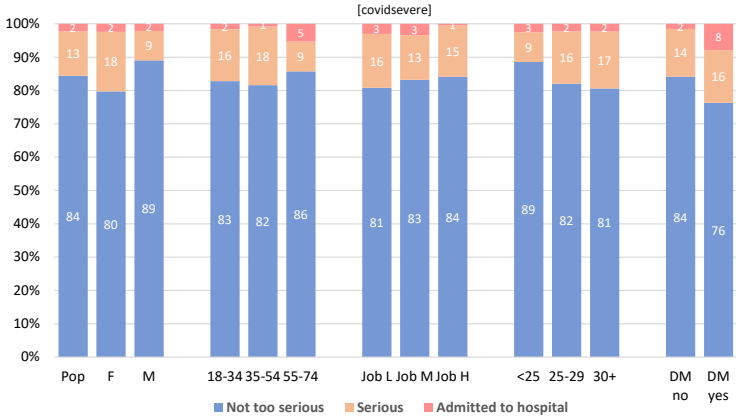


Comments

- The prevalence with a history of COVID-19 was inversely associated with age.
- Of note, the estimates reflect *symptomatic* COVID-19 infection or cases identified by PCR as part of contact tracing, but not asymptomatic cases.

Self-reported seriousness of COVID-19 disease

Figure 18.2 Prevalence with severe COVID-19 by sex, job, BMI, and diabetes categories in persons with self-reported history of COVID-19



[68] Global age-sex-specific mortality, life expectancy, and population estimates in 204 countries, 1950–2021, and the impact of the COVID-19 pandemic: a comprehensive demographic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024 (in press). PubMed

[69] Cabore et al. COVID-19 in the 47 countries of the WHO African region: a modelling analysis of past trends and future patterns". *Lancet Glob Health* 2022;10: e1099–14. PubMed

[70] Annual health sector preformance report 2022. Ministry of Health, Seychelles, 2022.

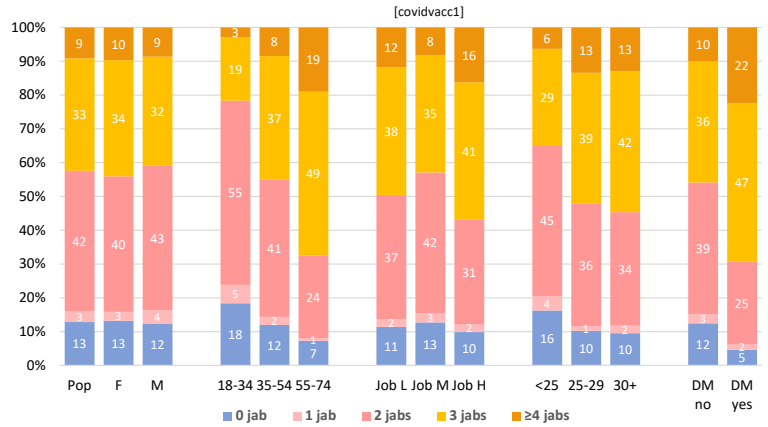
[71] COVID-19 in Seychelles. Wikipedia (accessed in March 2024) Web Link

Comments

- 84% of all individuals aged 18-74 with a history of COVID-19 reported that the disease was 'not too serious', ~13% reported it was 'serious' and 2% reported they needed hospital admission.
- The proportions with hospital admission were larger in older persons and in persons with diabetes.
- The proportions with COVID-19 infection reported as 'serious' was not markedly different according to age.

Vaccination for COVID-19

Figure 18.3 Distribution of self-reported COVID vaccine jabs by sex, age, job, BMI, and diabetes categories



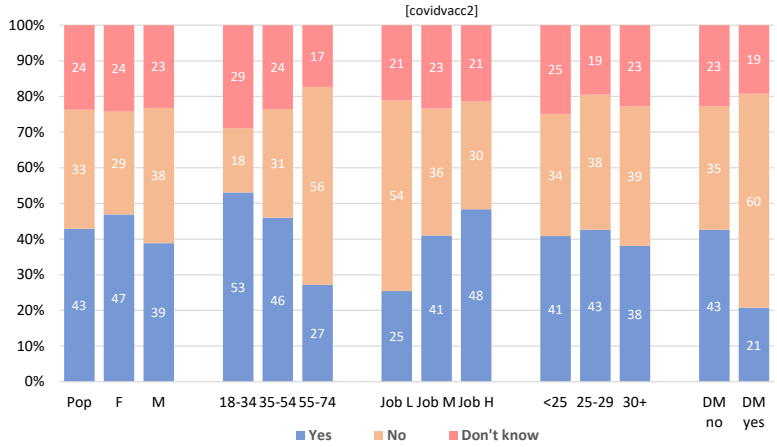
Comments

- 87% of adults aged 18-74 reported ≥1 vaccination jab.
- The number of jabs was inversely associated with age, was slightly larger in persons with a higher SES, and in persons with diabetes.

Willingness to take a COVD vaccination booster in the future

One question read 'Would you consider taking a booster every year if the World Health Organisation or another authoritative health organisation was recommending taking COVID vaccine every year?' with response options: 'Yes', 'No', and 'I don't know'.

Figure 18.4 Willingness to take a COVID vaccination booster yearly if recommended by health authorities, by sex, age, job, BMI, and diabetes categories



Comments

- Less than 50% of adults aged 18-74 years (in August-December 2023) were willing to take a yearly COVID vaccination booster if recommended by a health authority, and a quarter did not know.
- The proportions *not* willing to take a booster was larger in older adults, in persons of lower SES, and in non-diabetic persons.
- Of note, the utility of vaccine boosters (survey) had become less relevant in 2023 than earlier, given that most people in all populations would have developed, by 2023, some immunity against COVID.

19. Use of health services

Two questions assessed the frequency of medical visits to government health services and to private providers. The questions read 'During the past 12 months, approximately how many times did you go to a [government health centre] [private clinic] for any medical or surgical problem' with response options including '0 time', '1-2 times', 3-5 times', '6-10 times' and '>10 times'.

The questions did not enquire on the reasons of the visits, but motivation may include acute medical/surgical problems, follow-up visits, visits for routine screening (e.g. Pap smear for women, ultrasound for pregnant women), collecting a medication (as medications for chronic conditions must be collected monthly, at least in government health services). Visits to government health services are provided without cost to all (national) users.

Number of medical visits to government and private health providers in the past 12 months

Figure 19.1 Distribution of visits to *government* (left panel) and *private* health providers (right panel) in the past 12 months by sex, age, job, and BMI categories

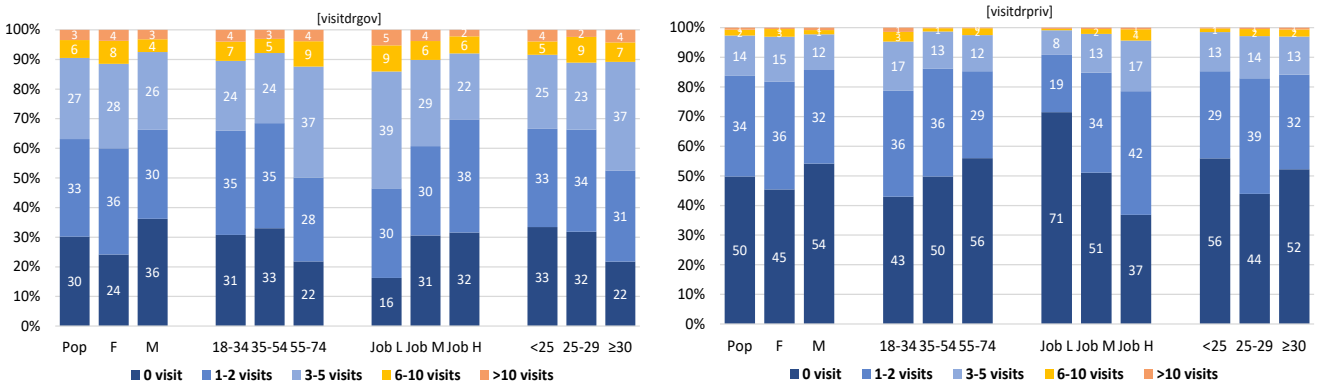
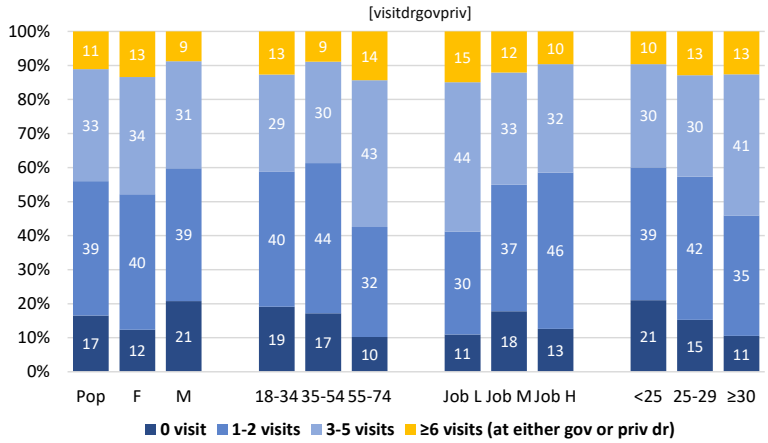


Figure 19.2 Distribution of visits to any government or private health providers in the past 12 months by sex, age, job, and BMI categories



Comments

- In the past 12 months, 70% of individuals aged 18-74 attended a government health service, 50% attended a private clinic, and 83% attended either a public or private health provider at least once for any medical or surgical reason.

Prevalence of persons attending a government service at least once in the past 12 months

- The prevalence was larger in females (76%) vs males (64%), perhaps partly because of visits for gynaecological reasons, including contraception, pregnancy, or routine screening Pap test.

- The prevalence was larger in older (78%) vs younger (69%) persons and in persons with lower (84%) vs higher (68%) SES, with the latter finding possibly related to the possibly larger frequency of accidents or chronic pain among persons with manual vs non manual occupations (including to obtain a sick a leave certificate) and considering that visits to government health services are provided without cost to users.
- The prevalence was also higher among persons with a higher (78%) vs lower (67%) BMI, possibly partly because obesity is associated with several cardiometabolic conditions (e.g. HBP and diabetes) that need long-term treatment.

Prevalence of persons attending government health services on ≥3 occasions in the past 12 months

- The prevalence was 36% in the whole population, 40% in females vs 33% in males, 37% in adults aged 18-34 years vs 52% in adults aged 55-74 years.
- This is consistent with a higher prevalence of HBP and diabetes in this age category, which are conditions that require many visits to collect medications.
- The prevalence was 53% in persons with a lower SES vs 30% in persons with a higher SES, and 48% in individuals with obesity vs 34% with a normal BMI, possibly partly for the same reasons.

Prevalence of persons attending a private health service at least once in the past 12 months

- The prevalence was 50% in the total population, 55% in females vs 46% in males.
- The prevalence was 57% in younger adults vs 44% in older adults, 63% in persons with a higher SES vs 29% in persons with a lower SES, and 48% in adults with obesity vs 44% in adults with normal weight.

Prevalence of persons attending any government or private health provider at least once in the past 12 months

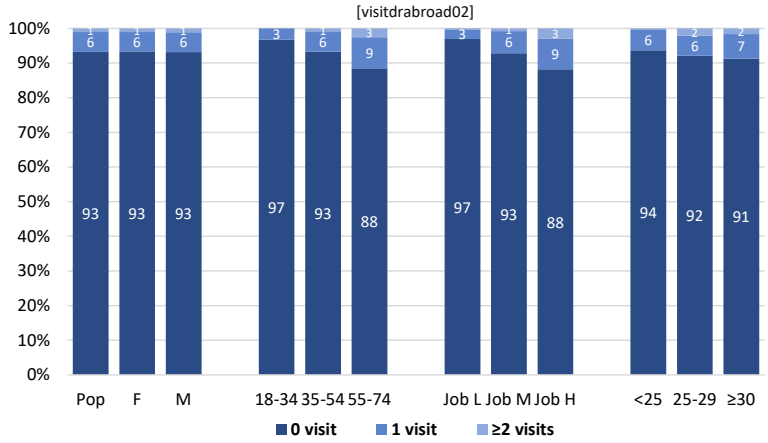
- 83% of adults aged 18-74 attended a health care provider at least once during the past 12 months.
- The proportion increased with age (e.g. 81% at age 18-34 vs 90% at age 55-74), and with increased BMI (79% in persons with normal weight vs 89% in persons with obesity), consistent with obesity being associated with chronic diseases.
- 44% of all adults attended any health care provider on ≥3 occasions, 48% of females vs 40% of males, 58% of adults aged 55-74 vs 41% of adults aged 18-34, 59% of persons with a lower SES vs 41% of persons with a higher SES, and 54% of individuals with obesity vs 40% of individuals with a normal weight.

Medical visits abroad in the last 5 years

Some highly specialised medical health care is not available in Seychelles, such as heart surgery, kidney transplant, radiotherapy or other highly specialised medical or surgical procedures. Individuals who need such care can be sent abroad with full or partial funding from government upon approval by a medical board.

A question assessed the number of medical visits abroad during the past 5 years, for any medical reason, and whether funded privately or by government or both.

Figure 19.3 Distribution of medical visits abroad during the past 5 years by sex, age, job, and BMI categories



Comments

- Around 7% of all adults aged 18-74 reported ≥1 medical visit abroad during the past 5 years.
- Of note, the data do not inform if the visits were funded by government or privately and whether visits were motivated for highly specialised care or for simple care (e.g. check-up).
- The number of medical visits abroad did not differ by sex but was larger in older vs younger persons, in persons with a higher vs lower SES and in persons with a higher vs lower BMI.

Associations between medical visits in the past 12 months and selected variables

Table 19.1 Associations between medical visits to government or private health providers in the past 12 months and selected variables and medical conditions

	Government (R2: 0.14)		Private (R2: 0.08)		Gov or private (R2: 0.18)	
	RC	*P*	RC	*P*	RC	*P*
Female sex (vs M)	0.09	ns	0.11	*	0.10	*
Age (vs 18-34)						
35-54	-0.21	**	-0.17	**	-0.17	**
55-74	-0.13	ns	-0.17	*	-0.10	ns
Job (vs high)						
Mid	0.11	ns	-0.22	***	-0.02	ns
Low	0.28	**	-0.54	***	0.04	ns
Rx for hypertension	0.56	***	0.09	ns	0.56	***
Rx for diabetes	0.32	**	0.10	ns	0.32	***
Hx of cancer	0.53	**	-0.14	ns	0.28	*
Hx of CVD	-0.03	ns	-0.12	ns	-0.12	ns
Pain due to a medical condition	0.23	***	0.20	***	0.29	***
Hx of poor teeth state	0.02	ns	-0.06	ns	0.04	ns
Psychological problem (GHQ-12)	0.13	*	0.13	*	0.07	ns

RC: multivariate regression coefficient. A RC of 1 corresponds tp a change of ~2-3 visits/yr.

Hx: history; Rx: treatment. Psy disorder: score of GHQ-12 >P80.

P: ns: not significant; * <0.05; ** <0.01; *** <0.001. Red: direct assoc.; blue: inverse association.

Comments

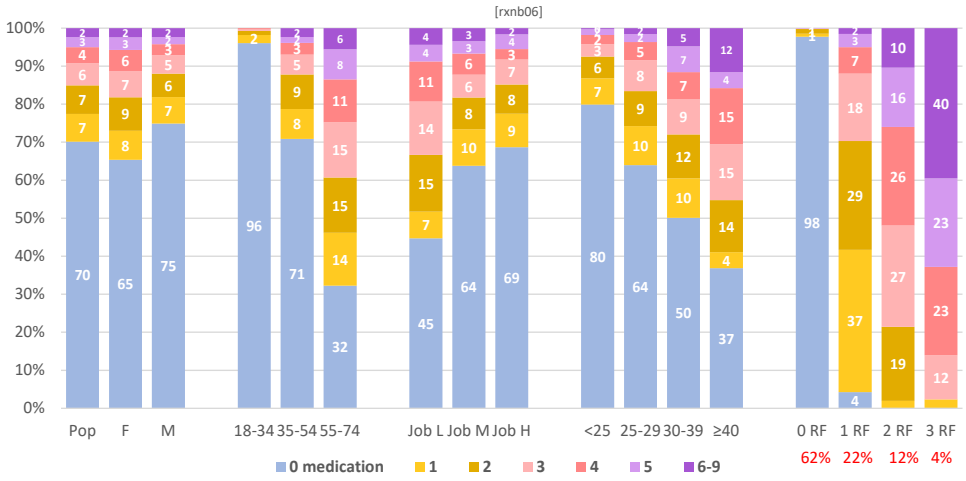
- The predictors of the number of visits differed for government vs private health care providers. Lower SES was associated with more medical visits to government health services and less visits to private health providers.
- Treatments for chronic conditions such as hypertension, diabetes, and cancer were associated strongly with visits to public health services but not with visits to private health providers. This is consistent with these chronic diseases requiring long-term treatment and frequent medical visits, with health care provided without fees to users in government health services.
- Physical pain (which may be related to musculoskeletal disorders in some cases) and psychological disorders were associated with medical visits to both government and private health care providers.
- The inverse association between age and visits to both government and private health care may reflect that older persons consult health services less often than younger persons when the medical conditions in the table (e.g. treatment for hypertension, diabetes, pain, etc) are accounted for, but possibly also because younger persons may consult more often for conditions not considered in the table (e.g. sore throat, fever, injuries, etc) and to obtain a medical certificate.

Prevalence of taking selected numbers of different medications for HBP, diabetes and/or dyslipidaemia

The number of different medications reported in the survey ranged from 1 to 5 for hypertension treatment, 1 to 4 for diabetes treatment, 1 for cholesterol treatment, and 0 to 2 for anticoagulation related to CVD prevention (aspirin, clopidogrel). 12 participants were taking 7 different drugs and 3 participants were taking 9 different drugs; these individuals were merged in the category taking ≥6 different medications. In the survey sample aged 18-74 years, 62% were not treated with medications for hypertension, diabetes or raised cholesterol, 21% were treated (with drugs) for one risk factor, 12% were treated for 2 risk factors and 4% were treated for all 3 RFs (in red in Figure 17.4). The prevalence for all, males, and females is standardized for age.

Figure 19.4 Prevalence (in the population aged 18-74) taking selected numbers of medications for hypertension, diabetes, and/or dyslipidaemia, by sex, age, job, BMI, and risk factor number categories

In red: prevalence with treatment for 0-3 RFs in the total population aged 18-74 years



Comments

- 25% of men and 35% of women aged 18-74 took ≥1 drug for treatment of hypertension, diabetes, or dyslipidaemias (including aspirin or clopidogrel for CVD prevention).
- The proportion increased largely with age (as the prevalence of the 3 risk factors in the population sharply increases with age), with BMI (as BMI is strongly associated with each of the 3 risk factors) and, obviously, with the number of risk factors treated.
- 14% of individuals aged 55-74, 16% of individuals with BMI ≥40, and 63% of individuals with all 3 risk factors were taking ≥5 drugs.
- The larger number of medications in persons with a lower vs higher SES is consistent with the generally larger NCD burden among the former. This indirectly demonstrates that universal health care is a reality in Seychelles (treatment provided without fees to all nationals in government health services and government health centres available in most districts).
- Of note, these data do not inform on whether medications were provided appropriately or not, or whether treated risk factors were well controlled or not.
- Yet, despite the large numbers of medications dispensed, the survey (**Table 10.1**) also showed that large proportions of individuals treated for these risk factors were not treated or not controlled, which can relate to many reasons, including lack of adherence to treatment.
- Using a conservative estimate of SCR 0.20 as the average cost of 1 pill for all medications for HBP, cholesterol and diabetes (the cost of most of them ranges between SCR 0.12 and 0.39 in the medication price list of the MOH), and not accounting for insulin and dapagliflozin which are much more expensive, the cost of medications for HBP, diabetes, and dyslipidaemias would amount to SCR 5.7 million (~US$0.4 million) per year (at age 18-74 only and without counting the associated laboratory tests and medical services).

Implications for health policy and programmes

- The data demonstrates that the overarching objective of *universal health care* affirmed in the constitution of Seychelles is attained. This is also consistent with WHO guidance that governments should offer quality health care to all.
- The volume of health care provided by government health services, at no cost to users, is largely driven by treatment of chronic conditions such as hypertension and diabetes (a rough cost estimation of >SCR 6 million per year for these conditions only).
- This emphasizes the importance of primary prevention of NCDs through interventions in multiple sectors. A reduced burden of NCDs through prevention would result in less treatment costs for these conditions and free up resources for health care of diseases that cannot be prevented but need health care (e.g. certain cancers, neurodegenerative diseases, certain musculoskeletal conditions, etc).
- Sustaining a free provision of government health care to all users will be challenging given the population aging and the increasing numbers of individuals with chronic conditions that request long-term, and often expensive, treatment.
- New funding mechanisms may be needed to sustain the free provision of quality health care by government services in the future, e.g. co-payment of selected services or mandating all or some people to contract private or government insurance to cover for selected medical procedures and treatments beyond essential health care.

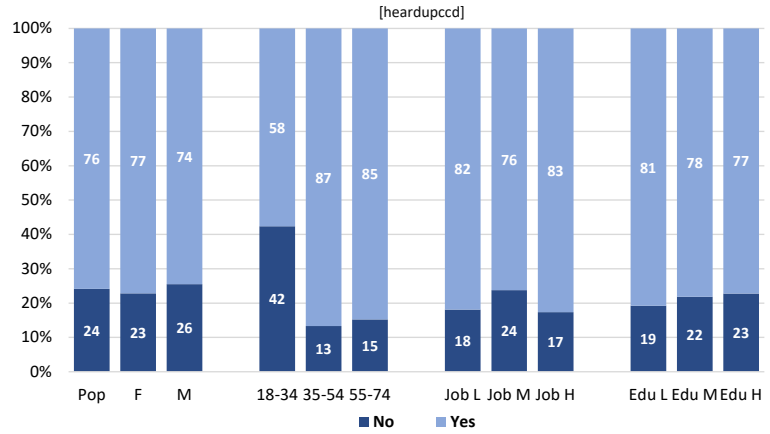
- Interventions to prevent NCDs in the population (e.g. diet, physical activity, tobacco use, alcohol intake, weight control) and measures to strengthen health care for NCDs are described in the *Seychelles NCD Strategy 2016-2025*.
- Priority interventions advocated by WHO are listed in **Appendix 12** and are discussed, for example, in *Noncommunicable Diseases: A Compendium*, Routledge 2023 (e.g. WHO best buys for NCDs, Health check-ups, Health systems and NCDs, Access to medicines for NCDs).

20. Communication and health education

Having heard of UPCCD

A question assessed if participants knew about the Unit of Prevention and Control of Cardiovascular Disease (UPCCD), which has been organising many awareness and other health programmes around healthy behaviours, CVD, and NCDs in the past 35 years on local radios and TV and organised all five NCD surveys between 1989 and 2023. The question read: 'Before you came to this study, had you ever heard of the Unit for Prevention and Control of Cardiovascular Disease (UPCCD) in the Ministry of Health?'.

Figure 20.1 Had heard of the Unit of Prevention and Control of Cardiovascular Disease, by sex, age, job, and education categories



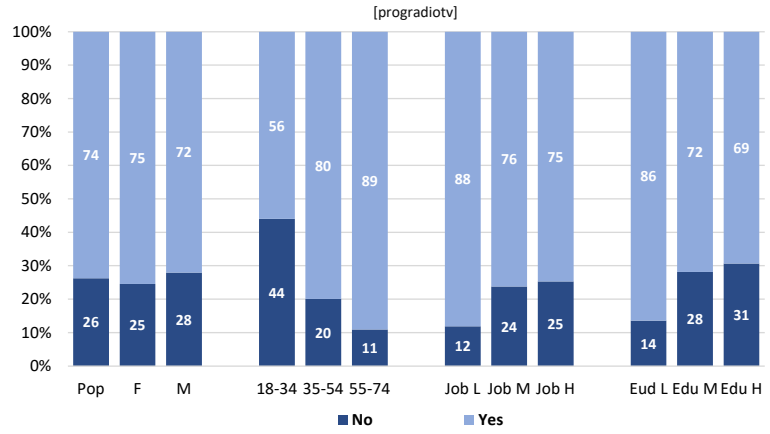
Comments

- Three quarters of adults had heard on UPCCD.
- Knowing about the Unit was lower among individuals aged 18-34.

Remembering of health programmes on the national media

A question assessed if participants remembered of at least 1 programme on tobacco (smoking), blood pressure, diabetes, diet or CVD from the Ministry of Health on Seychelles radios or television stations in the past 12 months.

Figure 20.2 Had heard or watched at least 1 programme on health behaviours or CVD from the Ministry of Health on the national radio or TV in the past 12 months, by sex, age, job, and education categories



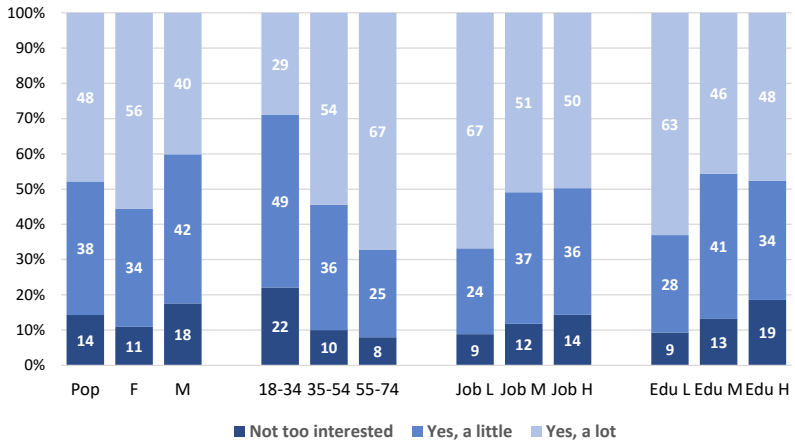
Comments

- Three quarters of adults aged 18-74 remembered a health programme on the national media.
- The proportions were lower among younger persons and those with lower education.

Interest in health awareness programmes on national radio or TV

A question explored participants' interest in listening to or watching health education programmes. The question read: 'Do you like watching or listening to locally made programs on different health topics through Seychelles media services (SBC radio/TV, Telesesel, K-Radio, Pure FM)' with response options: 'yes, I am interested a lot'; 'yes, I am interested a little'; and 'no, I am not too interested'.

Figure 20.3 Interest in listening to or watching locally-made health programmes on national radio/TV stations, by sex, age, job, and education



Comments

- Around half of adults aged 18-74 were interested 'a lot' in listening to or watching locally-made health programme on the national media.
- The proportions interested 'a lot' were higher in older persons and those with a lower SES.

Implications for policy and programmes

- Data shows substantial interest for health education programmes on healthy behaviours and NCDs on the national mass media, yet with much less interest among younger adults, who are an important target group.
- To better target young people, heath awareness programmes could build on the newer available media platforms and have content and format with new, shorter, and innovative ways to convey attractive messages.

21. Trends of main modifiable CVD risk factors between 1989 and 2023

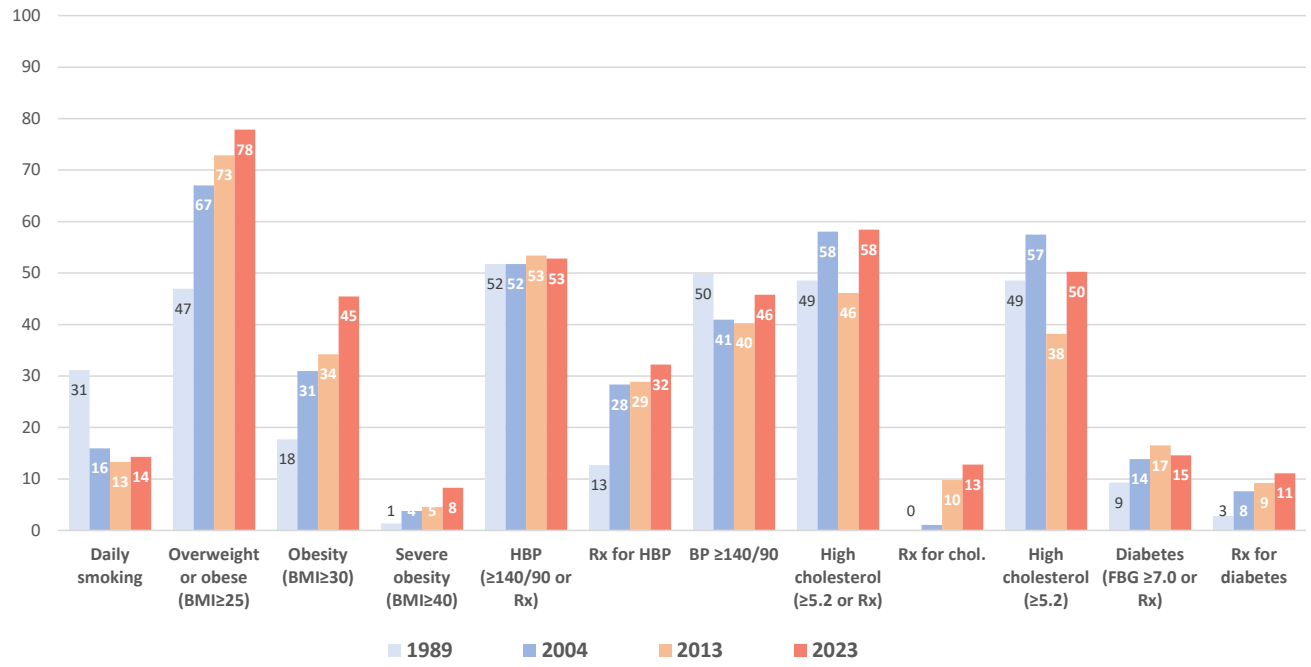
Determining trends over time in the prevalence of risk factors in the general population provides important epidemiologic information for prevention and control. More detailed analysis will be considered in a future report.

This section provides a brief overview of trends in one area, major modifiable CVD risk factors.

Given that the prevalence of several main CVD risk factors (e.g. HBP or diabetes) is relatively low before the age of 35, prevalence is shown for age 35-64 (surveys before 2023 did not include individuals aged ≥65 years).

Prevalence estimates are standardised to the age distribution of Seychelles nationals in the 2022 census. While the survey methods were similar in all surveys, different instruments or reagents were used for some measurements, which may lead to challenges when directly comparing results between surveys. The relatively small samples sizes of the surveys (n <1250 participants, with only 705-954 participants aged 35-74) result in random variation in estimates. It is therefore important to consider these point estimates as approximate.

Figure 21.1 Trends in age-standardised prevalence of main CVD risk factors in the population, age 35-64 years



Comments

- The prevalence of daily cigarette smoking decreased from 31% in 1989 to the relatively low prevalence of ~15% subsequently, with however no further substantial decrease in the past 20 years.
- The prevalence of obesity has increased sharply and regularly over time.
- Approximately 50% of the population aged 35-64 had HBP (treated or untreated) across all surveys. The prevalence of individuals taking antihypertensive medication (in the whole population) largely increased over time, reaching 32% in 2023. Yet, the prevalence of raised BP (≥140/90) remained high (46% in 2023), with the impact of treatment possibly partly countered by the increasing prevalence of obesity over time.
- Approximately 55% of the population aged 35-64 had raised blood total cholesterol across surveys (treated or untreated). The prevalence of individuals taking a cholesterol-lowering medication (in the whole population) increased largely over time, reaching 13% in 2023. Yet, the prevalence of raised cholesterol (≥5.2 mmol/l) remained high (50% in 2023).
- The (age-standardised) prevalence of diabetes (based on FBG ≥7.0 mmol/l) at age 35-64 nearly doubled from 1989 to 2023. The prevalence of individuals taking glucose-lowering treatment (in the whole population) largely increased over time, reaching 11% in 2023 (see **Table 10.1** for control rates).

Dissemination of the survey key findings

- On 8 April 2024, the main preliminary survey results were presented, during a 2-hour meeting, to the senior management team of the Ministry of Health, in presence of the Minister of Health, Public Health Commissioner, directors, and other high officials from the hospital services, community health services, and other health services.
- Results are expected to be presented to Cabinet of Ministers.
- Survey results will be shared with policy makers, healthcare professionals, community centres, national media, and national and international academic and health organisations.
- A dozen of leaflets are expected to be prepared to summarize, in a brief and user-friendly manner, key findings in particular areas (e.g. nutrition, alcohol, tobacco and substances, physical activity, diabetes, high blood pressure, cancer screening, psychological health, disability, oral health, socioeconomic findings and social determinants, etc.), which may be useful for assessment and review of specific programmes and policy.
- A communication strategy for the dissemination of key survey findings from the survey was developed in collaboration with the Heath Promotion Unit of the Ministry of Health (**Appendix 10**).

Appendices

Appendix 1. Letter of support from Public Health Commissioner, PHA, MOH

Appendix 2. Approval of the survey from the Health Research & Ethics Committee

Appendix 3. Form used by National Bureau of Statistics to contact the randomly selected participants to the 2022 census to ask if they were willing to share their phone number with Ministry of Health

Appendix 4. Consent form

Appendix 5. Track form used for the data not immediately entered into REDCap data entry software

Appendix 6. Data Dictionary Codebook

Appendix 7. Procedures for blood and urine measurements

Appendix 8. Budget (summary)

Appendix 9. Letter with selected results given to the participants

Appendix 10. Communication strategy for dissemination of the survey key findings

Appendix 11. Selected pictures of the survey

Appendix 12. WHO best buys, effective and other recommended interventions for NCD prevention and control

Appendix 1. Letter of support from Public Health Commissioner, PHA, MOH

PUBLIC HEALTH AUTHORITY
OFFICE OF THE PUBLIC HEALTH COMMISSIONER
P.O. Box 52, Seychelles Hospital, Mahé, Republic of Seychelles
Seychelles Telephone: 4388000, Fax: 4225131
Email: jude.gedeon@health.gov.sc

Please address all correspondence to the Public Health Commissioner

20th April 2023

Ms Anna Lisa Labiche
Chairperson of Health Research and Ethics Committee
Seychelles Hospital

Dear Ms Labiche

The Public Health Authority endorses the proposal entitled 'Population-based survey of risk factors and conditions related to non-communicable diseases (Seychelles Heart Study V)' being submitted by Dr Pascal Bovet as principal investigator.

This proposal is very important, as it will bring an update on the distribution of health behaviours and conditions in relation to non-communicable diseases (NCD) and other related risk factors in the population. The findings will provide useful data to inform NCD-related public health and health care policies and programmes. I have read through the research proposal and support the involvement of Public Health Authority in assisting Dr Pascal Bovet.

I wish the project team best of luck in completing this important national survey.

Yours Sincerely,

Dr Jude Gedeon
Public Health Commissioner

PUBLIC HEALTH AUTHORITY * PUBLIC HEALTH COMMISSIONER *

Appendix 2. Approval of the survey from the Health Research & Ethics Committee

MINISTRY OF HEALTH
PUBLIC HEALTH AUTHORITY
P.O. Box 52, Seychelles Hospital, Mahé, Republic of Seychelles
Seychelles Telephone: 4388000, Fax: 4225131
Email: jude.gedeon@health.gov.sc

Please address all correspondence to the Public Health Commissioner

19th May 2023

Dr. Pascal Bovet
Principal Investigator

Dear Dr. Bovet,

Research Proposal 2303: Population-based survey of non-communicable diseases (Seychelles Heart Study V)

This is to inform you that the Health Research and Ethics Committee (HREC) has reviewed the proposal as submitted for approval on 28th April 2023. Based on the proposal submitted and the presentation delivered on Thursday 11th May, the committee is of the opinion that the proposed study is **Approved**.

The committee requires a copy of the final report of the study.

Best wishes with the project.

Thanking you

Yours sincerely,

Anna-Lisa Labiche (Ms)
Chairperson
Health Research & Ethics Committee

HEALTH RESEARCH AND ETHICS COMMITTEE
- 2 JUN 2023

Appendix 3. Form used by National Bureau of Statistics to contact the randomly selected participants to the 2022 census to ask if they were willing to share their phone number with Ministry of Health

The form was used by National Bureau of Statistics (NBS) and UPCCD personnel seconded to SBS to call (on March-April 2023) the 2500 participants randomly selected from the 2022 census to ask them if they agreed to be contacted by phone by MOH in relation to the possibility to attend the NCD Survey

Terms in brackets are merged fields (from the xls list of names randomly selected from Census).

ELIGIBLE PARTICIPANT'S INFORMATION

Survey ID: **«ID»** Census ID: **«SurveyID»**

First name: «**Firstname**» Surname: **«Lastname»** Other names: **«Othername»**

Adjust name if it appears during the call(s) that orthography and/or order of first/last names need be corrected:

Firstname: _____ *Surname:* _____

Sex: **«Sex»** DOB: «DOB» Age: **«Age»** District: **«District»**

Phone number(s) from census: **«Phone»**

Preferred phone number(s) for next call(s) (from questions below): _____

All participants are expected to be Seychellois nationals. There might however be a few rare errors. Kindly check END8 below if it appears during the discussion that a participant is not Seychellois. Note that this a 'friendly' phone call and one cannot request a person to confirm that she/he is a Seychellois.

HISTORY OF CALLS TO PHONE NUMBER GIVEN BY CENSUS FOR ELIGIBLE PARTICIPANT, *UP TO 3 CALLS*:

Serial	Date of call (dd/mm):	Time of call (hh/mm):	Phone was taken (y/n):	Skip pattern
1				if Y proceed below; if N go to next call
2				if Y proceed below; if N go to next call
3				if N, select '**END2**' below & end of process

Final participant's SURVEY STATUS

SELECT ONE	STATUS
☐ Phone out of service (non-eligible)	***END1***
☐ Phone not picked up by anyone upon 3 calls (non-eligible)	***END2***
Phone picked up but (non-eligible): ☐ Wrong tel/name for X ☐ X passed away ☐ X is currently living abroad ☐ Other(specify) [e.g.: hung up after self-introduction, doesn't want to receive calls, etc.]: _____	***END3***
☐ Phone picked up & but person X is no longer living in household and no other phone # was given (known) to reach Mr/Mrs X (non-eligible)	***END4***
☐ X picked up phone but refuses to be contacted by Unit Cardiovascular (non-participant)	***END5***
☐ **X picked up the phone and agreed to be called by Unit Cardiovascular (eligible participant)**	***END6***
☐ X is in an institution for long (rehab, prison, old person home, etc.). This might request a Survey team to go to the institution or arrange for the person to be transported to survey centre. (**eligible participant**)	***END7*** *(see later what to do with these persons)*
☐ X is not a Seychellois national (non-eligible)	***END8***

CALL INTRO

A1. Good morning/afternoon/evening Mr/Mrs. My name is Y from the National Bureau of Statistics (NBS) of Seychelles. May I kindly ask you if you are Mr/Mrs **«Firstname»«Surname»**?

Bonzour/bonn apremidi/bonswar Msye/Madanm. Mon apel X e mon travay kot biro statistic Seysel.

Tou dabor, eski mon kapab demand ou si mon pe koz ek **«SexCr» «Firstname» «Full_Name»**?

SELECT ONE	
□ Yes (person on the phone is Mr/Mrs X)	**GO TO SURVEY INTRO**
□ No (person answering is not Mr/Mrs X)	**GO TO B1**

B1. Could you please pass me to Mr/Mrs X? Eski mon kapab koz avek **«SexCr» «Firstname» «Surname»** silvouple?

SELECT ONE	
□ Mr/Mrs X is responding	**GO TO SURVEY INTRO**
□ Mr/Mrs X is living in household but is NOT present at home now and/or can't respond now (including short travel abroad)	**GO TO B1.1**
Mr/Mrs X is not reachable because: □ Mr/Mrs X is currently living abroad (until June+; if <Jun: **GO** to **B1.1**) □ Mr/Mrs X passed away □ Other situation X cannot be reached (& not institution below): _____	**END3**
□ Mr/Mrs X was living in household but is living now elsewhere Note: this also applies if person is in prison/institution	**GO TO B1.2**
□ Mr/Mrs X was never living in household (wrong phone number)	**END1**

B1.1 Could you tell me when I could contact Mr/Mrs X and, if any, which phone number I can best reach X on?

Eski ou kapab dir mwan en pli bon letan ki mon kapab telefonnen pou ganny **«SexCr» «Firstname» «Full_Name»** lo laniny, e lekel limero telefonn ki mon pli kapab ganny li lo la?

Date (day): _____ /_____(*ddd*:)	*Time (hh:mm, 24h)*: _____
If alternate phone number (if any) is given to reach Mr/Mrs X (*copy phone # on top of 1st page*): _____ **GO TO B1.3**	

B1.2 Do you know a phone number for this person X?
Eski i annan en limero telefonn pou **«SexCr» «Firstname» «Surname»**?

□ The person on the phone knows a phone number for Mr/Mrs X (and X not in prison/institution)	**GO TO B1.3**
□ The person on the phone does <u>not</u> know a phone number for Mr/Mrs X	**END3**
□ Mr/Mrs X is in prison/institution: which one? _____ Phone (if possible): _____	**END7**

B1.3 Enter ***new phone*** No. of «Firstname»«Full_Name»: _____ (and *copy this number on top of first page: 'preferred #'*). Then **call new phone number of «Firstname» «Surname»** ***up to 3 times*****:**

Date call (dd.mm): _____ Time (hh:mm): _____ Phone taken (Y/N): ___ (Yes: GO to SURVEY INTRO; No: go to next call)

Date call (dd.mm): _____ Time (hh:mm): _____ Phone taken (Y/N): ___ (Yes: GO to SURVEY INTRO; No: go to next call)

Date call (dd.mm): _____ Time (hh:mm): _____ Phone taken (Y/N): ___ (Yes: GO to SURVEY INTRO; No: **END1**)

Appendix 4. Consent form

MINISTRY OF HEALTH
PUBLIC HEALTH AUTHORITY
OFFICE OF THE PUBLIC HEALTH COMMISSIONER
P. O. Box 52, Seychelles Hospital, Mahé, Republic of Seychelles
Tel: 4388016, Fax: 4225131, E-mail: Jude.Gedeon@health.gov.sc

Please address all correspondence to the Public Health Commissioner

Consent form

Last name: **First name:** **Study ID:** **NIN:**

You are invited to participate in a national health study which the Ministry of Health is undertaking, aimed at examining risk factors of cardiovascular disease and other chronic diseases such as cancer and kidney disease. Your name was included in a sample of approximately 1500 persons randomly selected from the Seychelles population aged 18-74 years for this study. Information collected will be useful to help the Ministry of Health plan and improve on provision of health services. Participants have been randomly selected from the 2022 census, and the National Bureau of Statistics sought their permission to allow Ministry of Health to contact them for enrolment in the study.

For this study, participants will be asked questions about their socio-economic characteristics, health behaviours and conditions, as well as undergo several clinical measurements such as blood pressure, body weight, a one-lead electrocardiogram and an ultrasound exam of their carotid arteries to screen for atherosclerotic plaques (i.e. an early sign of artery disease). Blood will be collected for analysis of sugar, insulin and lipids (cholesterol) and markers of the kidney function. Except for blood glucose done on a finger-prick blood sample, which will be done at the study centre, all analyses will be performed at the Seychelles Hospital laboratory. The whole procedure will take between 1 and 3 hours.

All participants will receive counselling based on their results before they leave the study centre. For laboratory tests, which will not be immediately available, participants will be informed at a later date of any abnormal results. Participants will be given a certificate of attendance and receive a voucher amounted to SCR 300 voucher, to cover for transportation and as a token of gratitude for their participation in the study.

All data will remain strictly confidential. Names and any personal information of participants will not appear in any report or document on study findings. All findings of the survey will be displayed only in an aggregate manner (e.g. the frequency of a behaviour or the mean value of a variable among many participants).

Procedures used in this study are similar to those that take place in a medical consultation and examination, and are not expected to cause any harm to a participant.

Participants are free to participate in the study and to decline answering to any question or exam. Participants have also the right to withdraw from the study at any point.

We will be glad to answer any question or clarification you may have on the study and your participation.

I have fully explained to _____ the nature and purpose of the study as described above. I have answered and will answer all questions to the best of my ability. I may be reached for any further information or complain at telephone 4 388 000 ext 8507.

_____ _____ _____
Name of **Researcher** Date Signature

Declaration from the participant

I confirm that I have read and understood this information sheet for the above-mentioned study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
I agree to participate in the study as explained above.

_____ _____ _____
Name of **Participant** Date Signature

MINISTRY OF HEALTH
PUBLIC HEALTH AUTHORITY
OFFICE OF THE PUBLIC HEALTH COMMISSIONER
P. O. Box 52, Seychelles Hospital, Mahé, Republic of Seychelles
Tel: 4388016, Fax: 4225131, E-mail: Jude.Gedeon@health.gov.sc

Please address all correspondence to the Public Health Commissioner

Form konsantman

Sinyatir: **Non:** **Limero letid:** **Limero kart idantite:**

Minister Lasante pe al fer en letid lo bann maladi kardyovaskiler ek lezot kondisyon kronik dan 1500 dimoun ki'n ganny swazir par azar parmi popilasyon ki aze ant 18 a 74 an, dapre dernyen resansman ki ti fer an 2022. Bann ki'n ganny selekte ti ganny demande zot permisyon par biro nasyonal pou statistic (NBS) pou zot limero telefonn ganny donnen avek Minister Lasante pou zot kapab ganny kontakte pou partisip dan sa letid. Lobzektif sa letid se pou egzamin bann fakter de risk ki annan relasyon avek maladi kardyovaskiler ek bann lezot maladi kronik parey kanser ek malad ronnyon. Lenformasyon ki pou ganny kolekte pou ed Minister Lasante avek son plan pou lefitir e osi amelyor servis swen lasante.

Dan sa letid, partisipan pou ganny demande bann kestyon lo zot stati sosyo-ekonomik, stil lavi ek lezot kondisyon. Zot pou pas atraver bann diferan tes klinikal tel ki teste tansyon, pran lapeze, elektrokardyogranm (ECG) ek ekografi (ultrasound) zot gro lavenn pou gete si napa bann plak (bann premye siny malad lavenn). Disan pou ganny tire e analize pou disik, "insulin", lagres (kolesterol) ek fonksyonnman ronyon. Tou bann analiz pou ganny fer dan laboratwar Lopital Sesel eksepte pik ledwa pou tyek disik ki pou ganny fer kot sant letid limenm. Prosedir an antye pou pran ant 1 a 3 erdtan.

A lafen sa bann tes, tou partisipan pou resevwar konsey dapre zot rezilta. Pou bann tes laboratwar, partisipan pou ganny enformen pli tar si i annan okenn abnormalite dan zot rezilta. Bann partisipan pou ganny donnen en "attendance paper" ek en voucher a la valer 300 roupi pou kouver zot fre transport e konman en rekonpans pou zot partisipasyon.

Tou lenformasyon ki pou ganny kolekte pou reste strikteman konfidansyel. Non partisipan ek lezot lenfomasyon personnel pa pou aparet dan okenn rapor ouswa dokiman lo rezilta sa letid. Tou rezilta pou sa letid pou ganny donnen an gro.

Bann prosedir ki pou ganny servi dan sa letid i parey avek sa bann ki ganny fer dan nenport sant medikal ek lasanm legzaminasyon e pa ekspekte pou koz dimal okenn partisipan.

Partisipan i lib pou partisip dan sa letid. Zot kapab refize pou reponn okenn kestyon ouswa fer okenn tes ki zot pa santi zot konfortab avek.

Nou pou byen kontan pou reponn okenn kestyon ouswa klarifikasyon ki ou kapab annan lo sa letid ek ou partisipasyon.

Mon'n eksplik _____ rezon e prosedir pour sa letid ek son lenportans parey in ganny dekri dan sa bann paragraf anler. Mon'n reponn tou kestyon dan pli meyer fason ki mon ti kapab. Mon kapab ganny kontakte pou plis lenformasyon ouswa konplent lo limero telefonn 4 388 000 ext 8507.

_____ _____ _____
Non **Ofisye lasante** Dat Sinyatir

Deklarasyon partisipan

Mon konfirmen ki mon'n lir e konpran tou lenformasyon lo sa form konsantman pou sa letid. Mon ganny sans pou konsider tou lenformasyon e osi demann kestyon pou eklersi okenn dout. Mon satisfe avek bann larepons ki mon gannyen. Mon dakor pou partisip dan sa letid parey i'n ganny eksplike anler.

_____ _____ _____
Non **Partisipan** Dat Sinyatir

Appendix 5. Track form used for data not immediately entered into REDCap data entry software

Last name		*First name*		**Study ID**	
Age (from census list)		Tel preferred		Email:	
Date (dd-mmm)		Time (hh/mm)		Arm circumf (cm)	
Weight asked (n, DNK)		Weight measured		Height (cm)	
Sys/Dia_entry	/	Pulse_entry			
Waist1 (cm)		Waist2 (cm)		Form completed (Y)	
Voucher signature partic		*Attend certif. (Y/N)*			
Takes **any medic** (Y/N)		Brought med (Y/N)		*Fields in **violet** to be entered by either Q&A officer or lab officer, whoever sees participant first*	
History of **HBP** (Y/N)		**Rx for HBP (Y/N)**			
List **all medic** for **HBP**					
History of **DM** (Y/N)		**Rx** (pill, insul) for **DM (Y/N)**			
List **all medic for DM** (pill, insul), write 'none' if none					
List **all chronic diseases** (other than DM or BP)					
List **all other medic** (other than HBP or DM).					
Lab officer initials		Time (hh/mm)		**Took** Rx for **DM** today **(Y/N)**	
Fasting, excl. water (Y/N)		Blood lab taken (Y/N/F)			
Gluc1 Contour		Needs **gluc2** today (if unaw & gluc >7.0 & <11 **(Y/N)**		**Gluc 2** Contour (>2 h after gluc1)	
DM: urine taken for ACR / dipstick **(Y/N)**		**Na**: urine taken (Y/N)		**DM**: Leucocytes (neg.tr, +-, ++, +++)	
DM: Gluc stick (neg, tr, +-, ++, +++, ++++)		**DM**: Prot stick (neg, tr, +-, ++, +++, ++++)		**DM**: ketones stick (neg, tr, +, ++, +++, ++++)	
Quest. officer initials					
Sys1/Dia1 (welcome)	/	Pulse1 (welcome)		Cuff used (S, M, L, XL)	
Sys2/Dia2 (check out)	/	Pulse2 (check out)			
Sys3/Dia3 (check out)	/	Pulse3 (check out)		**Mean Sys2-3/Dia2-3 >=140 or >=90 (Y/N)**	
Needs BP_otherday if unawar & >140/90**(Y/N)**		*Date BP_otherday*			
Sys/Dia:_otherday1	/	**Sys/Dia_otherday2**	/	Pulse_other_day1	
Needs gluc_other day if gluc>7.0 &<11.1 & una**(Y/N)**		Date/time **gluc_other_day**		**Gluc_other_day**	
Sys/Dia_dr1	/	Pulse_dr1		Sys/Dia_dr2	/
AF (y/n, 9:not done)		Murmur (1-5; 9 not done)		Ebeats 2+/20 sec (Y/N; 9)	
Carotid US done (Y/N)		Carotid R (mm)		Carotid L (mm)	
Fem R (mm)		Fem L (mm)		Pred BWICM	
Form completed (Y/N)		*Results explained (Y/N)*		*Remarks exit*	
Referal (Y/N)		What condition		Where	
Officer lab entry		Data entry done (Y/N)		Remark	
chol tot		HDL C		LDL C	
trigly		yGT		creatinine	
CRP		uric acid			
gluc		A1c		insulin	
(NA) uNa		(Na) uK		(DM & Na) uCreat	
(DM) Albumin					
Particip informed about abnormal lab results		Which abn. lab result		Report collected (Y/N)	

Appendix 6. Data Dictionary Codebook

Note: The table below has been adapted from the REDCap Codebook. The REDCap codebook (which can be obtained from the investigators) is the reference and should be utilised when analysing the data.

#	Topic	Q name	Questions	Kestyon	Answer categories	Kategori larepons
1	study	**id**	Study ID (4 digits)	ID letid	text (integer, Min: 900, Max 10000)	teks
2	study	**sex**	Sex of participant	Seks	1: Male 2: Female	1: Mal 2: Femel
3	study	**age**	Age as indicated in census list (18-74 yr)	Laz dapre lalis resansman (18--74 an)	text (integer, Min: 900, Max 10000)	teks
4	study	**date**	Date (DD-MM-YYYY)	Dat (DD-MM-YYYY)	text (date_dmy), Required	teks (dat_dmy)
5	study	**entry**	Initials of study officer administering questionnaire or checking it (if Qa is self-entered by participant)	Inisyal zofisye letid ki pe administre sa kestyonner ouswa pe tyeke (si kestyonner pe ganny reponn par partisipan zot menm)	1. BV 2. ABC 3. Gaynor M 4. Gina M 5. VL 6. JW 7. Other	1. BV 2. ABC 3. Gaynor M 4. Gina M 5. VL 6. JW 7. lezot
6	study	**language**	Language used for Q&A	Langaz ki pe servi pou kestyonner	1: Creole; 2: English; 3: French	1: Kreol; 2: Angle; 3: Franse
7	study	**jobname**	What is your current paid work (job)? If you are not working now, what was your last paid job? (question also applies to pensioners or housewives, etc)	Ki louvraz ou pe fer pou en saler (lapey, 'income' pou le moman? Si ou pa dan lanplwa, ki dernyen louvraz ki ou ti pe fer pou en saler oparavan? (sa kestyon I aplik osi pou pensioner, housewife, etc)	text, required	teks
8	study	**jobcat**	Categorize the current/last job into the following categories:	Kategoriz louvraz ki ou pe fer ouswa ti pe fer dan sa fason swivan:	1: professional or executive; 2: qualified non-manual (teacher); 3: semiqualified non-manual (clerk, vendor); 4: qualified manual (trained mechanic, carpenter); 5: semiqualified manual (some training, construction, driver); 6: nonqualified (labourer, security, stevedore, casual); 7: fisherman/farmer; 8: student; 9: other	1: profesyonel ou egzekitiv; 2: kalifikasyon non-manyel (ansenyan); 3: semi kalifikasyon non-manyel ("clerk", vander); 4: kalifikasyon manyel (ki'n ganny formen dan sa domenn, mekannisyen, sarpantye, etc); 5: semi kalifikasyon manyel (ki'n ganny enpe enstriksyon dan sa domenn, konstriksyon, drayver, etc); 6: napa kalifikasyon (labourer, etc); 7: peser/fermye; 8: etidyan; 9: lezot
9	study	study	Stduy officer: decide with participant if questionnaire 'Qa' is to be administered by study officer or self-administered by participant (on a tablet or the participant's phone)	Zofisye Letid: Desid ansanm ek partisipan si l oule kestyoner l ganny administre part zofisye letid ouswa ganny administre par partisipan l(lo tablet ouswa zot prop telefonn)	1. administered by study officer 2. self-administered using QR code (e.g.UPCCD tablet 3. self-administered by sending questionnaire by emial to participant (e.g. participant's smartphone/tabley)	1. administre par zofisye letid 2. ganny administre par partisipan an servan QR code (e.g.UPCCD tablet) 3. ganny administre par partisipan atraver anvoy kestyoner par e-mail (e.g. telefonn ouswa tablet partisipan)

10	ses	**educ**	What is the highest level of education you have completed?	Ki pli o nivo ledikasyon ou'n konplete?	1: i did not complete obligatory school (primary/secondary); 2: i completed obligat school (prim/sec, up to S4); 3: i completed up to NYS/S5 4: i completed post-secondary education vocational/ apprenticeship (mechanic, carpenter, secretary etc) polytechnic, A levels or similar; 5: i completed post secondary/polytechnic, 'A levels', or similar; 6: did university or equivalent high technical training	1: mon pa'n fini dan lekol obligatwar (primer/segoder); 2: mon'n konplet lekol obligatwar (primer/segonder, ziska S4); 3: mon konplet ziska NYS/S5); 4: mon'n al pos segonder vokasyonel/apprenticeship (mekanisyen, sarpantye, sekreter, etc) politeknik, A levels, ou ekivalan; 5: mon'n al pos segonder/politeknik, 'A levels', ou ekivalan 6: mon'n al liniversite ou ekivalan
11	ses	**kids**	How many children do you have? (including biological children but not 'zanfan sonnyen')	Konbyen zanfan ou annan? (enkli zanfan , me pa kont 'zanfan sonnyen')	0. 0 1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 7. 7 or more	0. 0 1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 7. 7 ou plis
12	ses	**homepeople**	How many people, including yourself, family and children who are currently living in your household (on at least 4 days per week)?	Konbyen dimoun enkli ou menm, fanimir ek ou zanfan ki reste dan menm lakour? (omwen 4 zour dan en semenn)	1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 7. 7-9 8. 10 or more	1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 7. 7-9 8. 10 ou plis
13	ses	**houseown**	Does this house or flat you live in belongs to you, your family or other living arrangement?	Eski sa lakaz ou flat ki ou pe reste ladan, i pou ou, ou fanmir ouswa ou pe lwe, oubyen lezot sitiasyon?	1: for myself or for a member of my family; 2: for my partner or member of his/her family 3: I rent 4: other situation (stay at a friend's place, hotel, etc.)	1: i pou mwan ouswa en manm mon fanmir; 2: I pou mon partner ouswa en manm son fanimir; 3: i lwe 4: lezot sitiasyon (pe reste kot en zanmi, lotel, etc.)
14	ses	**homerooms**	How many rooms are there in your house/flat, including the living room but not including the kitchen, bathroom, toilets, and verandah?	Konbyen lasanm i annan dan ou lakaz ki ou pe reste ladan pou le moman. Enkli salon me pa lakwizin, ni lasanm ben, twalet ou lavarang?	1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 or more	1. 1 2. 2 3. 3 4. 4 5. 5 6. 6 ou plis
15	ses	**partner**	Do you currently live in the same house with a partner for at least 4 days a week?	Eski ou pe reste dan menm lakaz ouswa flat avek en partner (omwen 4 zour par semenn?	1: i live with my husband/wife; 2: i live with a partner ("menaz"); 3: i don't have a partner and I live with (one or more) parent, children or relative; 4: i don't have a partner and I live with friends 5: I currently live alone	1: mon reste avek mon msye/madanm marye; 2: mon reste avek mon partner (menaz); 3: mon napa partner e mon reste avek en (ou plizyer) paran, zanfan ouswa fanmir 4: mon napa partner e mon reste avek en (ou plizyer) zanmi 5: mon reste tousel dan mon lakaz/flat
16	ses	**worksituation**	Which of the following best describes your main current work situation ?	Lekel ant sa bann deskripsyon swivan ki pli byen dekri ou sitiasyon travay aktyel?	1: government or parastatal employee; 2: non-government employee (private sector); 3: self-employed; 4: casual non-formal work; 5: not currently working but able to work; 6: unable to work for medical reason; 7: housewife/man; 8: i am a student 9: retired/pensioner; 10: unemployed 11: Other situation	1: anploye par gouvernman ouswa parastatal; 2: anploye par en lakonpanyen prive; 3: mon annan mon prop bizness; 4: mon travay "casual"; 5: mon kapab travay me mon pa dan en lanplwa pour le moman ; 6: mon pa pe travay pour rezon medikal; 7: mon en madanm/ msye ki reste kot lakour; 8: mon en etidyan 9: mon pran retret/pansyoner 10: mon pa pe travay pou le moman 11: lezot sitiasyon

17	ses	**income**	What is your personal total earnings per month, on average, before tax, incl. all allowances, benefits, bonuses, accessory works, rental of apartments, etc. **Is it around:**	Ki manyer ou pou dekrir ou lapey par mwan apepre? Enkli tou bann allowance, bonus, pansyon e larzan ki ou resevwar atraver en lot mwanyen tel ki lwe lakaz etc	1: less than 3000; 2: 3000-6000; 3: 6001-10,000; 4: 10'001-20,000; 5: 20'001-40,'000; 6: 40'000	1: mwens ki 3000; 2: ant 3000-6000; 3: ant 6001-10,000; 4: ant 10'001-20,000; 5: ant 20'001-40,'000; 6: plis ki 40'000
18	ses	**income**	What is the approximate monthly earnings of your partner? Is it around:	Ki manyer ou pou dekrir lapey ou partner par mwan apepre? Enkli tou bann allowance, bonus, pansyon e larzan ki ou resevwar atraver en lot mwanyen tel ki lwe lakaz, etc	1: less than 3000; 2: 3000-6000; 3: 6001-10,000; 4: 10'001-20,000; 5: 20'001-40,'000; 6: 40'000	1: mwens ki 3000; 2: ant 3000-6000; 3: ant 6001-10,000; 4: ant 10'001-20,000; 5: ant 20'001-40,'000; 6: plis ki 40'000;
19	tobacco	**smokever**	Have you ever smoked cigarettes, cigarillos, shisha or electronic cigarettes (vaping),or chew or snuff tobacco regularly for more than one month?	Dan ou lavi eksi ou'n deza fim sigaret, sigar, shisha oubyen sigaret elektronik (vaping), oubyen sik ou respir (sniff) taba regilyerman pou plis ki en mwan?	1: yes 2: no	1: wi 2: non
20	tobacco	**smokdaily**	[smoker] Do you currently smoke cigarettes daily? (do not include e-cig)	Eski ou fim sigaret toulezour aktyelman? (me pa kont sigaret elektronik/vaping ki nou pou demann kestyon apre)	1: yes 2: no (→ X)	1: wi 2: non (→ X)
21	tobacco	**cigday**	[current smoker] How many cigarettes do you smoke each day on average?	Apepre konbyen sigaret ou fimen par zour?	1. 1-2 per day 2. 3-5 per day 3. 6-10 per day 4. 11-19 per day 5. 20 or more per day	1. 1-2 par zour 2. 3-5 par zour 3. 6-10 par zour 4. 11-19 par zour 5. 20 ou plis ki 20 par zour
22	tobacco	**smokoc**	[If not a daily smoker] Do you smoke cigarettes occasionally?	Eski ou fim sigaret okazyonelman? (Pa toulezour)	1: yes 2: no (→ X)	1: wi 2: non (→ X)
23	tobacco	**smokoccigw**	[occasional smoker] How many cigarettes do you smoke in one week on average?	Apepre konbyen sigaret ou fimen dan en semenn?	1: 1 or 2 per week or per month; 2: 3 to 10 per week; 3: 10 to 20 per week; 4: more than 20 per week	1: 1 ou 2 par semenn ou par mwan; 2: ant 3 ou 10 par semenn; 3: ant 10 a 20 par semenn; 4: plis ki 20 par semenn
24	tobacco	**shisha**	Do you currently smoke shisha?	Eski ou pe fim/servi shisha (tobacco pipe)?	1: no; 2: occasionally; 3: at least once per week; 4: everyday	1: non; 2: okazyonelman; 3: omwen 1 fwa par semenn; 4: toulezour
25	tobacco	**chewtob**	Do you currently chew or sniff tobacco?	Eski ou pe sik taba (chew) ou respir taba dan nennen (snuff)?	1: no; 2: occasionally; 3: at least once per week; 4: everyday	1: non; 2: okazyonelman; 3: omwen 1 fwa par semenn; 4: toulezour
26	tobacco	*ecig*	Do you currently use electronic cigarettes or a heating tobacco device (e.g. IQOS)?	Eski ou pe servi sigaret elektronik (vaping) ouswa bann lezot prodwir taba ki sofe pe pa brile? (legzanp IQOS)	1: no; 2: occasionally (not every day); 3: at least once per week; 4: everyday	1: non; 2: okazyonelman, rar; 3: omwen 1 fwa par semenn; 4: toulezour
27	subst	**cannabis**	During the past 12 months, did you ever smoke or use marijuana or cannabis occasionally or regularly?	Pandan sa dernyen 12 mwan, eski ou'n deza fim ou servi mariwana, hashish ouswa kanabis okasyonelman ouswa regilyerman?	0: no; 1: once or few times; 2: regularly (at least once per week)	0: non; 1: 1 ou detrwa fwa; 2: regilyerman (omwen 1 fwa par semen)
28	subst	**heroin**	During the past 12 months, did you ever use heroin occasionally or regularly?	Pandan sa dernyen 12 mwan, eski ou'n deza servi eroin ou metadon okasyonelman ouswa regilyerman?	0: no; 1: heroin once or few times; 2: heroin regularly (at least once per week) 3: methadone only 4: heroin and methadone	0: non; 1: eroin 1 ou detrwa fwa; 2: eroin regilyerman (omwen en fwa par semenn) 3: metadon selman 4: eroin ek metadon
29	subst	**heroininj**	(if yes): How do you use heroin?	Dan ki fason ki ou servi eroini?	1: injection; 2: inhalation or smoking; 3: both ways	1: enzeksyon dan lavenn; 2: respir eroin atraver nennen (sniffing) ou fimen (smoking); 3: toulede fason ki'n mansyonnen.
30	subst	**methadone**	(if yes) During the past 12 months, did you try to substitute heroin with methadone, provided by health services?	Pandan sa dernyen 12 mwan, eski oun deza sey ranplas eroin avek metadon, ki ganny donnen servis lasante?	0: no; 1: yes, I now use only or mostly methadone; 2: yes, but I still also often use heroin	0: non; 1: wi, mon servi zis ouswa lapli par letan metadon; 2: wi, me selman mon ankor touzour pe servi eroin

31	subst	**fentanyl**	During the past 12 months, did you ever use fentanyl or other synthetic opioid substances (pills, lozenge, patches, spray, or injection) occasionally or regularly?	Pandan sa dernyen 12 mwan, eski ou'n deza servi fentanyl ouswa lezot sibstans opioid kemikal parey (pilil, draze, spray ou enzeksyon) okasyonelman ouswa regilyerman?	0: no; 1: once or few times; 2: regularly (at least once per week)	0: non; 1: 1 ou detrwa fwa; 2: regilyerman (omwen 1 fwa par semen)
32	subst	**cocaine**	During the past 12 months, did you ever use cocaine or crack (smokable cocaine)?	Pandan sa dernyen 12 mwan, eski ou'n deza servi cocaine ouswa crack (cocaine ki ou fimen) okasyonelman ouswa regilyerman?	0: no; 1: once or few times; 2: regularly (at least once per week)	0: non; 1: 1 ou detrwa fwa; 2: regilyerman (omwen 1 fwa par semen)
33	subst	**amphet**	During the past 12 months, did you ever use other stimulants such as methamphetamines (crank, ice, speed, ecstasy, crystal meth, MDMA, happy pill, etc) occasionally or regularly?	Pandan sa dernyen 12 mwan, eski ou'n deza servi lezot sibstans stimilan tel ki methamphetamines (crank, ice, speed, ecstasy, crystal meth, MDMA, happy pill, etc) okasyonelman ouswa regilyerman?	0: no; 1: once or few times; 2: regularly (at least once per week)	0: non; 1: 1 ou detrwa fwa; 2: regilyerman (omwen 1 fwa par semen)
34	diet	**fruitd**	In a typical week, on how many days do you eat fruit (fresh, frozen or can; local or imported) on average, such as mango, banana, starfruit, ripe papaya, orange, apple, pear, grape, etc [card]	An mwayen, konbyen zour dan en semenn ki ou manz fri (fre, konzele, dan kann, lokal ou enporte)? Par egzanp mang, bannann, karanbol, papay mir, zoranz, ponm, pwar, rezen etc.	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: every day	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
35	diet	**druits**	How many portions of fruit do you eat on average on one of those days?	Dan enn sa bann zour, konbyen porsyon fri ou manze an mwayenn?	1: 1 portion 2: 2 portions 3: 3 portions 4: 4 portions 5: more than 4 portions	1: 1 porsyon 2: 2 porsyon 3: 3 porsyon 4: 4 posrsyon 5: plis ki 4 posyon
36	diet	**vegd**	In a typical week, on how many days do you eat vegetables on average, such as tomato, carrot, Chinese cabbage, cabbage, chayote, lettuce, eggplant, pumpkin, green beans, salad, chutney	An mwayen, konbyen zour dan en semenn ki ou manz legim? Par egzanp tomat, karot, bred, sou, leti, brenzel, zironmon, zariko, salad, satini	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
37	diet	**vegs**	On one of those days, how many portions of vegetables do you eat, on average?	Dan enn sa bann zour, konbyen porsyon legim ou manze an mwayenn?	1: 1 portion 2: 2 portions 3: 3 portions 4: 4 portions 5: more than 4 portions	1: 1 porsyon 2: 2 porsyon 3: 3 porsyon 4: 4 posrsyon 5: plis ki 4 posyon
38	diet	**riced**	In a typical week, on how many days do you eat rice on average?	An mwayenn, konbyen zour dan en semenn ki ou manz diri?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
39	diet	**rice12**	On one of those days, how many meals do you eat rice ?(breakfast, lunch and/or dinner)	Dan 1 sa bann zour, dan konbyen repa (parmi gadyak, dezennen ek dinen) ou manz diri, an mwayenn?	1: 1 meal 2: 2 meals 3: 3 meals	1: 1 repa 2: 2 repa 3: 3 repa
40	diet	**breadd**	In a typical week, on how many days do you eat bread, whether fresh, toasted, sandwiches, etc?	An mwayenn, konbyen zour dan en semenn ki ou manz dipen? (fre, toast, sandwich, etc)	1: never or rarely 2: 1 or 2 days per week 3: 3 or 4 days per week 4: 5 or 6 days per week 5: everyday	1: zanmen ou rar 2: 1 ou 2 zour par semenn 3: 3 ou 4 zour dan 1 semenn 4: 5 ou 6 zour dan en 1 semenn 5: toulezoour
41	diet	**breadbrown**	How often do you use brown bread at home?	An mwayenn, konbyen fwa ou servi dipen gri dan lakour?	0: never or rarely 1: at least once per month 2: at least once per week 3: everyday or almost everyday	0: zanmen ou rar 1: omwen 1 fwa par mwan 2: omwen 1 fwa par semenn 3: toulezoour ou preski toulezour

42	diet	**pastad**	In a typical week, on how many days do you eat pasta? e.g: spaghetti, macaroni, etc	An mwayenn, konbyen zour dan en 1 semenn ki ou manz pasta? Par egzanp spaghetti,macaroni, etc	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
43	diet	**potatod**	In a typical week, on how many days do you eat potato (boiled, fried, curried, salad or other ways?	An mwayenn, konbyen zour dan en 1 semenn ki ou servi ponmdeter (bwi, fri, dan kari, salad ou lezot fason)?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
44	diet	**saladd**	In a typical week, on how many days do you eat salad? E.g: tomato, lettuce, watercress, carrots, cabbage, cucumber, long gourd, bitter gourd, and others.	An mwayenn, konbyen zour dan en semenn ki ou manz salad? Par egzanp tomat, leti, kreson, karot, sou, kokonm, patol, margoz e lezot.	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
45	diet	**gromanzed**	In a typical week, on how many days do you eat "gro manze" (tubers and starches)? e.g. breadfruit, cassava, sweet potato, plantain, etc)?	An mwayenn, konbyen zour dan en semenn ki ou manz gro manze? Par egzanp friyapen, patat, mayok, bannan sen zak etc.)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
46	diet	**lentild**	In a typical week, on how many days do you eat lentils?	An mwayenn konbyen zour dan en semenn ki ou manz lantir?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
47	diet	**chutneyd**	In a typical week, on how many days do you eat chutney (papaya, golden apple, pumpkin, eggplant, etc)?	An mwayenn, konbyen zour dan en semenn ki ou manz satini? (papay, frisiter, zironmon, brenzel etc)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
48	diet	**cheesed**	In a typical week, on how many days do you eat cheese (natural, sliced, spread)?	An mwayenn, konbyen zour dan en semenn ki ou manz fromaz? (natirel, trans, ankrenm)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
49	diet	**eggs**	In a typical week, on how many days do you eat eggs?	An mwayenn, konbyen zour dan en semenn ki ou manz dizef ?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
50	diet	**yogurt**	In a typical week, on how many days do you eat yoghurt (natural/plain or flavored)?	An mwayenn, konbyen zour dan en semenn ki ou manz yogurt? (natirel ouswa avek lezot gou)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
51	diet	**milkd**	In a typical week, on how many days do you drink milk or flavored milk, or use milk in breakfast cereals, on average, not counting milk added in tea/coffee?	An mwayenn, konbyen zour dan en semenn ki ou servi dile par egzanp dan cornflakes etc? (pa kont dile ki ou azout dan dite ouswa kafe)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
52	diet	**milktype**	When buying milk in packet ("dile pake") or powdered milk ("dile dan bwat"), which one do you buy most often?	Ki kalite dile likid ouswa an poud ki ou servi pli souvan?	1: whole milk (full cream); 2: semi-skimmed milk; 3: skimmed milk; 4: i dont pay attention; 5: i use plant based milk (almond, soya, oat)	1: whole milk (dile gra); 2: semi-skimmed milk; (dile demi gra) 3: skimmed milk; (dile san lagres) 4: mon pa port atansyon; 5: mon servi pli souvan dile a baz plant (almond, soya, oat)
53	diet	**fishd**	In a typical week, on how many days do you eat fish on average, fresh, frozen or in can?	An mwayenn, konbyen zour dan en semenn ki ou manz pwason? (fre, konzele ouswa dan kann)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour

54	diet	**fish12meal**	On one of those days, on how many meals (breakfast, lunch, dinner) do you eat fish?	Dan enn sa bann zour, dan konbyen repa (parmi gadyak,dezennen ou dinen) ou manz pwason an mwayenn?	1: 1 meal per day; 2: 2 meals per day 3: 3 meals or more per day	1: dan 1 repa (1 fwa) par zour; 2: dan 2 repa (2 fwa) par zour 3: dan 3 repa ou plis (3 fwa ou plis) par zour
55	diet	**fishfry**	When you cook fish at home, how often do you deep-fry your fish?	Kantite fwa ki ou fri pwason dan lakour?	0: never or rarely 1: at least once per month 2: at least once per week 3: almost all the time	0: zanmen ou rar 1: omwen 1 fwa par mwan 2: omwen 1 fwa par semenn 3: laplipar letan
56	diet	**seafood**	In a typical week, how often do you eat seafood (calamari, octopus, shrimps, etc)?	An mwayenn, konbyen zour dan en semenn ki ou manz bann fri de mer (seafood)? Par egzanp kalamar, krab, zourit, kanmaron, etc)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
57	diet	**poultryd**	In a typical week, on how many days do you eat poultry?	An mwayenn, konbyen zour dan en semenn ki ou manz lavyannlavyann poul, kannar ouswa denn?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
58	diet	**meatfreshd**	In a typical week, on how many days do you eat fresh or frozen red meat? (pork, beef, lamb)	An mwayenn, konbyen zour dan en semenn ki ou manz lavyann rouz fre ouswa konzele? (pork, bef, mouton)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
59	diet	**meatproc**	In a typical week, on how many days do you eat processed meat such as sausages, bacon, corned beef, ham, luncheon meat?	An mwayenn, konbyen zour dan en semenn ki ou manz sosis, bacon, bef dan bwat, ham, lunchon meat?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
60	diet	**fishsaltd**	In a typical week, how often do you eat salted fish including smoked fish?	An mwayenn, konbyen zour dan en semenn ki ou manz pwason sale ouswa pwason fimen?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
61	diet	**curryd**	In a typical week, how often do you eat curry? (e.g. chicken, fish, crab, octopus or other)	An mwayenn, konbyen zour dan en semenn ki ou servi kari? (poul, pwason, krab, zourit ou lezot)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
62	diet	**oilolive**	How often do you use olive oil when cooking or to add in salad?	Konbyen fwa ou servi delwil doliv pou kwi manze ouswa dan salad?	1: never or rarely 2: 1 or 2 times per week; 4: more than 2 days per week	1: zanemen ou rar; 2: 1 ou 2 fwa par semenn; 4: plis ki 2 fwa par semenn
63	diet	**tead**	In a typical week, on how many days do you drink tea on average (black tea, green tea, citronel, camomille, etc)?	An mwayenn, konbyen zour dan 1 semenn ki ou bwar dite? Par egzanp dite nwanr, dite ver, sitronel ek kamomil etc)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
64	diet	**teas**	On such days, how many cups of tea do you drink per day on average?	Dan 1 sa bann zour, konbyen tas dite ou bwar an mwayenn?	1: 1 cup of tea 2: 2 3: 3 4: 4 5: more than 4 cups	1: 1 tas dite 2: 2 3: 3 4: 4 5: plis ki 4 tas
65	diet	**teasugspoon**	When you have tea, how many spoons of sugar do you add in each cup? (tea spoons)	Ler ou bwar ou dite, konbyen pti kwiyer disik ou mete ladan?	0: I don't use sugar 1: 1 teaspoon of sugar 2: 2 teaspoons of sugar 3: 3 teaspoons of sugar 4: more than 3 teaspoons of sugar	0: mon pa mete disik 1: 1 pti kwiyer disik 2: 2 pti kwiyer disik 3: 3 pti kwiyer disik 4: plis ki 3 pti kwiyer
66	diet	**teamilk**	Do you use milk in your tea (powder or liquid milk, but not soya)?	An zeneral, eski ou met dile dan ou dite (dile an poud ou likid, me pa enkli soya)?	1: Yes 0: No	1: Wi 0: Non
67	diet	**coffeed**	In a typical week, on how many days do you drink coffee?	An mwayenn, konbyen zour dan 1 semenn ki ou bwar kafe?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour

68	diet	**coffees**	On such days, how many cups of coffee do you drink per day on average?	Dan enn sa bann zour, konbyen tas kafe ou bwar an mwayenn?	1: 1 cup of tea 2: 2 cups 3: 3 cups 4: 4 cups 5: more than 4 cups	1: 1 tas kafe 2: 2 tas 3: 3 tas 4: 4 tas 5: plis ki 4 tas
69	diet	**coffesugar**	When you have coffee, how many spoons of sugar do you add in each cup? (teaspoons)	Ler ou bwar ou kafe, konbyen pti kwiyer disik ou mete ladan?	0: I don't use sugar 1: 1 teaspoon of sugar 2: 2 teaspooon of sugar 3: 3 teaspoon of sugar 4: more tha 3 teaspoon of sugar	0: mon pa mete disik 1: 1 pti kwiyer disik 2: 2 pti kwiyer disik 3: 3 pti kwiyer disik 4: plis ki 3 pti kwiyer
70	diet	**coffeemilk**	Do you use milk in your coffee (powder or liquid milk, but not soya)?	An zeneral, eski ou met dile dan ou kafe (dile an poud ou likid, me pa enkli soya)?	1: Yes 0: No	1: Wi 0: Non
71	diet	**softdrinkd**	In a typical week, on how many days do you drink carbonated lemonades/soft drinks (Coke, Sprite, Fanta, etc) on average?	An mwayenn, konbyen zour dan 1 semenn ki ou bwar limonad/labwason ki annan gaz? (Coca-Cola, Sprite, Fanta, etc)	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
72	diet	**softdrinks**	On such days, how many small bottles (pet), glass bottles or glasses do you have per day on average?	Dan enn sa bann zour, konbyen pti boutey, sopin ou ver ou bwar an mwayenn? 1 gro boutey limonad (1L) koresponn a 4 ver; 1 gro boutey 1.5L koresponn a 6 ver	1: 1 2: 2 3: 3 4: 4 5: more than 4	1: 1 2: 2 3: 3 4: 4 5: plis ki 4
73	diet	**fruitjuiced**	In a typical week, on how many days do you have fruit juice in packet or bottle ("juice dan pake") on average?	An mwayenn, konbyen zour dan 1 semenn ki ou bwar zi fri dan pake ouswa boutey?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
74	diet	**fruitjuices**	On such days, how many small packets or glasses of juice do you have per day on average?	Dan 1 sa bann zour, konbyen pti pake oubyen ver zi fri ou bwar an mwayenn? 1 pti pake=1 ver 1 pake 1L koresponn a 4 ver	1: 1 2: 2 3: 3 4: 4 5: more than 5	1: 1 2: 2 3: 3 4: 4 5: 5 ou plis
75	diet	**juicehomed**	In a typical week, on how many days do you have home made fruit juice "juice dan pake) on average?	An mwayenn, konbyen zour dan 1 semenn ki ou bwar zi fri ki'n ganny fer dan lakour?	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
76	diet	**juicehomes**	On such days, how many glasses of home-made fruit juice do you have per day on average?	Dan 1 sa bann zour, konbyen ver zi fri ki'n ganny fer dan lakour ou bwar, an mwayenn?	1: 1 2: 2 3: 3 4: 4 5: more than 5	1: 1 2: 2 3: 3 4: 4 5: 5 ou plis
77	diet	**energydrinkd**	In a typical week, on how many days do you have nonalcoholic "energy" drinks such as RedBull, KiddyBell, PussyDrink, DarkDug, Monster, Glucozade, etc?	An mwayenn, konbyen zour dan 1 semenn ki ou bwar bann labwason lenerzi? Par egzanp RedBull, KiddyBelle, PussyDrink, DarkDog, Monster, Glucozade, etc.	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour
78	diet	**energydrinks**	On such days, how many bottles of energy drink do you have per day on average?	Dan 1 sa bann zour, konbyen boutey sa bann labwason lenerzi ('energydrink') ou bwar an mwayenn? 1 pti boutey = 2-3 dL 1 gro boutey 1L koresponn a 4 ver	1: 1 2: 2 3: 3 4: 4 5: more than 5	1: 1 2: 2 3: 3 4: 4 5: 5 ou plis
79	diet	**waterd**	In a typical week, on how many days do you drink water on average? Including 'soda' (sparkling water), bottled water or tap water.	An mwayenn, konbyen zour dan 1 semenn ki ou bwar delo? Sa I enkli osi 'soda' (sparkling water), boutey delo, ouswa delo anba tiyo.	0: never or rarely 1: 1 or 2 days per week 2: 3 or 4 days per week 3: 5 or 6 days per week 4: everyday	0: zanmen ou rar 1: 1 ou 2 zour par semenn 2: 3 ou 4 zour dan 1 semenn 3: 5 ou 6 zour dan en 1 semenn 4: toulezoour

80	diet	**waters**	On such days, how many glasses of water do you drink per day on average? 1 glass = 2-3 dL; 1 bottle 5 dL= 2 glasses)	Dan 1 sa bann zour, konbyen ver delo ou bwar an mwayenn? 1 ver delo = 2-3 dL; 1 boutey 5 dL=2 ver	1: 1-2 2: 3-5 3: 6-9 4: 10 or more	1: 1-2 2: 3-5 3: 6-9 4: 10 ou plis
81	diet	**takeaway**	How often do you have take-away meals?	Konbyen fwa ou manz take-away?	0: never or rarely 1: 1-3 times per month 2: 1 or several days per week	0: zanmen ou rar 1: detrwa fwa dan 1 mwan 2: 1 ou plizyer zour dan 1 semenn
82	diet	**vegan**	How would you classify your usual diet in relation to animal products (including meat, fish, poultry, eggs, dairy, etc)?	Ki manyer ou pou klasifye ou fason manze an relasyon ek bann prodwi zannimo? (enkli lavyann, pwason, volay, dizef, prodwi dile, etc)	1: I often eat animal products 2: i eat animal products but restrict to less than once or twice per week; 3: i generally do not eat meat, chicken or fish or dairy but i eat dairy products or eggs; 4: i generally do not eat animal products, as well as no eggs and dairy products.	1: mon manz sa bann prodwi zannimo souvan 2: mon manz sa bann prodwi zanimol, me pa plis ki enn ou de fwa par semenn; 3: mon pa manz lavyann, poul, pwason ouswa prodwi dile me mon konsonm dile zanimo ou zef; 4: mon pa manz lavyann ni okenn prodwi zanimo ki enkli dizef ou prodwi dile.
83	diet	**suppl**	During the past 12 months, how often did you take supplements such as vitamins, nutrients or other substances sold in “dose” form (pills, liquids, etc) in pharmacies, drugstores, or internet?	Pandan sa dernyen 12 mwan, konbyen fwa ou'n pran vitamin/sipleman ouswa okenn lezot sibstans ki vann dan farmasi, laboutik ouswa internet? Par egzanp an form pilil, likid, lapoud etc	1: never; 2: a few times; 3: regularly (at least once per month)	1: zanmen; 2: detrwa fwa; 3: regilyerman (omwen 1 fwa par mwan)
84	diet	**lafres**	During the past 12 months, how often did you take any traditional medicine "lafresisan" for any condition, such as high BP, diabetes or other reason?	Pandan sa dernyen 12 mwan, konbyen fwa oun servi bann plant medisinal (lafresisan) pou okenn kondisyon lasante tel ki tansyon o, dyabe ouswa lezot maladi?	1: never; 2: a few times; 3: regularly (at least once per month)	1: zanmen; 2: detrwa fwa; 3: regilyerman (omwen 1 fwa par mwan)
85	diet	**label**	Do you read labels on food packages to help you decide to purchase a food, for example to look for salt, sugar or fat content (don't count for looking at "expiry date")?	Eski ou lir lenformasyon la la kantite disel, sisik, lagres ki l annan dan bann prodwi manze pour ed ou deside ki ou pou aste? (me pa kont 'expiry date')	1: never; 2: rarely; 3: sometimes; 4: often	1: zanmen; 2: rar; 3: par ler; 4: souvan
86	oh	**ohyear**	During the past 12 months, did you drink alcohol beverages such as beer, wine, spirit or other alcohol drinks?	Pandan sa dernyen 12 mwan, eski ou'n bwar lalkol parey labyer, diven, spririt ou lezot labwason alkolize omwen en fwa?	1: yes 0: no (→ X)	1: wi 0: non (→ X)
87	oh	**ohmonth**	Do you currently drink alcohol beverages such as beer, wine, spirit or other alcoholic drinks at least once per month?	Eski ou bwar lalkol parey labyer, diven, spirit ou lezot labwason alkolize omwen 1 fwa par mwan?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
88	oh	**ohd**	[Drinker] On average, on how many days in a month (30 days) do you have at least one alcohol drink?	Konbyen zour dan 1 mwan (30 zour) ki ou bwar omwen 1 labwason alkolize?	1: 1 to 2 days per week 2: 3 to 5 days per week 3: 6 to 9 days per week 4: 10 to 20 days per week 5: every day or almost everyday	1: ant 1 a 2 zour par mwan 2: ant 3 a 5 zour par mwan 3: ant 6 a 9 zour par mwan 4: ant 10 a 20 zour par mwan 5 toulezour ou preski toulezour
89	oh	**ohs**	[Drinker] On average, on one of those days, how many alcoholic drinks do you drink? 1 drink corresponding to 1 small bottle of beer (3 dL), or 1 glass of wine (1-2 dL), or 1 small glass of liquer or 1 peg spirit (0.25 dL), or 1 bottle hombrew (5 dL).	Dan 1 sa bann zour, apepre konbyen 'drink' (younit) ou bwar an mwayenn? 1 'drink' (younit) lalkol koresponn a 1 pti boutey labyer (3 dL), ou 1 ver diven (1-2 dL), ou 1 pti ver liker ou 1 peg spirit (0.25 dL), ouswa 1 boutey homebrew (5 dL).	1: 1 drink 2: 2 drinks 3: 3-4 drinks 4: 5-9 drinks 5: more thani 10 drinks	1: 1 drink (1 younit) 2: 2 drink 3: 3-4 drink 4: 5-9 drink 5: plis ki 10 drink

90	oh	**ohsepcialoc**	[Drinker] On special occasions such as celebrations, parties, etc, how many alcohol drinks can you have in total in one day? 1 drink corresponding to 1 small bottle of beer (3 dL), or 1 glass of wine (1-2 dL), or 1 small glass of liquor or 1 peg spirit (0.25 dL), or 1 bottle homebrew (5 dL).	Dan bann lokazyon spesyal, parey selebrasyon, parti, etc, ki pli gran drink (younit) labwason alkolize ou kapab servi pandan sa zour? 1 'drink' (younit) lalkol koresponn a 1 pti boutey labyer (3 dL), ou 1 ver diven (1-2 dL), ou 1 pti ver liker ou 1 peg spirit (0.25 dL), ouswa 1 boutey homebrew (5 dL).	1: 1 to 2 drinks 2: 3 to 5 drinks 3: 6 to 10 drinks 4: 11 to 15 drinks 5: more than 15 drinks	1: ant 1 a 2 drink 2: ant 3 a 5 drink 3: ant 6 a 10 drink 4: ant 11 a 15 drink 5: more than 15 drink
91	oh	**ohmax**	[Drinker] In the past 12 months, what was the largest amount of drinks you had on 1 single day, accounting for all types of drinks altogether? 1 drink corresponding to 1 small bottle of beer (3 dL), or 1 glass of wine (1-2 dL), or 1 small glass of liquor or 1 peg spirit (0.25 dL), or 1 bottle homebrew (5 dL).	Pandan sa dernyen 12 mwan, ki pli gran kantite drink lalkol ki ou'n bwar dan zis 1 zournen enkli tou kalite lalkol? 1 'drink' (younit) lalkol koresponn a 1 pti boutey labyer (3 dL), ou 1 ver diven (1-2 dL), ou 1 pti ver liker ou 1 peg spirit (0.25 dL), ouswa 1 boutey homebrew (5 dL).	1: 1 drink 2: 2-3 drinks 3: 4-5 drinks 4: 6-9 drinks 5:10-20 drinks 6: more than 20 drinks	1: 1 drink 2: 2-3 drink 3: 4-5 drink 4: 6-9 drink 5:10-20 drink 6: plis ki 20 drink
92	oh	**drink5d**	[Drinker] In a typical month (30 days), on how many days do you drink more than 5 (men) /4 (women) standard drinks per day, on average? 1 drink corresponding to 1 small bottle of beer (3 dL), or 1 glass of wine (1-2 dL), or 1 small glass of liquor or 1 peg spirit (0.25 dL), or 1 bottle homebrew (5 dL).	Dan en mwan (30 zour), konbyen zour ki ou bwar plis ki 5 'drink' (si ou en zonm) ou plis ki 4 'drink' (si ou en fanm) labwason standar ('younit', 'drink'), an mwayenn? 1 'drink' (younit) lalkol koresponn a 1 pti boutey labyer (3 dL), ou 1 ver diven (1-2 dL), ou 1 pti ver liker ou 1 peg spirit (0.25 dL), ouswa 1 boutey homebrew (5 dL).	0: 0 day 1: 1 day 2: 2 to 3 days 3: 4 to 5 days 4: 6 to 10 days 5: more than 10 days	0: 0 zour 1: 1 zour 2: ant 2 a 3 zour 3: ant 4 a 5 zour 4:ant 6 a 10 zour 5: plis ki 10 zour
93	oh	**beerw**	[Drinker] *Now, think of your alcohol consumption in a whole week, including weekdays and weekends.* How many bottles/cans of light beers such as Seybrew or Heineken, but not Guinness or Gold Seal, do you drink in 1 week, on average? (consider amount in equivalents beer bottle/can 3 dL (e.g. Seybrew). 1 big can or bottle 0.5-0.6 L (5-6 dL0 beer is equivalent to 2 drinks	*Mazin enpe lo kantite lalkol ki ou kosonmen dan 1 semenn antye ki ve dir zour lasemenn enkli weekend.* Dan 1 semenn, apepre konbyen sopin/kann labyer parey Seybrew ouswa Heineken ou bwar an mwayenn? (me pa enkli labyer for tel ki Guinness ouswa Gold Seal ki nou ou demann kestyon apre)? (Evalye par ekivalan bann sopin/kann labyer 3 dL (e.g. Seybrew). 1 gro kann ou gro sopin 0.5-0.6 L (5-6 dL) labyer i ekivalan avek 2 drink.	0: 0 (beer bottle/can) 1: 1 to 2 2: 3 to 7 (e.g: 1 bottle per day) 3: ant 8 to 15 4: more than 15	0: 0 (sopin/kann labyer) 1: ant 1 a 2 2: ant 3 a 7 (par egzanp 1 pti sopin sak zour) 3: ant 8 a 15 4: plis ki 15
94	oh	**guinnessw**	[Drinker] How many bottles of beer with a higher alcohol content, such as Guinness, Gold Seal or Atlas) do you drink in 1 week, on average? (OH: 8-15%)	Dan 1 semenn, konbyen sopin labyer ki annan en O pousantaz lalkol, parey Guiness, Gold Seal ouswa Atlas ki ou bwar antou, an mwayenn? (pousantaz lalkol: 8-15%)	0: 0 (beer bottle/can) 1: 1 to 2 2: 3 to 7 (e.g: 1 per day) 3: 8 to 15 4: more than 15	0: 0 (sopin/kann labyer) 1: ant 1 a 2 2: ant 3 a 7 (par egzanp 1 sak zour) 3: ant 8 a 15 4: plis ki 15
95	oh	**winew**	[Drinker] How many glasses of wine (1-2 dl) do you drink in 1 week, on average? 1 bottle of wine (0.75 L) corresponding to 4 glasses of wine	Dan 1 semenn, konbyen ver diven (1-2 dL) ou bwar antou, an mwayenn? 1 boutey diven (0.75 L) koresponn a 4 ver diven.	0: 0 (glass of wine) 1: 1 to 2 2: 3 to 7 (e.g: 1 per day) 3: 8 to 15 4: more than 15	0: 0 (ver diven) 1: ant 1 a 2 2: ant 3 a 7 (par egzanp 1 sak zour) 3: ant 8 a 15 4: plis ki 15

96	oh	**spiritw**	[Ever drinker] Not accounting for mixed drinks such as Breeze, Vandswet or liquor such as Martini, how many pegs(0.25 dl) of spirit (whisky, Takamaka, rhum, vodka, Paradise, Tropical, Moutia) do you drink in 1 week, on average? 1 peg spirit = 0.25 dL. 1 big bottle of spirit (0.75 L) corresponding to 28 peg and 1 small botte of spirit 2.5 dL corresponding to 6 peg	Dan 1 semenn ki kantite 'peg' spirit ('lalkol for' tel ki whisky, Takamaka Rum, Vodka, paradsie, Tropical, Moutya) ou bwar an mwayenn? Me pa enkli alcopops parey Breezer, Smirnoff Ice, etc, ouswa liker parey Martini ki nou pou demann kestyon apre. 1 peg spirit = 0.25 dL. sa i fer ki 1 gro boutey spirit (0.75 L) koresponn a 28 peg e 1 pti boutey spirit 2.5 dL i koresponn a 6 peg	0: 0 (peg spirit) 1: 1 to 2 2: 3 to 7 (e.g: 1 per day) 3: 8 to 15 4: more than 15	0: 0 (peg spirit) 1: ant 1 a 2 2: ant 3 a 7 (par egzanp 1 sak zour) 3: ant 8 a 15 4: plis ki 15
97	oh	**portow**	[Drinker] How many small glasses of liquor such as Irish coffee, Amarula, Martini, Porto, etc, do you drink in 1 week on average (OH: 15-20%)	Dan 1 semenn konbyen pti ver liker parey Irish Cream, Amarula, Martini, Porto, etc ou bwar an mwayenn?	0: 0 (glasses of liquor) 1: 1 to 2 2: 3 to 7 (e.g: 1 per day) 3: 8 to 15 4: more than 15	0: 0 (ver liker) 1: ant 1 a 2 2: ant 3 a 7 (par egzanp 1 sak zour) 3: ant 8 a 15 4: plis ki 15
98	oh	**alcopopw**	[Drinker] How many bottle/cans (~3 dl) of alcopops/mixed/flavored alcohol drinks such as Smirnoff Ice, Bacardi Breezer, etc. do you drink in 1 week, on average? (OH: 5-10%)	Dan 1 semenn Konbyen pti sopin/kann (3dl) of alcopops/ flavored/ labwason alkolize 'flavored' (ki annan disik avek, dou) ou bwar, an mwayenn (parey Smirnoff Ice, Bacardi Breezer etc)?	0: 0 (bottle/can alcopops) 1: 1 to 2 2: 3 to 7 (e.g: 1 per day) 3: 8 to 15 4: more than 15	0: 0 (sopin/kann alcopos) 1: ant 1 a 2 2: ant 3 a 7 (par egzanp 1 sak zour) 3: ant 8 a 15 4: plis ki 15
99	oh	**homebrew**	[Drinker] Do you drink homebrews such as baka, kalou or lapire at times?	Eski ou bwar baka, kalou ouswa lapire par ler?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
100	oh	**bakaw**	[Drinker] How many bottles (0.5l) of homebrew (baka, lapire, kalou) do you drink in 1 week, on average? (assess in terms of bottles of 0.5 l)	Dan 1 semenn, konbyen boutey baka, lapire ouswa kalou ou bwar an mwayenn? Evalye par ekivalan (younit) bann boutey 5dL= 0.5L	0: 0 (bottle baka, lapire, ouswa kalou) 1: 1-2 2: 3-10 3: more than 10	0: 0 (boutey baka, lapire, ouswa kalou) 1: 1-2 2: 3-10 3: plis ki 10
101	pa	**paworkvigy**	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate, like carrying of lifting heavy loads, digging or construction, for at least 10 min continuously?	Eski ou travay i enkli ban aktivite fizik entans ki fer ou respir for e batman leker i ogmante (parey letan ou pe anmenn keksoz lour, travay konstriksyon) kontinyelman pou omwen 10 minit?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
102	pa	**paworkvigd**	In a typical week, on how many days do you do vigorous-intensity activity as part of doing your usual work?)	Konbyen zour dan 1 semenn ou fer bann travay fizik entans ki form par dan ou travay?	1: 1 day 2: 2 days 3: 3 days 4: 4 days 5: 5 days 6: 6 days 7: 7 days	1: 1 zour 2: 2 zour 3: 3 zour 4: 4 zour 5: 5 zour 6: 6 zour 7: 7 zour
103	pa	**paworkvigm**	How much time do you spend doing vigorous-intensity activity as part of doing your work on a typical day?	Dan 1 sa bann zour, konbyen letan ou pran pou fer bann aktivite fizik entans ki form par dan ou travay?	1: between 10 to 30 minutes 2: between 30 to 60 minutes 3: between 60 to 120 minutes 4: more than 120 minutes (more than 2 hours)	1: ant 10 a 30 minit 2: ant 30 a 60 minit 3: ant 60 a 120 minit 4: plis ki 120 minit (plis ki 2 ertan)
104	pa	**paworkmody**	Does your work (at your working place, at home, etc) involve moderate-intensity activity, that causes small increases in breathing or heart rate, such as brisk walking, lifting light weights, gardening, etc), for at least 10 min continuously?	Eski ou travay (dan landrwa travay, dan lakour, etc) enkli bann aktivite fizik modere, ki ogmant ou respirasyon ouswa batman ou leker (parey marse, lev keksoz lour, zardinaz, etc) kontinyelman pou omwen 10 minit?	1: yes: no (→ X)	1: wi 2: non (→ X)

105	pa	**paworkmodd**	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Konbyen zour dan 1 semenn ki ou fer bann aktivite fizik modere konman parti ou travay?	1: 1 day 2: 2 days 3: 3 days 4: 4 days 5: 5 days 6: 6 days 7: 7 days	1: 1 zour 2: 2 zour 3: 3 zour 4: 4 zour 5: 5 zour 6: 6 zour 7: 7 zour
106	pa	**paworkmodm**	How much time do you spend doing moderate-intensity activities at work on a typical day?	Dan 1 sa bann zour,konbyen letan ou pran pou fer bann aktivite fizik modere konman en parti ou travay?	1: between 10 to 30 minutes 2: between 30 to 60 minutes 3: between 60 to 120 minutes 4: more than 120 minutes (more than 2 hours)	1: ant 10 a 30 minit 2: ant 30 a 60 minit 3: ant 60 a 120 minit 4: plis ki 120 minit (plis ki 2 ertan)
107	pa	**pawalky**	Do you walk (or use a bicycle) for at least 10 min continuously to get to and from such places?	Eski ou marse (ouswa servi bisiklet) pou omwen 10 minit kontinyelman pou sorti dan en landrwa pou al kot en lot?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
108	pa	**pawalkd**	In a typical week, on how many days do you walk continuously for at least 10 min to get to and from places?	Konbyen zour dan en semenn ou marse pou omwen 10 minit kontinyelman pou sorti dan en landrwa pou al kot en lot?	1: 1 day 2: 2 days 3: 3 days 4: 4 days 5: 5 days 6: 6 days 7: 7 days	1: 1 zour 2: 2 zour 3: 3 zour 4: 4 zour 5: 5 zour 6: 6 zour 7: 7 zour
109	pa	**pawalkm**	How much time do you spend walking to/from places on a typical day?	Dan 1 sa bann zour, kantite letan marse i pran ou pou sorti dan en landrwa pou al kot en lot?	1: between 10 to 30 minutes 2: between 30 to 60 minutes 3: between 60 to 120 minutes 4: more than 120 minutes (more than 2 hours)	1: ant 10 a 30 minit 2: ant 30 a 60 minit 3: ant 60 a 120 minit 4: plis ki 120 minit (plis ki 2 ertan)
110	pa	**paleisvigy**	Do you do any vigorous-intensity sports, fitness or recreational ("leisure") activities that cause large increase in breathing or heart rate like running, football, weightlifting, cycling, swimming, cycling, etc, for at least 10 min continuously?	Eski ou fer okenn sport, legzersis ouswa aktivite rekreasyonel entans ki ogmant ou respirasyon ou batman leker parey zwe football, lev pwa, mont bisiklet, taye (running) etc, kontinyelman pou omwen 10 minit?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
111	pa	**paleisvigd**	In a typical week, on how many days do you do vigorous-intensity sports, fitness or other recreational activities?	Konbyen zour dan 1 semenn ki ou fer aktivite entans parey sport, legzersis ouswa lezot aktivite rekreasyonel, an mwayenn?	1: 1 day 2: 2 days 3: 3 days 4: 4 days 5: 5 days 6: 6 days 7: 7 days	1: 1 zour 2: 2 zour 3: 3 zour 4: 4 zour 5: 5 zour 6: 6 zour 7: 7 zour
112	pa	**paleisvigm**	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Dan 1 sa bann zour, kantite letan ou pran pour fer aktivite fizik entans parey sport, legzersis ouswa lezot aktivite rekreasyonel, an mwayenn?	1: between 10 to 30 minutes 2: between 30 to 60 minutes 3: between 60 to 120 minutes 4: more than 120 minutes (more than 2 hours)	1: ant 10 a 30 minit 2: ant 30 a 60 minit 3: ant 60 a 120 minit 4: plis ki 120 minit (plis ki 2 ertan)
113	pa	**paleismody**	Do you do any moderate-intensity sports, fitness or recreational activities that cause a small increase in breathing or heart rate such as brisk walking, light swimming, easy cycling, etc, for at least 10 min continuously?	Eski ou fer okenn sport, legzersis ouswa aktivite fizik rekreasyonel ki lentansite i modere ek ki ogmant ou respirasyon en pti git ouswa batman leker parey marse, naze, mont bisiklet kontinyelman pou omwen 10 minit?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
114	pa	**paleismodd**	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Konbyen zour dan 1 semenn ki ou fer aktivite lfizik entansite modere parey sport, legzersis ouswa aktivite rekreasyonel, an mwayenn?	1: 1 day 2: 2 days 3: 3 days 4: 4 days 5: 5 days 6: 6 days 7: 7 days	1: 1 zour 2: 2 zour 3: 3 zour 4: 4 zour 5: 5 zour 6: 6 zour 7: 7 zour

115	pa	**paleismodm**	How much time do you spend doing moderate-intensity sports, fitness or recreational activities on a typical day?	Dan 1 sa bann zour, kantite letan ou pran pou fer aktivite fizik modere parey sport, legzersis ouswa aktivite rekreasyonel, an mwayenn?	1: between 10 to 30 minutes 2: between 30 to 60 minutes 3: between 60 to 120 minutes 4: more than 120 minutes (more than 2 hours)	1: ant 10 a 30 minit 2: ant 30 a 60 minit 3: ant 60 a 120 minit 4: plis ki 120 minit (plis ki 2 ertan)
116	pa	**tvworkdayh**	In a typical weekday, how many hours do you spend watching TV, a tablet, your phone, or using internet, per day?	Dan 1 zour lasemenn (pa kont weekend), konbyen letan ou get TV, servi tablet, telefonn ouswa internet?	0: I don't watch anything 1: between 1 to 60 minutes 2: between 60 to 120 minutes 3: between 2 hours to 3 hours 4: more than 3 hours	0: mon pa get ditou 1: ant 1 a 60 minit 2: ant 60 a 120 minit 3: ant 2 ertan a 3 ertan 4: plis kit 3 ertan
117	pa	**tvweekendh**	In a typical weekend, how many hours do you spend watching TV, your phone, a tablet, or using internet, per day?	Dan 1 zour weekend, konbyen letan ou get TV, servi telefonn ouswa internet?	0: I don't watch anything 1: between 1 to 30 minutes 2: between 30 to 60 minutes 3: between 60 to 120 minutes 4: between 2 hours to 3 hours 5: more than 3 hours	0: mon pa get ditou 1: ant 1 a 30 minit 2: ant 30 a 60 minit 3: ant 60 a 120 minit 4: ant 2 ertan a 3 ertan 5: plis kit 3 ertan
118	pa	**bushomemin**	How long does it take to walk between your house and the closest bus stop (in minutes, one way)?	Konbyen minit i pran ou pou sorti kot ou lakour pou al kot bus stop pli pre avek ou lakaz?	0: less than 5 minutes 1: between 5 to 10 minutes 2: between 10 to 20 minutes 3: between 20 to 30 minutes 4: more than 30 minutes 5: I live on La Digue	1: mwens ki 5 minit 2: ant 5 a 10 minit 3: ant 10 a 20 minit 4: ant 20 a 30 minit 5: plis ki 30 minit 6: mon reste La Digue
119	pa	**workbus**	On average, how often do you take a bus to go to work, shop, church, etc?	An mwayenn, konbyen fwa ki ou pran bis pou al travay, laboutik, legliz etc?	1: never or rarely 2: at least once per month but not every week 3: 1 or more times per week 4: everyday or most of the time	1: zanmen ou tre rar 2: omwen 1 fwa par mwan me pa sak semenn 3: 1 ou detrwa fwa par semenn 4: toulezour ou preski
120	pa	**carown**	Does anyone in your household have a car or a pickup?	Eski i annan okenn dimoun kot lakour ki annan loto ouswa pickup, jeep ou pti bis?	1: no; 2: yes, in the family; 3: yes, it is my own.	1: non; 2: wi, enn manm mon fanmir dan lakour; 3: wi, pou mwan menm.
121	pa	**carwork**	How often do you go to work with a private vehicle (yours or another one)?	An mwayenn, konbyen fwa ki ou al travay dan en transpor prive (pou ou ouswa en lot dimoun)?	0: never or rarely 1: at least once per month but not every week 2: 1 or more times per week 3: everyday or most of the time 4: I don't work	0: zanmen ou tre rar 1: omwen 1 fwa par mwan me pa sak semenn 2: 1 ou detrwa fwa par semenn 3: toulezour ou preski 4: mon pa travay
122	bp	**bpheard**	Have you ever heard of high blood pressure or hypertension ("tansyon o")?	Annou koz lo tansyon O (high blood pressure) Eski ou'n deza tann koz lo tansyon eleve ouswa tansyon o?	1: yes 0: no	1: wi 0: non
123	bp	**bpknownsys**	Can you tell 1 or 2 values of your own blood pressure ('tansyon'), even approximate?	Eski ou konnen 1 ouswa 2 valer (sif) ou tansyon?	1: yes 0: no	1: wi 0: non
124	bp	**bpnormsys**	Can you tell me a figure, even approximate, for the upper limit for normal blood pressure ('tansyon normal')?	Eski ou konnen 1 ouswa 2 valer pou sif anler tasnton normal?	1: yes 0: no	1: wi 0: non
125	bp	**bpfeels**	In general, do you think that someone can feel when blood pressure (tansyon') is high?	An zeneral, eski ou krwar en dimoun i santi letan son tansyon i o?	1: yes; 2: no; 3: DNK	1: wi; 2: non; 3: mon pa konnen
126	bp	**bpdurationrx**	In general, for how long people with high blood pressure ('tansyon o') should take pills to reduce their BP?	An zeneral, pou konbyen letan ou krwar dimoun ki lo pilil tansyon i devret pran pilil pou redwir zot tansyon?	1: several days; 2: several months; 3: several years; 4: I don't know	1: plizyer zour 2: plizyer mwan; 3: plizyer lannen; 4: mon pa konnen
127	bp	**bpcheck**	When was the last time you had your blood pressure ('tansyon') checked by a health officer?	Ki dernyen fwa ou tansyon ti ganny teste par en dokter ouswa zofisye lasante?	1: less than 1 year ago; 2: between 1 to 5 years ago; 3: more than 5 years ago 4: I don't know	1: mwens ki 1 an pase; 2: ant 1 a 5 an pase; 3: plis ki 5 an pase 4: mon pa konnen

128	bp	**bpdevice**	Do you, or a member of your household, have an electronic device to measure your own blood pressure ('tansyon') at home?	Eski ou ouswa okenn manm ou fanmir dan lakour i annan en masin tansyon elektronik?	1: yes; 2: no; 3: DNK	1: wi; 2: non; 3: mon pa konnen
129	bp	**bptold**	Were you ever told by a doctor or another health professional that you had high blood pressure ("tansyon o")?	Eski ou'n deza ganny dir avek en dokter ki ou tansyon ti o ('high BP on several visits')?	1: yes 2: no (→ X)	1: wi 2: non (→ X)
130	bp	**bpyr**	How many years ago approximately, were you told that you had high blood pressure?	Konbyen lannen pase apepre ou ti ganny dir ki ou tansyon o (high blood pressure)?	1: less than 1 year ago; 2: between 1 to 5 years ago; 3: between 5 to 10 years ago; 4: more than 10 years ago 5: I don't know/ don't remember	1: mwens ki 1 an pase; 2: ant 1 a 5 an pase; 3: ant 5 a 10 an pase 4: plis ki 10 an pase 5: mon pa konnen/ pa mazinen
131	bp	**bprx**	Do you currently take or supposed a medication (pills) for high blood pressure ('tansyon o')?	Eski ou pe pran okenn pilil pou tansyon o?	1: yes 0: no (→ X)	1: wi 0: non (→ X)
132	bp	**bpdrsame**	When you go to a dr to check your blood pressure ('tansyon'), do you see the same dr?	Letan ou al kot dokter pou tyek ou tansyon, eski ou vwar menm dokter toultan?	1: rarely the same dr; 2: often the same dr; 3: always the same dr;	1: rarman menm dokter; 2: souvan menm dokter; 3: toultan menm dokter
133	bp	**bpprescrip**	Who prescribed your current medication for high blood pressure?	Lekel ki'n preskrir sa latizann (pilil) ki ou pe servi pou tansyon o (high blood pressure)?	1: doctor in the health clinics/government hospital; 2: private doctor; 3: doctor abroad	1: dokter dan sant lasante/lopital gouvernman 2: dokter prive; 3: dokter a letranze
134	bp	**bprxmiss**	It is difficult to not forget to take pills every day. On average, how frequently do you miss (voluntarily of involuntarily) your medication for high BP?	I difisil pou pran pilil toulezour. Konbyen fwa ki ou bliye (volonter ou envolonter) pran ou latizann pou tansyon o, an mwayenn ?	1: i forget very rarely; 2: i forget on 1-2 days in a week; 3: i forget on 3 or more days in a week	1: mon rarman bliye; 2: mon bliye pou 1-2 zour dan en semenn; 3: mon bliye pou 3 ou plis zour dan en semenn 4: mon pa oule pran latizann pou tansyon o
135	bp	**bprxgovpriv**	Where do you most frequently go to for your high blood pressure treatment (pills), government health clinics or private doctor/clinic?	Pour tretman (pilil) pour ou tansyon o (high blood pressure), eski ou al pli souvan kot sant lasante gouvernman ou kot dokter/klinik prive?	1: government health clinic 2: private doctor/clinic 3: both	1: sant lasante gouvernman 2: dokter/klinik prive 3: kot tou le de
136	diab	**diabheard**	Have you ever heard of diabetes?	Annou koz lo dyabet. Eski ou'n deza tann koz lo dyabet?	1: yes 0: no	1: wi 0: non
137	diab	**diabcheck**	When did you last have your blood sugar checked?	Ki dernyen fwa ou ti tyek nivo disik dan ou disan (nivo dyabet)?	1: less than 1 year ago; 2: between 1 to 5 years ago; 3: more than 5 years ago 4: I don't know/don't remember	1: mwens ki 1 an pase; 2: ant 1 a 5 an pase; 3: plis ki 5 an pase 4: mon pa konnen/pa mazinen
138	diab	**diabhx**	Have you ever been told by a doctor or a health worker that you had high blood sugar or diabetes?	Eski ou'n deza ganny dir avek en dokter/zofisye lasante ki nivo disik dan ou disan i o (dyabet)?	1: yes 0: no (→ X)	1: wi 0: non (→ X)
139	diab	**diabyr**	How many years ago were you first told that you had diabetes?	Konbyen lannen pase ou ti ganny dir premyer fwa ki ou'n ganny dyabet?	1: less than 1 year ago; 2: between 1 to 5 years ago; 3: more than 5 years ago 4: I don't know/don't remember	1: mwens ki 1 an pase; 2: ant 1 a 5 an pase; 3: plis ki 5 an pase 4: mon pa konnen/pa mazinen
140	diab	**diabrx**	Do you currently take tablets for diabetes?	Eski ou pe pran pilil ouswa insulin pou dyabet?	1: yes 0: no	1: wi 0: non
141	diab	**diabrxpiilins**	Do you currently take insulin for diabetes?	Ki kalite tretman ou pe pran pour dyabet?	1: pills (like metformin or other pills for diabetes); 2:insulin (injection); 3: pills and insulin (both);	1: pilil (parey metformin ou lezot pilil pour dyabet); 2: insulin (pikir); 3: pilil ek insulin (toulede);

142	diab	**diabmissrx**	[if Rx] One often forgets about taking pills. On average, how frequently do you miss your medication for diabetes in a typical week?	I fasil pou bliye pran pilil toulezour, konbyen fwa dan 1 semenn ki ou bliye (volonter ou envolonter) pran ou latizann pou dyabet, an mwayenn ?	1: i forget very rarely; 2: i forget on 1-2 days in a week; 3: i forget on 3 or more days in a week; 4: i don't take the pills	1: mon rarman bliye; 2: mon bliye pou 1-2 zour dan en semenn; 3: mon bliye pou 3 ou plis zour dan en semenn; 4: mon pa pran latizann
143	diab	**diabrxgovpriv**	Where do you most frequently go to for your diabetes treatment (pills or insulin), government health clinics or private doctor/clinic?	Pour tretman pour ou dyabet (pilil ouswa insulin), eski ou al pli souvan kot sant lasante gouvernman ou kot dokter/klinik prive?	1: government health clinic 2: private doctor/clinic 3: both	1: sant lasante gouvernman 2: dokter/klinik prive 3: kot tou le de
144	diab	**diabdevice**	Do you have a device to measure blood glucose yourself on the fingers at home?	Eski ou annan masin ki mezir nivo disik dan disan dan lakour?	1: yes 0: no	1: wi 0: non
145	chol	**cholheard**	Have you ever heard of blood cholesterol or "lagres dan disan"?	Section Header: Annou koz lo kolesterol (lagres dan disan) Eski ou'n deza tann nonm kolesterol ouswa lagres dan disan?	1: yes 2: no	1: wi 2: non
146	chol	**cholhx**	Have you ever been told by a doctor or a health worker that you had high blood cholesterol?	Eski ou'n deza ganny dir avek en dokter/zofisye lasante ki nivo kolesterol dan ou disan (lagres dan disan) i o?	1: yes 0: no	1: wi 0: non
147	chol	**cholyr**	How many years ago were you first told that you had high blood cholesterol?	Konbyen lannen pase ou ti ganny dir ki nivo kolesterol dan ou disan l o?	1: less than 12 months ago; 2: between 1 to 5 years ago; 3: between 5 to 10 years ago 4: more than 10 years ago 5: I don't know/don't remember	1: mwens ki 12 mwan pase; 2: ant 1 a 5 an pase; 3: ant 5 a 10 an pase 4: plis ki 10 an pase 5: mon pa konnen/pa mazinen
148	chol	**cholrx**	Do you currently take any medication to reduce your blood cholesterol (statin)?	Eski ou pe pran okenn tretman (pilil) pou redwir ou nivo kolesterol dan ou disan ('statin' parey atorvastatin)?	1: yes 0: no 3: I don't know	1: wi 0: non 3: mon pa konnen
149	chol	**cholrxmiss**	One often forgets about taking pills. On average, how frequently do you miss your medication for cholesterol in a typical week?	I fasil pou bliye pran pilil toulezour, konbyen fwa dan 1 semenn ki ou bliye (volonter ou envolonter) pran ou latizann pou kolesterol/lagres dan disan, an mwayenn ?	1: i forget very rarely; 2: i forget on 1-2 days in a week; 3: i forget on 3 or more days in a week; 4: i don't take the pills for cholesterol	1: mon rarman bliye; 2: mon bliye pou 1-2 zour dan en semenn; 3: mon bliye pou 3 ou plis zour dan en semenn; 4: mon pa oule pran latizann pour kolesterol
150	weight	**weidescribe**	*Let's talk now about your body weight.* How would you describe your weight?	*Annou koz en kou lo lapeze (body weight).* Ki manyer ou pou dekrir ou lapeze?	1: much too low ; 2: a little too low 3: about right ('byen', 'bon'); 4: a little too high; 5: largely too high	1: vreman ba; 2: enpe tro ba; 3: ase bon ('byen', 'bon'); 4: enpe tro o; 5: vreman o
151	cvd	**attitudedietpa**	What best describes your attitude and actions regarding taking regular PA or having a balanced diet during the past 6 months?	Kwa ki pli byen dekrir ou latitid e aksyon anver fer aktivite fizik regilyerman e manz en ladyet balanse pour ou lasante pandan sa dernyen 12 mwan?	1: i didn't think much of it; 2: i think of it but i didn't take action; 3: i took action but i did not sustain it; 4: i took action and i still continue 5: I made a big effort and I still continue	1: mon pa'n mazin bokou lo la; 2: mon'n mazin lo la me mon pa'n fer okenn zefor; 3: mon'n fer en zefor me mon pa'n soutenir li; 4: mon'n fer en pe zefor e mon ankor pe kontinyen 5: mon'n fer en kantite zefor e mon ankor pe kontinyen
152	gyne	**pregnant**	Are you pregnant now, as far as you know?	Eski ou ansent aktyelman, dapre ou konesans?	1: yes 0: no	1: wi 0: non
153	health	**healthstatus**	*Let's turn to your health in general.* Would you say your health is?	Annou koz lo ou lasante an zeneral. Ki manyer ou vwar ou lasante an zeneral?	1: poor; 2: fair ('not too good', 'pa tro bon'); 3: good; 4: very good;	1: pa bon ditou; 2: pa tro bon; 3: bon; 4: tre bon;

154	health	**hlimitpamod**	Does your health limit you in physical activities of moderate intensity that you might do in a typical day, such as carrying a grocery bag, sweeping at home, or moving a light piece of furniture? If so, how much?	Eski ou annan okenn problenm lasante ki anpes ou fer bann aktivite fizik modere ki ou annan labitid fer pandan en lazournen, parey anmenn sak komisyon, balye lakaz oubyen bouz meb (e.g. latab)? Si wi ,ki kantite ?	1: no, i am not limited at all 2: yes, i am limited a little; 3: yes, i am limited a lot (e.g:diffculty ti breathe, disability, pain);	1: non, mon napa limitasyon; 2: wi, mon annan en pe limitasyon; 3: wi, mon annan en kantite limitasyon (e.g. mank respirasyon, dezabibilte, douler)
155	health	**hlimstair**	Does your health limit you in going up 1 floor, like when you came this morning to our office?	Eski ou annan okenn problenm lasante ki anpes ou mont peron 1 letaz, parey ler ou'n ariv isi kot nou biro/losis ozordi?	1: no, i am not limited and can climb the stair without difficulty 2: yes, i am limited a little (e.g. i must go slowly); 3: yes, i am limited a lot (e.g. breath shortness, diasability, pain) and i have to make one or more pauses;	1:non, mon napa okenn problenm e mon kapab mont peron san difikilte; 2: wi, mon ganny enpe problenm (e.g. mon bezwen al dousman); 3: wi, mon ganny en kantite problenm (e.g. mank respirasyon, dezabilite, douler) e mon bezwen arete pou enn ou plis ki en fwa
156	health	**hlimitpain**	During the past 4 weeks, did you have any physical pain that interfered with your activities at work or at home?	Eski ou annan okenn douler fiizk ki enterfer avek ou bann aktivite toulezour dan lakour e dan travay?	1: no, not i am not limited because of pain 2: yes, i am limited a little because of pain; 3: yes, i am limited a lot because of pain;	1: non, mon napa douler fizik ki anpes mwan fer mon bann aktivite 2: wi, mon annan douler fizik i'n anpes mwan enpe; 3: wi, mon annan douler fizik i'n anpes mwan bokou;
157	health	**happetite**	How was your appetite over the past 12 months?	Ki manyer ou lapeti ti ete pandan sa bann dernyen 12 mwan?	1: my appetite was as usual; 2: diminished; 3: increased	1: mon lapeti i'n parey labitid; 2: mon lapeti i'n diminyen; 3: mon lapeti i'n ogmante
158	health	**hweichange**	Have you lost or gained weight involuntary during the last 12 months?	Pandan sa dernyen 12 mwan, eski ou'n perdi ouswa ganny lapeze anplis envolonterman?	1: yes, i lost weight; 2: yes, i gained weight; 3: no, my weight did not change much	1: mon lapeze pa'n sanze bokou 2: mon'n perdi lapeze; 3: mon'n met lapeze anplis;
159	care	**visitdrgov**	Let's talk about access to health services. During the past 12 months, approximately how many times did you go to a government health facility (health centres, SOPD or hospital) for any medical or surgical problem?	Annou koz lo bann servis swen lasante ki ou servi. Pandan sa dernyen 12 mwan, apepre konbyen fwa ou'n al kot en sant lasante gouvernman (sant lasante, SOPD, ouswa lopital) pour okenn problenm medikal ou sirizikal?	0: 0 times; 1: 1-2 times 2: 3-5 times 3: 6-10 times 4: more than 10 times	0: 0 fwa; 1: 1-2 fwa 2: 3-5 fwa 3: 6-10 fwa 4: plis ki 10 fwa
160	care	**visitabrpriv**	During the past 12 months, approximately how many times did you go to a private doctor/clinic for any medical or surgical problem?	Pandan sa dernyen 12 mwan, apepre konbyen fwa ou'n al kot en dokter/klinik prive pou okenn problenm medikal ou sirizikal?	0: 0 time; 1: 1-2 times 2: 3-5 times 3: 6-10 times 4: more than 10 times	0: 0 fwa; 1: 1-2 fwa 2: 3-5 fwa 3: 6-10 fwa 4: plis ki 10 fwa
161	care	**visitdrabroad**	During the past 5 years, approximately how many times did you go abroad for any medical consultation or treatment paid by the government?	Pandan sa dernyen 5 an, apepre konbyen fwa ou'n deza al a letranze pou okenn konsiltasyon medikal oubyen tretman lo ou menm ouswa peye par gouvernman?	0: 0 time; 1: 1 times 2: 2-3 times 3: more than 3 times	0: 0 fwa; 1: 1 fwa 2: 2-3 fwa 3: plis ki 3 fwa
162	ses	**abroadpriv**	Not accounting for work or medical purposes, how often have you travelled abroad for holiday or lesiure during the past 5 years?	Pandan sa dernyen 5 an, konbyen fwa ki ou'n vwayaz aletranze selman pou vakans ouswa lwazir (me pa kont vwayaz pour lasante ou pou travay selman)?	0: 0 time; 1: 1 times 2: 2-3 times 3: more than 3 times	0: 0 fwa; 1: 1 fwa 2: 2-3 fwa 3: plis ki 3 fwa
163	cvd	**mi**	*Let's talk about cardiovascular diseases.* Have you ever suffered from a heart attack ("latak leker")? (myocardial infarction, heart attack)	Annou koz lo maladi kardyovaskiler. Eski ou'n deza ganny latak leker? (myocardial infarction, heart attack)	1: yes 0: no	1: wi 0: non
164	cvd	**stroke**	Have you ever suffered from a stroke ("latak laservel")?	Eski ou'n deza ganny latak laservel (stroke)?	1: yes 0: no	1: wi 0: non

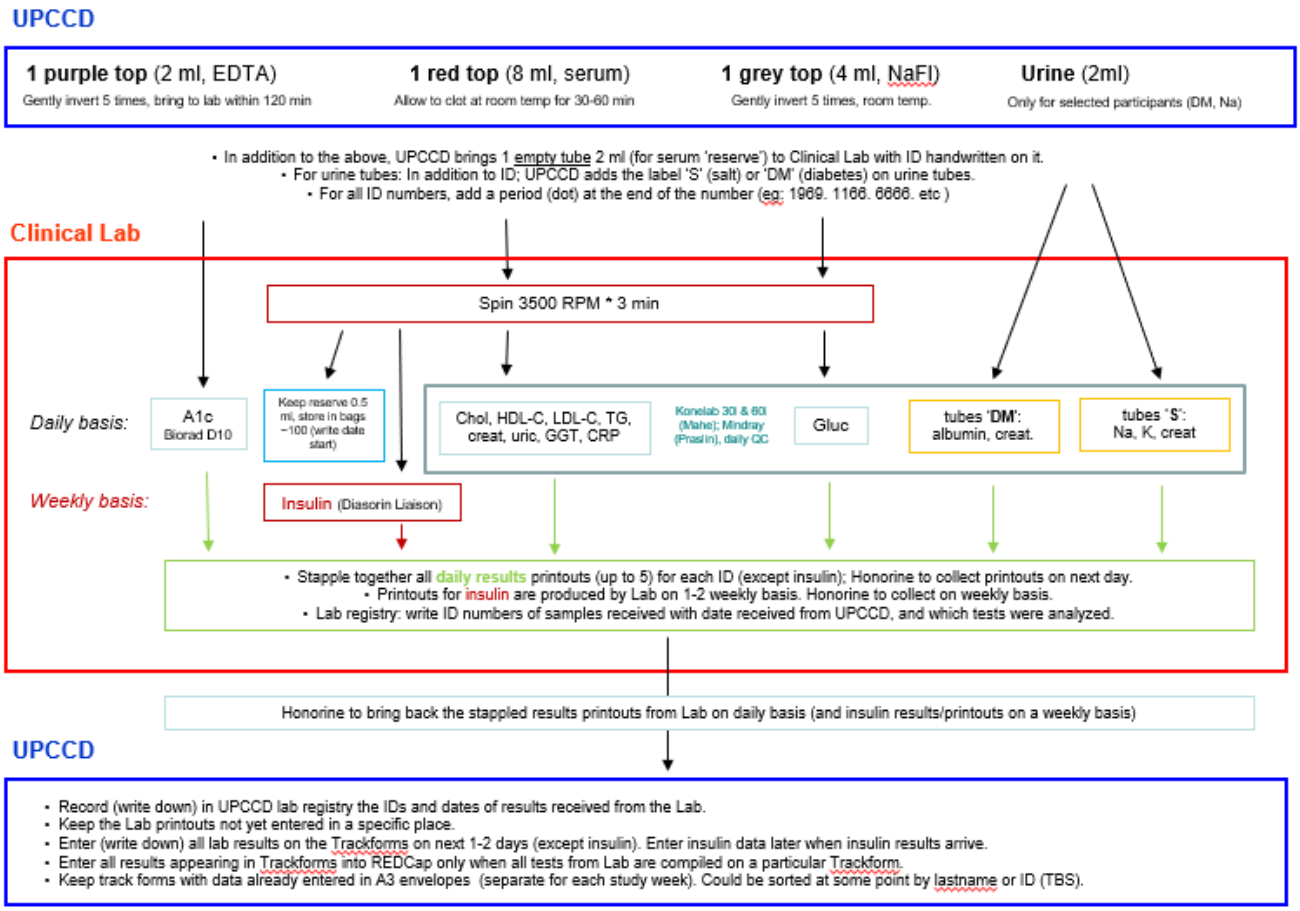
165	cvd	**claudic**	(intermittent claudication) Do you experience an aching or cramping pain in the calves, thighs, or legs (possibly on 1 side only) when walking or exercising, which typically appears after walking a certain same distance, and would recede (disappear) after a few minutes if you rest, but can come back if you walk a similar distance again?	Letan ou marse ouswa fer legzersis, eski ou eksperyans okenn douler ouswa ganny lavenn redi dan ou kaf, lazanm ouswa lipye (i kapab zis dan en kote). Ou kapab santi sa de dekonfor apre ki ou'n mars en serten zistans e i pou arete apre detrwa minit ki ou'n poze. Me i kapab retournen si ou rekonmans marse ouswa fer legzersis ankor.	1: no; 2: yes, at times; 3: yes, often (more than once per month)	0: non; 1: wi, parfwa; 2: wi, souvan (plis ki 1 fwa par mwan)
166	cvd	**angina**	(angina pectoris) Do you experience an aching or cramping pain in the chest when you walk or exercise, which possibly irradiates in the left arm, the back or the neck, and would recede (disappear) after a few minutes if you rest (or if you take triglycerine/trinitrate pills), but can come back when walking or exercising gain?	Letan ou marse ouswa fer legzersis, eski ou eksperyans okenn douler ouswa lakranp kot ou leker? Ou kapab santi sa dekonfor dan ou lebra kote gos, ledo, ouswa likou, e i pou arete apre detrwa minit ki ou'n poze (ouswa apre ki ou'n pran pilil ki met anba lalang tel ki triglycerine/trinitrate). Me i kapab retournen si ou rekonmans marse ouswa fer legzersis ankor.	1: no; 2: yes, at times; 3: yes, often 4: yes, and i take trinitrine or trigylcerine ('GTN') for this	1: non; 2: wi, parfwa; 3: wi, souvan; (plis ki 1 fwa par mwan) 4: wi, e mon pran trinitrine ou triglycerine ('GTN') pou sa
167	screening	**cahx**	*Let's talk about cancer.* Have you ever had cancer?	Annou koz lo kanser. Eski ou'n deza ganny kanser?	1: yes 0: no	1: wi 0: non
168	screening	**catype**	What type of cancer you had?	Ki kalite kanser ou'n deza gannyen? (trip, tete,lapo, prostat, matris etc)	1: colon, stomach or oesophageal 2: breast 3: cervix 4: prostate 5: another kind 6: several types of cancer 7: I don't remember which type of cancer	1: trip, lestoman, ouswa lesofaz 2: tete 3: kol matris 4: prostat 5: en lot kalite 6: plizyer diferan kanser 7: mon pa mazinen ki kalite kanser
169	screening	**pap**	How many times, approximately, did you have a screening test for cervical abnormalities such as a pap smear in the past 10 years ?	Konbyen fwa apepre ou'n fer en tes pap smear pandan sa dernyen 10 an?	1: never 2: 1 times 3: several times 4: I don't remember	1: zanmen 2: 1 fwa 3: plizyer fwa 4: mon pa mazinen
170	screening	**breastexam**	Have you ever had your breast examined by a health professional (in government or private clinic) do identify any abnormalities?	Eski ou'n deza fer legzaminasyon tete par en zofisye lasante (dan klinik, gouvernman ou prive) pou idantifye okenn abnormalite?	1: never 2: 1 time 3: several times 4: I don't remember	1: zanmen 2: 1 fwa 3: plizyer fwa 4: mon pa mazinen
171	screening	**camammo**	Did you ever do a mammography (xray) or ultrasound (in government or private clinic) to screen for breast cancer?	Eski ou'n deza fer mamogram (tes radyolozi) ouswa ultrasound (dan klinik gouvernman our prive) pou detekte kanser tete?	1: never 2: 1 time 3: several times 4: I don't remember	1: zanmen 2: 1 fwa 3: plizyer fwa 4: mon pa mazinen
172	screening	**cacolonoscopyhx**	Have you ever done a test to look for blood in your stools, or colonoscopy, to screen for colon/intestine cancer?	Eski ou'n deza fer okenn tes pou gete si i annan disan dan lasel ouswa tes pou kler dan trip ek en tib ek kamera (andoskopi/colonoscopy) dan trip pou detekte kanser trip/lentesten?	1: never 2: yes, blood test in feces; 3: yes, colonoscopy or sigmoidoscopy 4: yes, blood test in feces and colonoscopy or sigmoidoscopy 4: I don't remember	0: zanmen 1: wi, tes ki get disan dan lasel 2: wi, 'colonoscopy' ou 'andoskopi' 3: wi, tes ki get disan dan lasel ek 'colonoscopy' ou 'andoskopi 4: mon pa mazinen'
173	screening	**capsahx**	Did you ever undertake a PSA blood test to screen for prostate cancer?	Eski oun deza fer en tes disan ki apel PSA pou detekte kanser prostat?	1: never 2: 1 time 3: several times 4: I don't remember	1: zanmen 2: 1 fwa 3: plizyer fwa 4: mon pa mazinen

174	comm	**heardupccd**	Before you came to this study, had you ever heard of the Unit for Prevention and Control of Cardiovascular Disease (UPCCD) in the Ministry of Health?	Avan ou'n vin partisip dan sa letid, eski ou'n deza tann nonm sa Younit kardyovaskiler (UPCCD) dan Minister Lasante?	1: yes 0: no	1: wi 0: non
175	comm	**progradiotv**	In the past 12 months, can you remember of at least 1 program on cardiovascular disease, tobacco (smoking), blood pressure, diabetes or diet from the ministry of health on Seychelles radio or television?	Eski ou mazin okenn pogranm lo maladi kardyovaskiler, tansyon, fimen, dyabet ou ladyet ki sorti kot Minister Lasante lo radyo ou televizyon Sesel pandan sa dernyen lannen?	1: yes 0: no	1: wi 0: non
176	comm	**proglike**	Do you like watching or listening to locally made programs on different health topics through Seychelles media services (SBC radio/TV, Telesesel, K-Radio, Pure FM)?	Eski ou kontan ekout ouswa regard bann programn lokal lo bann diferan topik lasante lo medya Sesel (SBC, Telesesel, K-Radio, Pure FM)?	2: yes, i am interested a lot; 1: yes, i a little; 0: no, i am not too interested	2: wi, mon enterese en kantite; 1: wi, mon enterese enpe; 0: non, mon pa tro enterese
177	teeth	**teethstate**	Let's talk about teeth How would you describe the **state of your teeth?**	Annou koz lo ledan (teeth) Ki mannyer ou pou dekrir leta ou ledan?	1: very good; 2: good; 3: fair ('ase bon'); 4: poor	1: tre bon 2: bon; 3: ase bon; 4: pa bon
178	teeth	**teetnatural**	How many **natural teeth** do you have now? (not including implant or removable false teeth)	Konbyen ledan natirel ou annan komela? (pa kont 'implant' ou 'fos dan')	1: 20 or more; 2: 10 to 19; 3: 1 to 9; 4: none (0)	1: 20 ou plis; 2: 10 a 19; 3: 1 a 9; 4: napa (0)
179	teeth	**denture**	Do you have any **removable dentures**?	Eski ou met fos dan (dan ki ou kapab mete e anleve)?	1: yes 2: no	1: wi 2: non
180	teeth	**chewdiff**	Do you have difficulties in **chewing** your food because of your teeth?	Eski ou rankontre okenn difikilte pou mas ou manze akoz ou ledan?	1: no; 2: yes, but I can still manage to eat solid foods; 3: yes, but i tend to avoid eating solid foods	1: non; 2: wi, selman mon kapab manz manze solid; 3: wi, selman mon tant pou evite manz manze solid
181	teeth	**teethclean**	How often do you brush your teeth on average?	Konbyen fwa ou bros ou ledan an mwayenn?	1: never or almost never; 2: a few times per week but not every day; 3: once per day; 4: twice per day; 5: three ore more times per day	1: zanmen ou preski zanmen; 2: detrwa fwa par semenn, me pa toulezour; 3: 1 fwa par zour; 4: 2 fwa par zour; 5: 3 fwa par zour ou plis
182	teeth	**teethfluo**	Do you buy or use **toothpaste** that contains **fluoride?**	Eski ou fer sir ou aste ouswa servi dantifris ki annan fluoride ladan?	1: no 2: yes; 3: I don't remember	1: non 2: wi 3: mon pa mazinen
183	psy	**psyconcentrate**	Let's talk about psychological health Over these past months, have you been feeling you were unable to concentrate on what you are doing?	Annou koz lo lasante sikolozik Pandan sa bann dernyen mwan, eski ou'n santi ou pe perdi konsantrasyon dan keksoz ki ou pe fer?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
184	psy	**psyrole**	Over these last months, have you been feeling you were not playing a useful part in things?	Pandan sa bann dernyen mwan, eski ou'n santi ki ou pa ti pe zwe tro gran rol dan bann keksoz?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
185	psy	**psydecision**	Over these last months, have you been feeling you were unable to make decisions about things?	Pandan sa bann dernyen mwan, eski ou'n santi ki ou pa ti pe kapab fer desizyon lo bann keksoz?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
186	psy	**psyunhappy**	Over these last months, have you been feeling unhappy, all things considered?	Pandan sa dernyen semenn ou mwan, eski ou'n pa santi ou zwaye, si ou konsider tou keksoz?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan

187	psy	**psyenjoy**	Over these last months, have you been feeling that you were unable to enjoy your normal day-to-day activities?	Pandan sa bann dernyen mwan, eski ou'n santi ki ou pa ti pe kapab anmiz ou lekor dan ou bann akitivite labitid?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
188	psy	**psyfaceprob**	Over these last months, have you been feeling unable to face up to problems?	Pandan sa bann dernyen mwan, eski ou'n santi ki ou pa ti pe kapab fer fas avek okenn problenm?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
189	psy	**psydepressed**	Over these last months, have you been feeling depressed, all things considered?	Pandan sa bann dernyen mwan, eski ou'n pan santi ou deprese, si ou konsider tou keksoz?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
190	psy	**psysleep**	Over these last months, have you lost sleep over worry?	Pandan sa bann dernyen mwan, eski ou pa'n byen dormi akoz ou ti pe trakase?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
191	psy	**psystrain**	Over these last months, have you been feeling constantly under strain?	Pandan sa bann dernyen mwan, eski ou'n santi ou anba presyon touletan?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
192	psy	**psydifficulty**	Over these last months, have you been feeling you couldn't overcome your difficulties?	Pandan sa bann dernyen mwan, eski ou'n santi ki ou pa ti pe kapab sirmont bann difikilte?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
193	psy	**psyconfid**	Over these last months, have you been feeling you were losing confidence in yourself?	Pandan sa bann dernyen mwan, eski ou'n perdi konfidans dan ou lekor?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
194	psy	**psyworth**	Over these last months, have you been thinking of yourself as a worthless person?	Pandan sa bann dernyen mwan, eski ou'n mazin ou lekor konman en dimoun ki napa valer?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
195	psy	**psymemory**	Compared to years ago, do you have difficulty with your memory? For example, to remember a phone number, an appointment, or something you had panned to do?	Konpare avek bann lannen pase, eski ou annan difikilte pou mazin keksoz. Par egzanp pou mazin en limero telefonn, en apwentman ouswa en keksoz ki ou ti pou fer?	1: never; 2: sometimes; 3: often; 4: always or most of the time	1: zanmen; 2: par ler; 3: souvan; 4: toultan ouswa la pli par ditan
196	sleep	**sleep**	On average, how many hours do you sleep on a normal night?	Apepre, konbyen erdtan ou dormi an mwayenn?	1: less than 6 hours 2: about 6 hours 3: about 7 hours 4: about 8 hours 5: 9 hours or more	1: mwens ki 6 ertan 2: anviron 6 ertan 3: anviron 7 ertan 4: anviron 8 ertan 5: 9 ertan ou plis
197	stress	**stressbill**	During the past 12 months, did you have problems paying your routine bills such as for food, electricity or telephone?	Pandan sa dernyen bann 12 mwan, eski ou'n ganny okenn difikilte pou pey ou bann bill (delo, lelektrisite, telefonn, cable tv, etc) ouswa pou aste manze pou ou lakour) akoz ou ti napa ase larzan?	1: no; 2: sometimes; 3: often; 4: always or most of the time	1: non; 2: par ler; 3: souvan; 4: toultan ouswa laplipar letan
198	covid	**covidhx**	Did you have COVID once or more times?	Annou koz lo COVID Eski ou'n dezan ganny COVID enn ouswa plizyer fwa?	1: no, not that i know; 2: once; 2: twice; 3: 3 or more times	1: non, pa dapre mon konesans; 2: 1 fwa; 2: 2 fwa; 3: 3 fwa ou plis ki 3 fwa
199	covid	**covidsevere**	Would you say the disease was:	Eski ou pou dir sa maladi ti:	1: it was benign (e.g. no more than a bit of fever, some cough, but not treathening); 2: it was quite serious (e.g. respiratory impairement); 3: I needed hospital admission	1: pa tro serye (e.g. zis en pti lafyev, enpe latou, pa alarman 2: ti serye (e.g. mon ti pe ganny problem respiratwar); 3: mon ti bezwen ganny admit lopital pou plis ki 1 zour

200	covid	**covidvacc1**	How many vaccine jabs did you receive so far?	Konbyen pikir vaksen pou covid ou'n pran?	1: 1; 2: 2; 3: 3; 4: 4 or more	1: 1; 2: 2; 3: 3; 4: 4 ou plis
201	covid	**covidvacc2**	Would you consider having a further vaccine jab every year or so if this was recommended by the World Health Organization or international medical authorities?	Si lorganizasyon mondyal pou lasante (OMS, WHO) ouswa okenn lotorite lasante i rekonmande ki vaksen pou covid i devret ganny pran tou le lannen. Eski ou pou konsidere pou al pran vaksen sak lannen?	1: yes 2: no 3: I don't know	1: wi 2: non 3: mon pa konnen
202	followup	**followup**	A last question: would you agree, in principle, to participate in further studies or programmes related to cardiovascular diseases and other chronic conditions or questions that was covered in this survey?	En dernyen kestyon: Eski ou ti a kontan partisip pli tar dan okenn bann lezot letid ouswa programm ki relye avek maladi kardyovaskiler ek lezot maladi kronik ou kestyon kin ganny kouver dan sa letid?	1: yes 2: no	1: wi 2: non

Appendix 7. Procedures for laboratory blood and urine measurements



Appendix 8. Budget summary

(1 US$ ~14 SCR)

	Funding	Total SR
Regular salary to survey & lab team	MOH	1 067 049
Allowances to survey & lab team	MOH	567 500
Accommodation for team in Praslin and La Digue	MOH	142 050
Transport of team to Praslin/La Digue islands	MOH	15 460
Stationary	MOH	172 582
Refresher painting of study premises	MOH	80 000
Internet for data collection	MOH	14 400
Sim cards for survey telephones	MOH	9 600
Adverts for survey	MOH	53 095
Breakfast for participants	MOH	114 240
Blood collection material	MOH	30 000
Reagents for blood/urine tests (**total**)	MOH	317 829
Glucose glucometer Contour+		*6 120*
Glucose		*2 370*
A1c		*28 380*
Insulin		*48 180*
Cholesterol total		*4 590*
Cholesterol HDL		*11 790*
Cholesterol LDL		*34 440*
Triglycerides		*3 960*
Creatinine		*2 100*
Uric acid		*2 205*
Potassium (urine 400)		*13 425*
Sodium (urine 400)		*3 060*
CRP		*29 415*
Gamma GT		*585*
Quality control		*9 559*
Freight & insurance for procurement	MOH	*117 650*
Lunch for whole survey team (20 pax)	MOH	10 000
Printing leaflets with selected results	MOH	137 750
Printing final report	MOH	102 350
Total MOH	MOH	2 833 905
Total MOH not accounting for regular salaries	MOH	1 766 856
Ultrasound device Lumify	MCB	210 000
Vouchers to participants	SEYPEC	366 000
Total sponsors	Sponsors	576 000
Grand total		3 409 905
Grand total not accounting for reg. salaries		2 342 856

Appendix 9. Letter with selected results given to the participants

MINISTRY OF HEALTH
PUBLIC HEALTH AUTHORITY
P.O. Box 52, Victoria, Republic of Seychelles
Telephone: 4388000, Fax: 4225131

Please address all correspondence to the Public Health Commissioner

20 April 2024
ref: 2633; A-70

Dear Mr John Doe,

We thank you for your participation to the Seychelles Heart Survey 2023 on 11/6/2023.

Kindly find below some of your results, including selected blood tests. We spoke during your visit about lifestyle characteristics and your blood pressure, blood glucose, body weight, and what may be done about it.

If a blood test below is abnormal, please contact your health centre. Note that abnormal tests should be re-checked, and medical advice rely on medical evaluation with your doctor.

	Normal/abnormal values	**Your results** (0 = not available)	**General recommendations**
Body mass index (kg/m^2) Weight related to height	BMI<25: lean ☺ BMI 25-29: overweight 😐 BMI >30: obese ☹	Weight: **71** kg Height: **171** cm BMI: **24.4**	Have a balanced diet and regular physical activity. If overweight, reduce portion sizes of energy-dense foods (soft drinks/juices, rice, sweets, etc.).
Tobacco use (yes/no)	Tobacco use ☹	**No**	Abstain from tobacco use.
Physical activity (MET-days/week: energy spent)	<600 indicates *insufficient* physical activity ☹	**540**	At least 30 min of physical activity on ≥3 days per week is recommended.
Alcohol use (standard drink units per week) **Blood level of GGT** (U/L)	High: >7 standard units/week ☹ (1 stand. drink unit: 15 ml pure alcohol) Gamma GT. High: >55 ☹	**18** units/week GGT: **45**	Avoid having >1 drink per day & no more than 4 units on special occasions. GGT >55: may indicate liver damage.
Blood pressure (systolic/diastolic, mmHg) 'The lower the better'	<120 and <80: optimal ☺ 120-139 or 80-89: raised 😐 140-159 or 90-99: high ☹ ≥160 or ≥100: very high ☹☹	**172/91** Medication: **Yes**	Limit salt, avoid alcohol excess, control your weight. Check your BP at home (e.g. 8 BP values on 1 day every 1-3 months) and share values with your doctor. Treatment needed if BP is high.
Fasting blood sugar (FBG, mmol/l) **A1c** (%)	<5.6: normal ☺ 5.6-6.9: impaired 😐 ≥7.0: high, diabetes ☹ **A1c** ≥6.5: high, diabetes ☹	FBG: **4.49** A1c: **5** Medication: **No**	Control your weight (limit sugar rich food and energy-dense foods) and have regular physical activity. If diabetes, medications are needed.
Total cholesterol (mmol/l) Cardiovascular risk **LDL-cholesterol** (mmol/l)	<5.2: favourable ☺ 5.2-6.1: elevated CVD risk 😐 ≥6.2: high CVD risk ☹ **LDL-chol:** >3.4: unfavourable ☺	Total chol: **6.3** LDL-chol: **3.7** Medication: **No**	Avoid animal fats and palm oil. If your cholesterol is high, see with your doctor if a medication is needed, depending on your CVD risk.
HDL-cholesterol (mmol/l) 'Good cholesterol': higher better	<1.0: not favourable ☹ ≥1.4: favourable ☺	**1.99**	Control your weight, have regular physical activity, abstain from smoking.
Triglycerides (mmol/l) Fat in the blood	<1.0: normal ☺ ≥1.7: high ☹	**0.57**	Limit soft drinks/juices and sugar rich foods and avoid excess alcohol intake.
Creatinine (µmol/l) A kidney function marker	<80: normal ☺ >120: kidney problem ☹	**64**	Low blood pressure protects kidneys. See your doctor if creatinine is high.
Uric acid (mmol/l) risk of gout & cardiovascular disease	Unfavourable if ≥0.4 (M) or ≥0.3 (F) ☹	**0.5**	Have a healthy diet. Avoid alcohol. See with your doctor if uric acid is high.
Plaques in your carotid arteries	Presence indicates 'artery narrowing', which increases cardiovascular risk ☹	**No**	If plaques are present, discuss with your doctor and optimize treatment (blood pressure, diabetes, cholesterol).
If you are on **medication** for high blood pressure, diabetes, or high blood cholesterol, take it every day.			

Sincerely,

The Survey Team
Unit for Prevention and Control of Cardiovascular Disease (tel: 4 388 507)

Appendix 10. Communication strategy for dissemination of the survey key findings

Health Promotion Unit/Unit for Prevention and Control of Cardiovascular Disease

1. **Mission statement**
   - To effectively disseminate the key findings of the National Survey of Noncommunicable Diseases 2023 for empowering a broad range of stakeholders with accurate data to inform health policies and interventions aimed at reducing the burden of noncommunicable diseases (NCDs) in Seychelles and globally.
2. **Objectives**
   - Raise awareness on the prevalence and impact of NCDs and their risk factors in Seychelles.
   - Provide stakeholders in multiple sectors with actionable data to inform evidence-based decision-making.
   - Foster collaboration among government agencies, healthcare providers, NGOs, private sector, and the community at large to address NCDs and their risk factors comprehensively.
   - Share selected data to academic institutions for specific research purposes.
   - Share selected data to relevant international agencies.
3. **Audience segments**
   - Government policymakers
   - Healthcare professionals
   - NGOs/civil society organisations
   - Academic institutions
   - International health organisations
   - Community members
   - Media outlets
   - Survey participants
4. **Communication plan goals**
   - Increase awareness on the epidemiological situation of NCDs and their risk factors in Seychelles.
   - Encourage stakeholders' engagement and collaboration in addressing NCDs.
   - Facilitate the use of the survey data for evidence-based health policy and programme planning.
5. **Unique Selling Proposition (USP)**
   - The Seychelles Heart Study V provides comprehensive data on the prevalence in the population of the main NCDs and their risk factors, including psychological health and oral health, as well as associations with a number of variables such as socioeconomic variables; knowledge, attitudes and practices; rates of awareness, treatment and control of selected risk factors; cancer screening, and use of health services in Seychelles, enabling informed decision-making and targeted interventions to improve public health outcomes.
6. **Key messages for each audience segment**
   - Government officials: Prioritize and adjust NCD prevention and control in policy and programmes agendas.
   - Healthcare professionals: Inform on the epidemiological burden of NCDs and their risk factors and sensitize on gaps in NCD prevention and control.
   - NGOs/civil society organizations: Encourage collaboration in advocating for and implementing community-based interventions to promote healthy behaviours and assist in implementing NCD prevention and control interventions.
   - Academic institutions: Provide data to enable research and advance knowledge in NCD epidemiology and prevention.
   - Community members: Raise awareness on the burden NCDs, the role of healthy lifestyle and the importance of NCD prevention and control.
   - Participants: All participants were informed in April 2024 through SMS that they could collect at UPCCD a report of their personal survey results with related advice (**Appendix 9)**.

7. **Channels and frequency**
   - Social media: Regular posts and updates on platforms such as Facebook (164 k followers) and Instagram.
   - Websites: Dedicated pages with resources, FAQs, and contact information.
   - Email: Regular updates and announcements to media and stakeholders.
   - Webinars, meetings, and workshops: Periodic events for training and information sharing.
   - Printed materials: Brochures, flyers, and posters distributed to relevant organizations and facilities.
   - Written media: Press releases, contributed articles, interviews, newscasts.
   - Audio-visual media: Video spots, audio spots, short documentaries, press releases, newscasts, interviews, radio participations.
   - Mobilization and engagement of community leaders, parliamentarians, district administrators, local food markets associations, religious leaders, etc.
   - Engagement with NGOs/civil society/advocacy groups: Information packs, presentations.
   - Community engagement: Public meetings, presentations, collaboration meetings.

8. **Key events**
   - Presentation of the main survey results to the senior management team of the ministry of health (including Minister of health and heads of departments) on 8th April 2024.
   - Present final report to the Cabinet of Ministers for approval and acceptance (May 2024).
   - Seek ISBN number for the report and QR code.
   - Press conference and launch event to announce completion, thanking contributors, and communicate key survey findings (May 2024).
   - Present report to relevant national institutions such as the National Assembly, National Library, media, etc. (May 2024).
   - Webinars and workshops for stakeholders to discuss survey results and implications (June 2024).
   - Community forums to engage with community and gather feedback (July 2024).

9. **Distribution plan**
   - Disseminate the report to relevant local government departments, agencies, and healthcare institutions.
   - Share survey results with academic partners and relevant international health agencies.

10. **Feedback loop**
   - Health Promotion Unit in collaboration with UPCCD to regularly solicit feedback from stakeholders through surveys, focus groups, meetings, and social media polls.
   - Establish mechanisms for stakeholders to provide input on future research priorities and program initiatives.

11. **Timeline for communication plan refresh**
   - UPCCD in collaboration with Health Promotion Unit to quarterly review the communication activities and adjust as needed.
   - Annual evaluation of the communication plan to ensure alignment with evolving priorities and objectives.

12. **Definition of success of the communication strategy**
   - Increased awareness and understanding of NCDs and their risk factors in target audiences.
   - Engagement and collaboration among stakeholders in addressing NCDs and their risk factors.
   - Utilization of the survey data for evidence-based policymaking and program planning.
   - Receive positive feedback and participation in communication activities from stakeholders.

By implementing this communication plan, we aim to maximize the impact of the Seychelles Heart Study V by effectively disseminating key findings and empowering stakeholders to act towards improving public health outcomes.

Appendix 11. Selected pictures

All pictures with the agreement of all persons photographed.

Survey start event with Minister of Health, Public Health Commissioner, and sponsors

Preparation of study sample fame and tracing at Seychelles Bureau of Statistics

Tracing participants & setting appointments

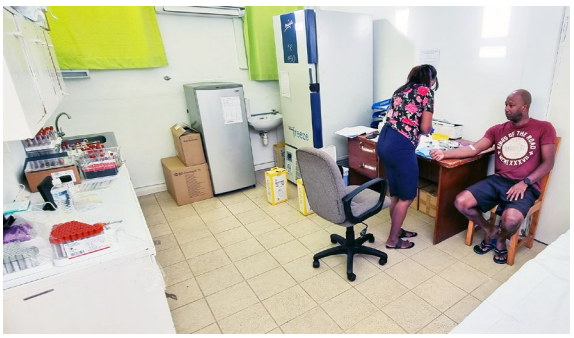
Registering, consent form


Administering the questionnaire by the survey team or by the participants using tablets





Lab at study centre in Mahé




Ultrasound or carotid arteries

Clinical lab team in Victoria Hospital and in Praslin Hospital

Waiting area in study centre in Mahé

Breakfast for participants

Overall organisation



Study in Praslin








Study in La Digue






Visits at home or at the haemodialysis centre for participants with a disability



Survey team members and sponsors (part of them)

Appendix 12. WHO best buys and other recommended interventions for NCD prevention and control[72]

When the WHO Global NCD Action Plan (NCD GAP) was first published in 2013, it included a menu of policy options and cost-effective and recommended interventions for cardiovascular disease (CVD), diabetes, cancer and chronic respiratory disease, and for reducing tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity. These policy options have been reviewed on several occasions, last at the WHA in 2023.[73]

- '*Best buys'*, which are considered highly cost-effective and feasible for implementation in most settings. These are interventions where a WHO CHOICE analysis found an average cost-effectiveness ratio (ACER) of ≤100 international dollars per disability-adjusted life year (DALY) averted in low- and lower middle-income countries. The CHOICE (**CHO**osing **I**nterventions that are **C**ost-**E**ffective) initiative was developed in 1998 to provide policy makers with evidence for deciding on interventions and programmes that maximize health for the available resources. [74]
- *'Other effective interventions'* for which the WHO CHOICE analysis produced an ACER >100 international dollars per DALY averted.
- *'Other recommended interventions'* that have been shown to be effective but for which no cost-effective analysis (CEA) was conducted, i.e. WHO-CHOICE analysis is not available.

REDUCING TOBACCO USE

Best buys
• Increase excise taxes and prices on tobacco products.
• Implement large graphic health warnings on all tobacco packages accompanied by plain/standardized packaging.
• Enact and enforce comprehensive bans on tobacco advertising, promotion and sponsorship.
• Eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places, public transport
• Implement effective mass media campaigns that educate the public about the harms of smoking/tobacco use and second-hand smoke, and encourage behavioural change.
• Provide cost-covered, effective and population-wide support (including brief advice, national toll-free quit line services and mCessation) for tobacco cessation to all those who want to quit.
Recommended interventions
• Provide cost-covered effective pharmacological interventions to all tobacco users who want to quit, through the use of nicotine replacement therapy, bupropion and varenicline.
Other recommended interventions
• Establish a tracking and tracing system to support the elimination of illicit trade in tobacco products that is in line with Article 8 of the Protocol to Eliminate Illicit Trade in Tobacco Products.
• Ban cross-border tobacco advertising, promotion and sponsorship, including those through modern means of communication.

REDUCING THE HARMFUL USE OF ALCOHOL

Best buys
• Increase excise taxes on alcoholic beverages.
• Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media).
• Enact and enforce restrictions on the physical availability of retailed alcohol (via reduced hours of sale).
Recommended interventions
• Enact and enforce drink-driving laws and blood alcohol concentration limits via sobriety checkpoints.
• Provide brief psychosocial intervention for persons with hazardous and harmful alcohol use.
Other recommended interventions
• Carry out regular reviews of prices in relation to level of inflation and income.
• Establish minimum prices for alcohol where applicable.

[72] Best buys and other recommended interventions for NCD prevention and control. Routledge, 2023. (Web Link
[73] https://apps.who.int/gb/ebwha/pdf_files/EB152/B152_6-en.pdf
[74] Bertram MY et al. Methods for the economic evaluation of health care interventions for priority setting in the health system: an update from WHO CHOICE. *Int J Health Policy Manag* 2021;10:673-77.

• Enact and enforce an appropriate minimum age for purchase or consumption of alcoholic beverages and reduce density of retail outlets.
• Restrict or ban promotions of alcoholic beverages in connection with sponsorships and activities targeting young people.
• Provide prevention, treatment and care for alcohol use disorders and comorbid conditions in health and social services.
• Provide consumers with information, including labels and health warnings, about contents of alcoholic beverages and the harms associated with alcohol consumption.

REDUCING UNHEALTHY DIET

Best buys
• Reformulation policies for healthier food and beverage products (for example, elimination of trans-fatty acids and/or reduction of saturated fats, free sugars and/or sodium).
• Public food procurement and service policies for healthy diets (for example, to reduce the intake of free sugars, sodium and unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables).
• Behavioural change communication and mass media campaigns for healthy diets (for example, to reduce the intake of energy, free sugars, sodium, and unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables).
• Front-of-pack labelling as part of comprehensive nutrition labelling policies for facilitating consumers' understanding and choice of food for healthy diets.
• Policies to protect children from the harmful impact of food marketing on diet.
• Protect, promote and support optimal breastfeeding practices.
Recommended interventions
• Taxation on sugar-sweetened beverages as part of fiscal policies for healthy diets.
Other recommended interventions
• Subsidies on healthy foods and beverages (for example, fruits and vegetables) as part of comprehensive fiscal policies for healthy diets.
• Limit portion and package size to reduce energy intake and the risk of overweight/obesity.
• Implement nutrition education and counselling in different settings (for example, in preschools, schools, workplaces and hospitals) to increase the intake of fruits and vegetables.
• Menu labelling in food service for healthy diets.

REDUCING PHYSICAL INACTIVITY

Best buys
• Implement sustained, population-wide communication campaigns about best practices to promote physical activity, with links to community-based programmes and environmental improvements to enable and support behavioural change.
Recommended interventions
• Provide physical activity assessment, counselling and behavioural change support as part of routine primary health care services through the use of a brief intervention.
Other recommended interventions
• Implement urban and transport planning and urban design, at all levels of government, to provide compact neighbourhoods providing mixed-land use and connected networks for walking and cycling and equitable access to safe, quality, public open spaces that enable and promote physical activity and active mobility.
• Implement whole-of-school programme that includes quality physical education, availability of adequate facilities and programs to support physical activity for all children, including active travel to and/or from school.
• Provide convenient and safe access to quality public open space and adequate infrastructure to support walking and cycling and other forms of micromobility (for example, wheelchairs, scooters and skates).
• Implement multicomponent workplace physical activity programmes.
• Provide and promote physical activity through provision of community-based (grassroots) sport and recreation programmes and conduct free mass participation events to encourage engagement by people of all ages and abilities.

MANAGING CARDIOVASCULAR DISEASE (CVD) AND DIABETES

Best buys
• Secondary prevention of rheumatic fever and rheumatic heart disease by developing a register of patients who receive regular prophylactic penicillin.
Recommended interventions
• Pharmacological treatment of hypertension in adults using any of the following: thiazide and thiazide-like agents; angiotensin-converting-enzyme inhibitors/angiotensin-receptor blocker; calcium channel blockers.
• Drug therapy (treatment with an antihypertensive agent and a statin) to control CVD risk using a total risk approach and counselling to individuals who have had a heart attack or stroke and to persons with a high risk (≥20%) of a fatal and non-fatal CVD event in the next 10 years using WHO's updated CVD e risk charts.
• Drug therapy (treatment with an antihypertensive agent) to control CVD risk using a total risk approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk (≥10%) of a fatal and non-fatal CVD event in the next 10 years using WHO's updated CVD risk charts.
• Treatment of new cases of acute myocardial infarction with acetylsalicylic acid, initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate.
• Treatment of new cases of acute myocardial infarction with acetylsalicylic acid and thrombolysis, with patients initially treated in a hospital setting with follow-up carried out through primary health care facilities at a 95% coverage rate.
• Treatment of new cases of acute myocardial infarction with acetylsalicylic acid, thrombolysis and clopidogrel, with patients initially treated in a hospital setting with follow-up carried out through primary health care facilities at a 95% coverage rate.
• Treatment of new cases of acute myocardial infarction with primary percutaneous coronary interventions, acetylsalicylic acid and clopidogrel, with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate.
• Treatment of acute ischemic stroke with intravenous thrombolytic therapy.
• Low-dose acetylsalicylic acid within 24 to 48 hours for secondary prevention of ischaemic stroke.
• Treatment of acute ischaemic stroke with mechanical thrombectomy within an experienced facility.
• Comprehensive* care of acute stroke patients in stroke units (*comprehensive care includes strategies such as staffing by a specialist stroke multidisciplinary team, access to equipment for monitoring, and rehabilitation).
Other recommended interventions
• Treatment of congestive cardiac failure with angiotensin-converting-enzyme inhibitor, beta-blocker and diuretic.
• Cardiac rehabilitation post myocardial infarction.
• Anticoagulation for medium-and high-risk non-valvular atrial fibrillation and for mitral stenosis with atrial fibrillation.
• Treatment of hypertension using single pill combination anti-hypertensive agents.
• Secondary prevention of coronary heart disease with a statin, angiotensin-converting-enzyme inhibitor, beta-blocker and acetylsalicylic acid (low dose).
• Seasonal influenza vaccination for people with cardiovascular diseases.
• COVID-19 vaccination for people with cardiovascular diseases.

MANAGING DIABETES

Best buys
• None.
Recommended interventions
• Screening of people with diabetes for proteinuria and treatment with angiotensin converting-enzyme inhibitor for the prevention and delay of renal disease.
• Control of blood pressure in people with diabetes.
• Use of statins in people with diabetes >40 years old.
• Foot care to prevent amputation in people with diabetes (including educational programmes, access to appropriate footwear and multidisciplinary clinics.
• Diabetic retinopathy screening for all diabetes patients and laser photocoagulation for prevention of blindness.
• Glycaemic control for people with diabetes, along with standard home monitoring of glucose concentrations for people treated with insulin to reduce diabetes complications.
Other recommended interventions
• Influenza vaccination for people with diabetes.
• COVID-19 vaccination for people with diabetes.

MANAGING CANCER

Best buys
• Vaccination against human papillomavirus (2 doses) of 9–14-year-old girls.
• Cervical cancer: human papillomavirus DNA screening, starting at the age of 30 years with regular screening every 5–10 years (using a screen-and-treat approach or screen, triage and treat approach).
• Cervical cancer: early diagnosis programmes linked with timely diagnostic work-up and comprehensive cancer treatment.
• Breast cancer: early diagnosis programmes linked with timely diagnostic work-up and comprehensive cancer treatment.
• Colorectal cancer: early diagnosis programmes linked with timely diagnostic work-up and comprehensive cancer treatment.
• Prevention of liver cancer through hepatitis B immunization.
• Childhood cancer: early diagnosis programmes linked with timely diagnostic work-up and comprehensive cancer treatment, focusing on six index cancers of WHO's Global initiative for childhood cancer.
• Early detection and comprehensive treatment of cancer for those living with HIV.
Recommended interventions
• Basic palliative care for cancer: home-based and hospital care with multi-disciplinary team and access to opiates and essential supportive medicines.
• Head and neck cancers including oral cancers: early diagnosis programmes linked with timely diagnostic work-up and comprehensive cancer treatment.
• Prostate cancer: early diagnosis programmes linked with timely diagnostic work-up and comprehensive cancer treatment.
• Colorectal cancer screening: population-based programmes, by means including stool-based tests, as appropriate, at age >50 years, linked with timely treatment in settings where a screening programme is recommended.
Other recommended interventions
• Prevention of liver cancer through hepatitis B immunization.

MANAGING CHRONIC RESPIRATORY DISEASE

Best buys
• Acute treatment of exacerbations of asthma with inhaled bronchodilators and oral steroids.
• Acute treatment of exacerbations of chronic obstructive pulmonary disease with inhaled bronchodilators and oral steroids.
• Long-term management of chronic obstructive pulmonary disease with inhaled bronchodilator.
Recommended interventions
• Long-term management of asthma with inhaled bronchodilator and low-dose beclomethasone.
Other recommended interventions
• Access to improved stoves and cleaner fuels to reduce indoor air pollution.
• Cost-effective interventions to prevent occupational lung diseases, for example, from exposure to silica, asbestos.
• Influenza vaccination for patients with chronic obstructive pulmonary disease.
• COVID-19 vaccination for people with chronic respiratory diseases.