Palau Hybrid Survey
FINAL REPORT

2017

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Summary

The aim of this report is to assess the current prevalence of non-communicable diseases (NCDs), substance use, mental health, and selected risk factors in Palau. We hope this report enables Palau to better understand its burden of disease, monitor trends and determine who is at greatest risk for poor health in order to improve health through the development of targeted evidence-based interventions.

Non-Communicable Diseases (NCDs) such as heart disease, cancer, and diabetes are global issues that result in high burdens of disability and premature death. Additionally, substance use and poor mental health can also greatly contribute to disability and premature death throughout the world. NCDs, substance use, and poor mental health are highly linked to a number of key risk factors, such as cigarette smoking, tobacco chewing, excessive alcohol consumption, unhealthy diet, lack of physical activity, and overweight/obesity. Over the past few decades there have been drastic changes in lifestyle in the Republic of Palau, a small independent nation in the northwestern region of the Pacific Ocean. Palau has shifted from mostly subsistence living and reliance on locally produced crops and fish to a more Western lifestyle of sedentary occupation and more reliance on imported foods, as well as the introduction of many illicit substances. This lifestyle shift has resulted in higher burdens of certain risk factors, NCDs, substance use, and poor mental health.

Palau undertook a novel population-based household survey that combined NCD and associated risk factor indicators, substance use, and mental health indicators from May – December 2016. A total of 1,768 individuals aged 18 years or older participated in the survey. Respondents answered questions about their alcohol and tobacco use, other substance use indicators, mental health, dietary habits, physical activity, health access, oral health, health conditions, and cancer screening. Additionally, height and weight, fasting blood glucose, total cholesterol, HDL cholesterol, and blood pressure were measured.

Palau vs. USA

Compared to the US, Palau has worse health outcomes and behaviors with the exceptions of general alcohol use, hypertension, and high cholesterol.

	Palau %	US %	Comparison
Current tobacco use (past 30 days)			
Cigarette smoking	20.4	17.0	↑
Smokeless tobacco use	45.8	4.0	↑
Current alcohol use (past 30 days)			
Alcohol use (any)	41.1	54.0	↓
Binge drinking (5+ drinks per day)	27.3	16.9	↑
Nutrition			
<5 servings of fruits and vegetables (per day)	90.1	76.5[1]	↑
Health and healthcare			
Fair or poor health (self-reported)	46.7	16.7	↑
No medical checkup in the past year	48.1	29.2	↑
Oral health			
No dental visit within past year	59.5	33.7	↑
Extracted permanent teeth due to decay/disease	65.7	43.4	↑
Chronic conditions			
Overweight/obesity	72.5	65.4	↑
Diabetes (self-reported + undiagnosed)	22.2	12.2[2]	↑
Hypertension (self-reported + undiagnosed)	32.9	33.5[3]	O
Measured High cholesterol (≥240mg/dL)	4.9	12.1[4]	↓
Cancer screening			
No Pap smear in the past 3 years (women 21-65 yo)	39.7	17.5	↑
No mammogram in the past 2 years (women 50-74yo)	70.3	21.9	↑

Source for US comparison: BRFSS 2016 unless noted with [1]BRFSS 2009 or [2] Estimation of U.S. (diagnosed + undiagnosed) 18+ prevalence based on NHANES 2011-2014 or [3] NHANES 2013-2014 (adults 20+). [4]NHANES 2011-2014 (adults 20+). Note that the US BRFSS overweight/obesity measures are based on self-report.

Surveillance in Palau: 2012 vs. 2016

The table below compares the 2012 Palau STEPS results from adults 25-64 years old to the 2016 Palau Hybrid Survey limited to adults 25-64 years old for comparison. From 2012 to 2016, tobacco use through betel nut chewing decreased while smoking increased. There was a decrease in overweight/obesity prevalence and hypertension, however there was no change in diabetes prevalence, and high cholesterol increased. Note that some of these changes could be explained by shifting demographics (mostly due to immigration) in Palau.

	2012%	2016%	Comparison
Current tobacco use			
Cigarette smoking	16.6	20.6	↑
Chewing betel nut with tobacco	54.2	46.2	↓
Current alcohol use			
Binge drinking (5+ drinks per day)	29.3	29.2	O
Chronic conditions			
Overweight/obesity	77.6	71.7	↓
Diabetes (self-reported on meds or ≥126mg/dL)	20.4	21.1	O
Hypertension (self-reported on meds or ≥140/90)	49.0	30.1	↓
High cholesterol (self-reported on meds or ≥240mg/dL)	7.2	11.0	↑

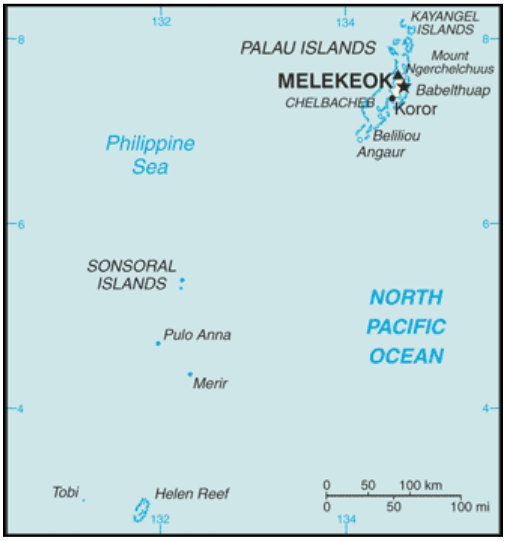
Introduction

Non-Communicable Diseases (NCDs) are the leading causes of morbidity and mortality in the United States Affiliated Pacific Islands (USAPIs) (American Samoa, Guam, Commonwealth of the Northern Mariana Islands [CNMI], Federated States of Micronesia [FSM], Republic of Palau, and Republic of Marshall Islands [RMI]) [1].

In 2010, the Pacific Island Health Officers Association (PIHOA) declared a regional health emergency due to the epidemic of NCDs in the USAPIs [2]. The NCDs of concern in the USAPIs include diabetes, heart disease, stroke, cancer, and chronic obstructive pulmonary disease [2,3]. The social determinants of health demonstrate that there is a complex system of factors that are linked to NCDs which include demographic, social, technological, cultural, environmental, biological, economic, and political factors [4]. However, the five leading risk factors attributable to NCDs globally include unhealthy diets (insufficient consumption of fruit and vegetables, excessive consumption of salt, high fat, and high sugar foods), insufficient physical activity, excessive consumption of alcohol, obesity, and tobacco use [3]. In the Pacific Islands, betel nut (which is carcinogenic to humans) chewing with or without tobacco is also identified as a significant health problem [5].

The Pacific, to include the Micronesia region is known to have some of the highest rates of suicide in the world, and these suicides are highly associated with substance use and mental health disorders [6,7]. In Palau, the average annual suicide rate from 2003-2012 was 21.7 per 100,000, which is about twice the global suicide rate [8]. Very little data have been collected in Palau regarding the risk factors for suicide, to include substance use and mental health.

NCD and substance use/mental health surveillance in Palau has historically been inconsistent and inadequate. Due to the need for surveillance on these two critical health concerns, the Republic of Palau Ministry of Health Non-Communicable Disease Unit and Prevention Unit combined efforts to develop a novel, integrated adult population-based survey. This hybrid survey was designed to simultaneously assess the Substance Abuse Mental Health Services Administration's (SAMHSA), National Outcome Measures (NOMs), as well as the Centers for Disease Control and Prevention's (CDC), and the World Health Organization's (WHO) NCD risk factor indicators.



Palau is comprised of more than 340 individual islands in six island groups forming an archipelago in the far southwestern corner of the North Pacific Ocean. The nation consists of high volcanic islands, raised limestone islands, barrier reefs, and classic atolls extending nearly 700 miles on the northeast to southwest axis. The islands of Palau have a total landmass of 188 square miles.

The Republic of Palau is a self-governing republic that is affiliated with the US under a Compact of Free Association, which became effective on October 1, 1994. While there are over 340 islands that make up the nation of Palau, only twelve are permanently inhabited. The main island group comprises fourteen of the total sixteen Palauan states. Koror, the prior capital of Palau totaling 7.1^2 miles is where the overwhelming majority of Palau's population resides. The capitol was recently relocated to the State of Melekeok on the large, rural island of Babeldaob. The State of Kayangel, an atoll north of Palau's largest island of Babeldaob, is accessible only by boat (approximately 2 hours by speed boat). The islands of Peleliu and Angaur (also accessible by speed boat), are located south of Babeldaob. A small group of islands 200-380 miles southwest of the main islands of Palau make up the States of Sonsorol and Hatohobei. There is no air service to these islands, but they are serviced sporadically by ship.

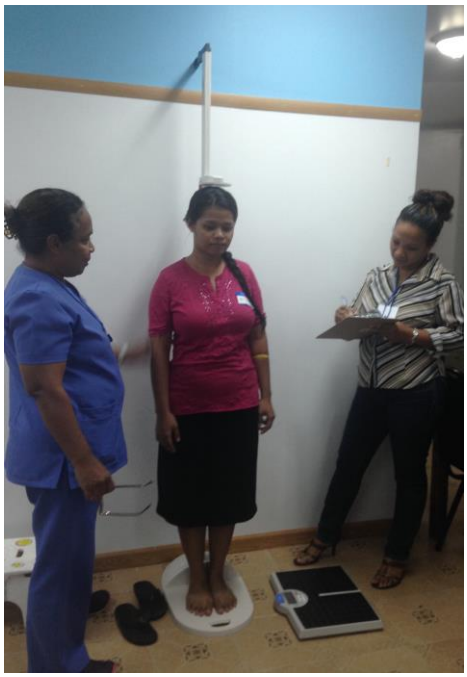
The population of Palau is 17,661 (2015 Census). The majority of the population has always resided in the state of Koror, Palau's most urban area. In 2015, 65% of the population resided in Koror, with the second highest populated state being that of Airai (14%), located just north of Koror. Airai can be considered the "suburb" of Koror, whereas the remaining sparsely populated states are quite rural. As of 2015, 73% of the population is native Palauan, with the second largest group being Filipino at 15%. The majority of the remaining foreign residents are of other Asian ethnicities.

Survey Methodology

The Palau Hybrid Survey aimed to assess the prevalence of selected NCDs, risk factors, and substance use/mental health indicators according to CDC, PIHOA, SAMHSA, and WHO surveillance frameworks.

Objectives

1. Inform the local community of Palau and support partners on NCD, risk factor, and substance use/mental health prevalence
2. Use these data to prioritize and tailor prevention programs developed and supported by the Republic of Palau Ministry of Health
3. Support further research on risk and protective factors of NCDs and substance use/mental health in Palau
4. Use these data to monitor progress and trends to reduce morbidity and mortality in Palau



Target group

Participants eligible for the Palau Hybrid Survey included all Palau residents aged 18 and older who were able to comprehend either English or Palauan language and provide consent.

Data collection

Data collection began on May 7, 2016 and ended on December 31, 2016. A total of 1,768 respondents completed the survey and measurements. All interviews and measurements were performed by trained surveyors hired by the Palau Ministry of Health.

Sample size determination	The original sample included 2409 households. 'Household' sample size was determined based on the most populated islands in Palau. (Koror = 1592 Households; Babeldaob = 704 Households; Peleliu = 70 Households; Angaur = 21 Households; Kayangel = 11 Households; Sonsorol = 6 Households; Hathobei = 5 Households)
Sampling procedures	Stage 1: Households were identified at random according to geographical stratification conducted on two levels: Island and Hamlet. Stage 2: One individual was selected at random from each household using the KISH table method.
Data collection	Surveys were translated and available in Palauan and English. Data were collected by trained surveyors using face-to-face questionnaires and anthropometric and other physical and biochemical measurements conducted at central locations the following morning for fasting measurements. Quality control of completed questionnaires was ensured at different stages during the questionnaire-processing phase.
Data entry	All data were collected electronically using a tablet. Tablets were uploaded on a weekly basis at the Ministry of Health. A data dictionary was created to explain the indicators and data codes.
Data cleaning	Descriptive statistics were produced for all variables. Values that did not match the data codes defined in the data dictionary were verified against the original questionnaire and rectified. Outliers were also checked, validated, and rectified.
Data analysis	Descriptive data analysis was conducted. Chi-squared analysis was used to analyzed differences by: • **age group** (18-24 years old, 25-34 yo, 35-44 yo, 45-65 yo, 65+ yo) • **gender** (male, female) • **ethnicity** (Palauan, all others) • **education** (high school education or less, more than high school education) Due to the representativeness of these data, large sample size, and ability to analyze locally, these data were not weighted.

Sample Summary

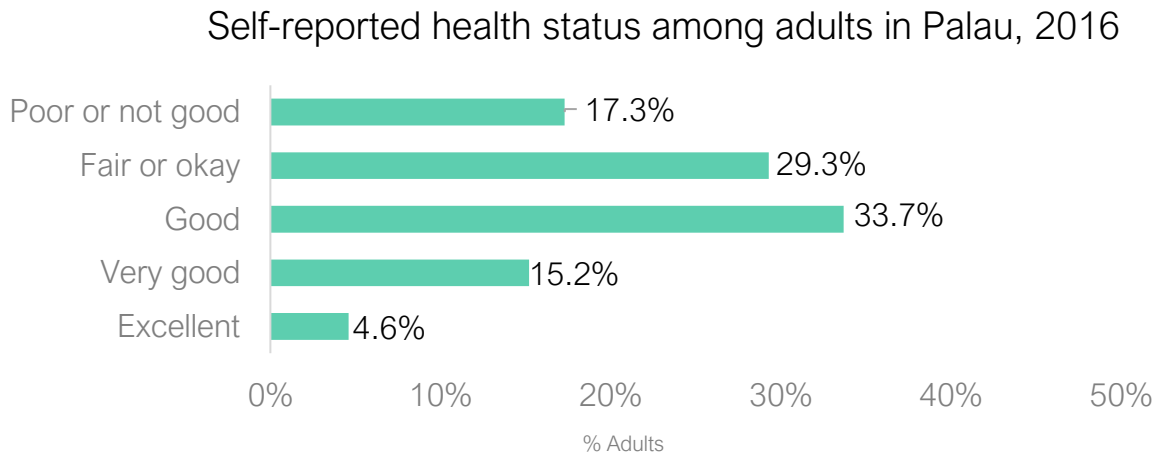
The sample randomly selected to participate in the Palau Hybrid Survey appears to be representative of the total population in Palau. The demographic distributions of the 2015 census are relatively similar to the distributions of the survey sample demographics.

	Survey sample	2015 Census data
	n=1768	n=13,299
Gender		
Male	894 (51%)	7373 (55%)
Female	874 (49%)	5926 (45%)
Age group		
18-24 years	143 (8%)	1660 (12%)
25-44 years	651 (37%)	5475 (41%)
45-64 years	754 (43%)	4874 (37%)
65+ years	220 (12%)	1289 (10%)
Ethnicity		
Palauan	1253 (71%)	(73%)*
Non-Palauan	515 (29%)	(27%)

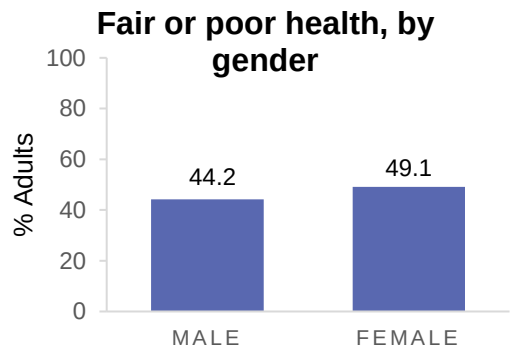
* For all ages

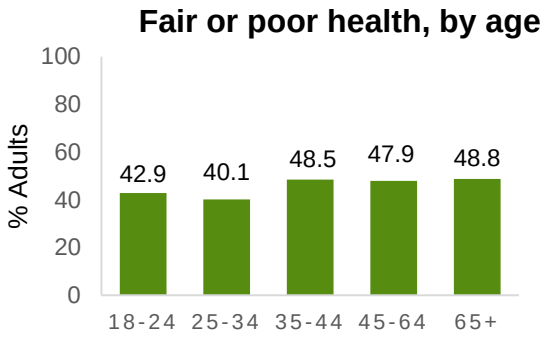
General Health

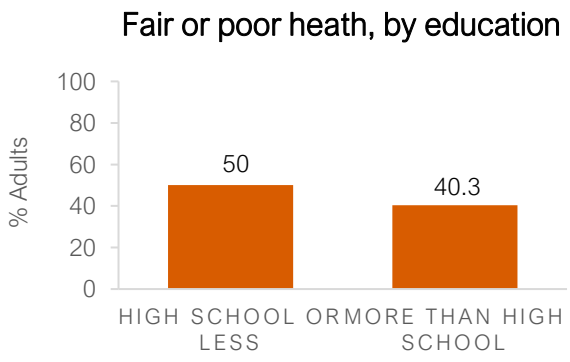
Almost half of adults in Palau (46.7%) self-reported their general health to be fair or poor.

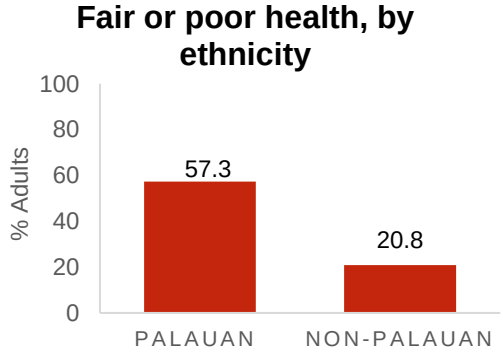


When we examine self-report of fair or poor health by demographics, we find that women self-report worse health than men, people with less education self-report worse health than people with more education, and Palauans self-report worse health than non-Palauans.



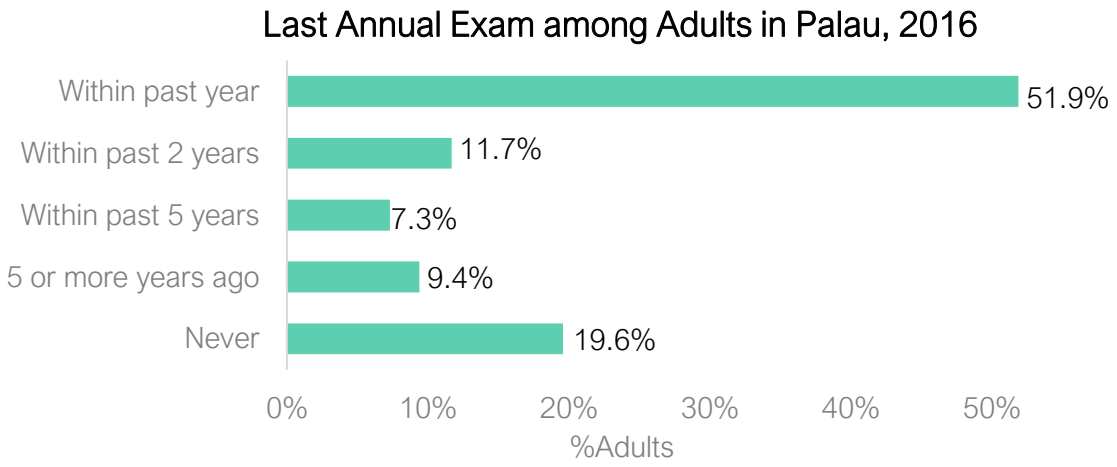




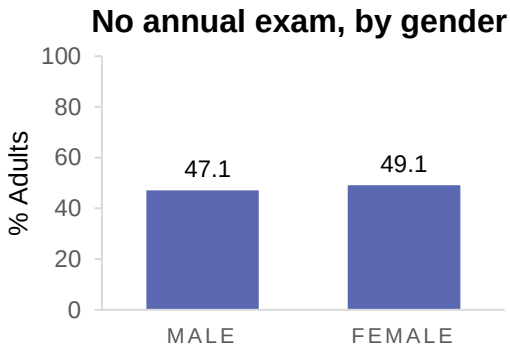


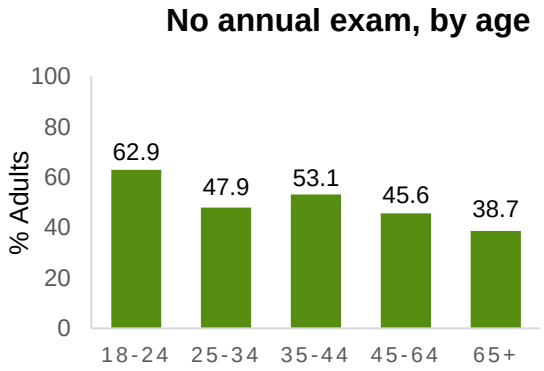
Access to Care

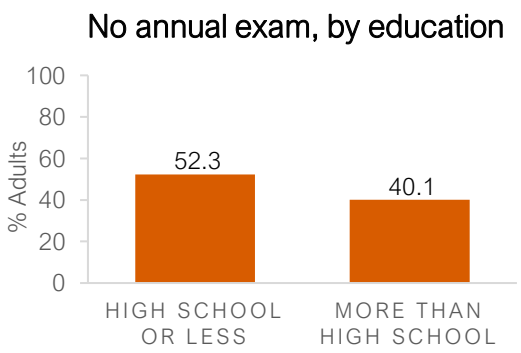
Overall, almost half (48.1%) of adults in Palau did not receive an annual checkup in the past year, and one out five (19.6%) adults have never had an annual checkup.

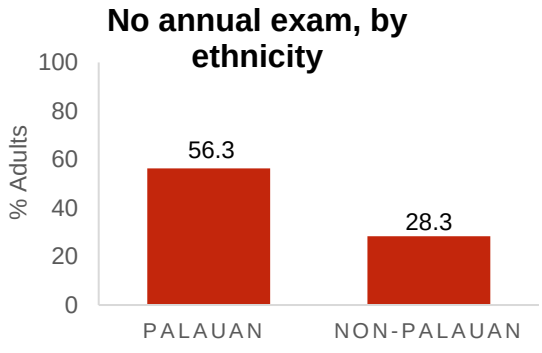


Younger adults, less educated adults, and Palauans were less likely to have had their annual exams.



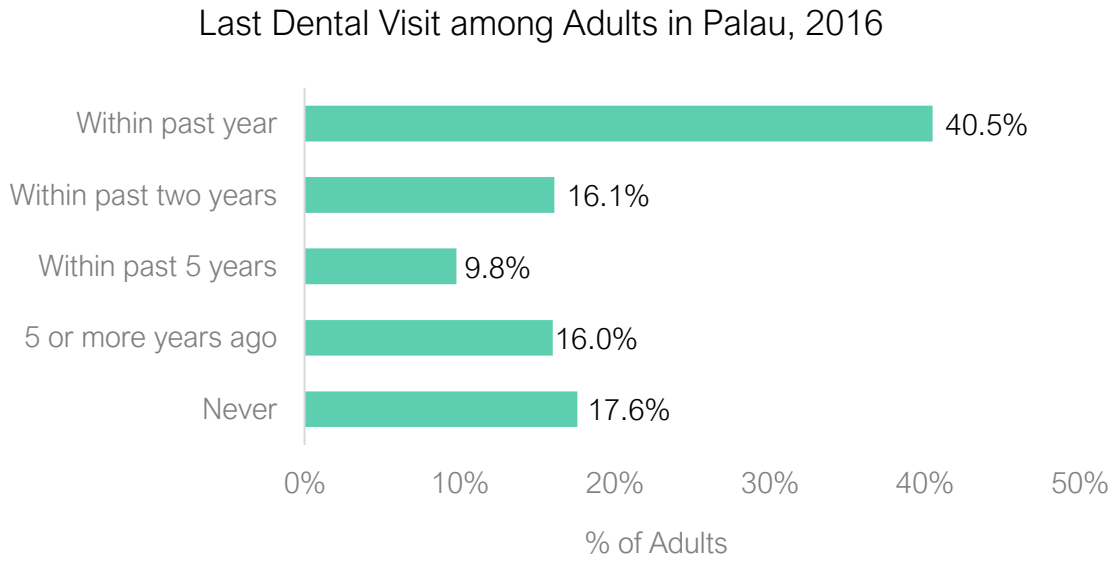


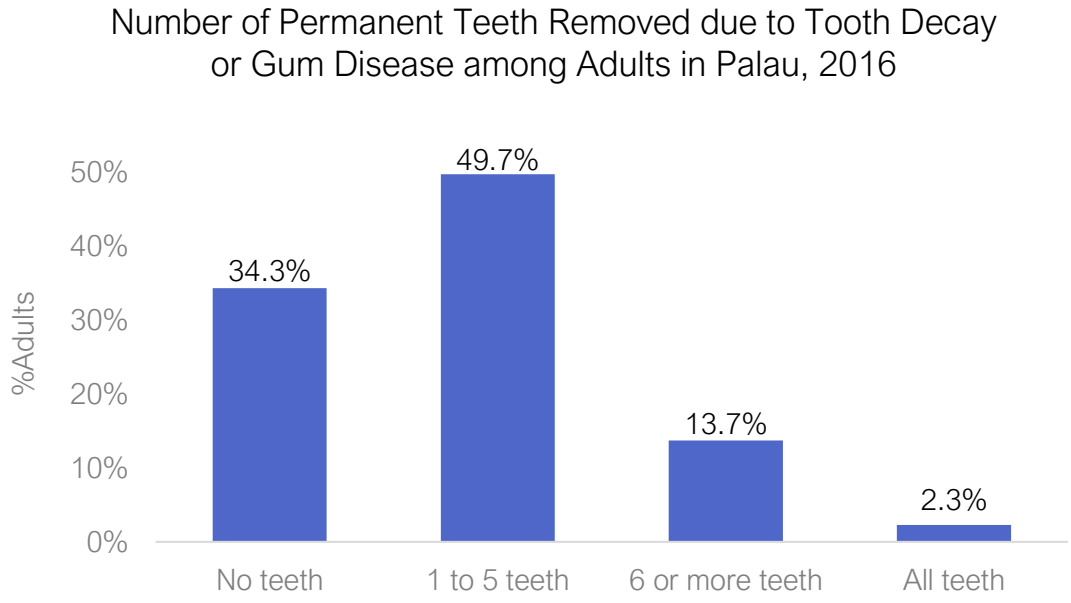




Oral Health

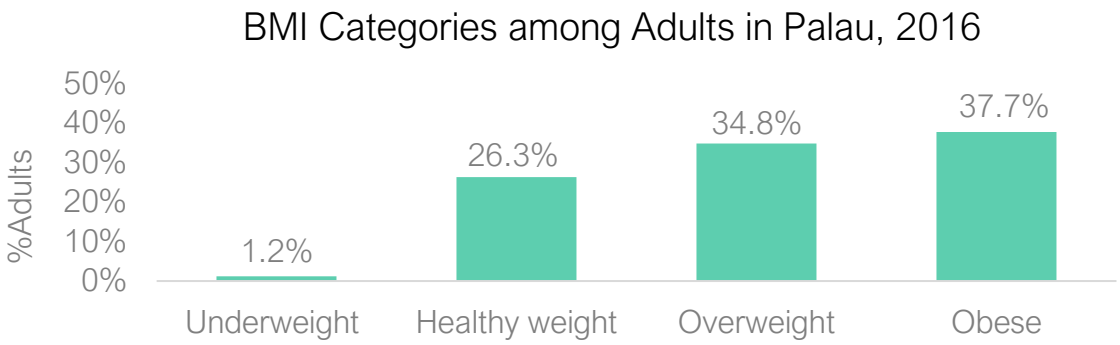
2 out of 5 adults in Palau (41%) had a dental visit in the past year. 1 out of 5 adults (17.6%) in Palau have never seen a dentist. About two-thirds (65.7%) of all adults in Palau have had at least one tooth removed due to tooth decay or gum disease.



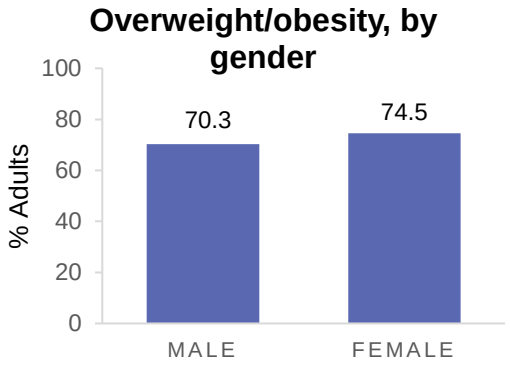


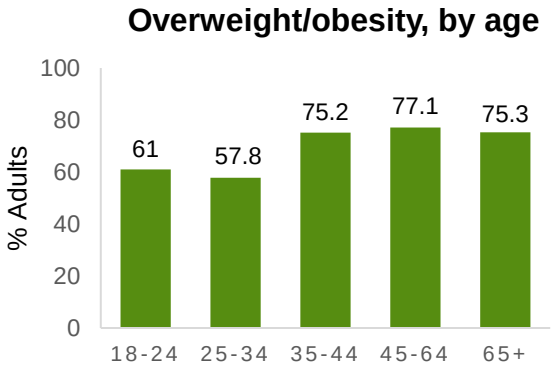
Overweight/Obesity

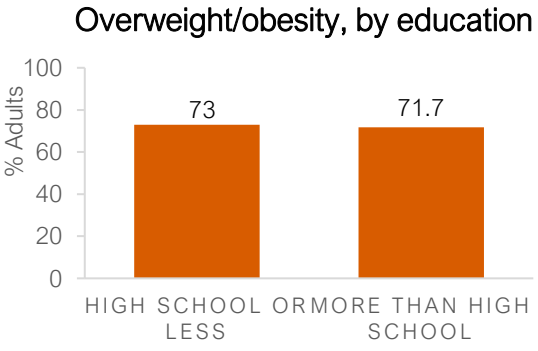
Body Mass Index (BMI) is calculated based on height and weight measurements. Based on these measurements, almost 3 out of 4 (72.5%) adults in Palau are overweight or obese.

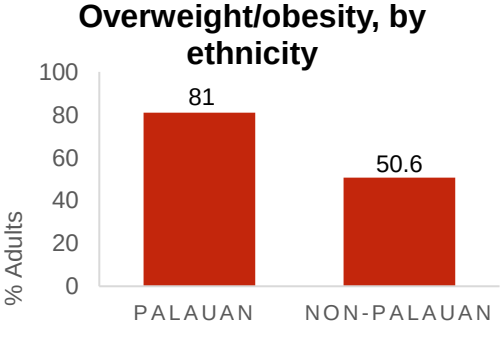


Women and older age groups have a higher prevalence of overweight/obesity then men and younger age groups. Additionally, Palauans have higher prevalence of overweight/obesity than non-Palauans.



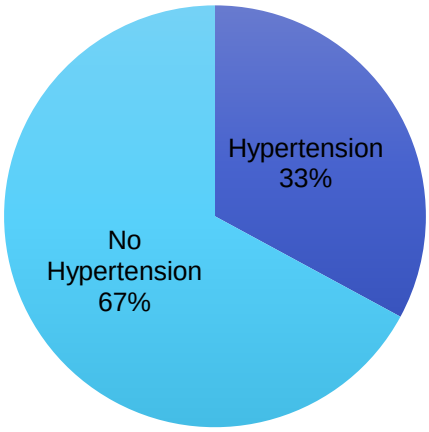






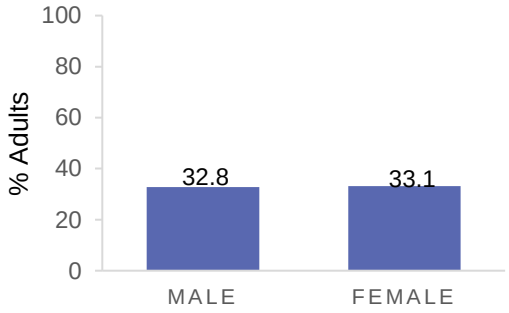
Hypertension

One-third (32.9%) of adults in Palau had high blood pressure (≥140/90) during screening or self-reported having hypertension for which they took medication.

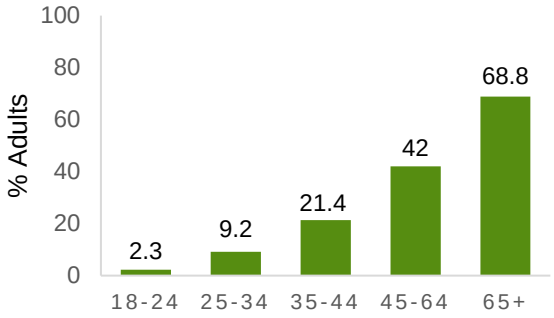


Hypertension prevalence increases with age, with almost two-thirds (68.8%) of adults 65 and older having hypertension. Hypertension prevalence was higher in Palauans compared to non-Palauans.

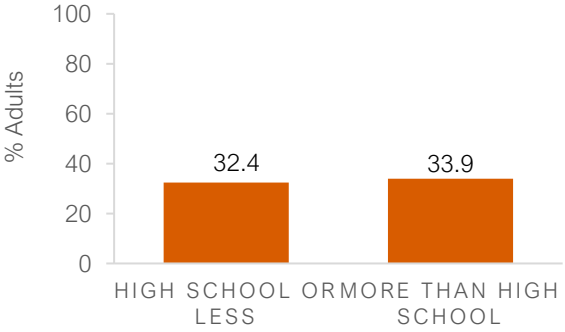
Hypertension, by gender



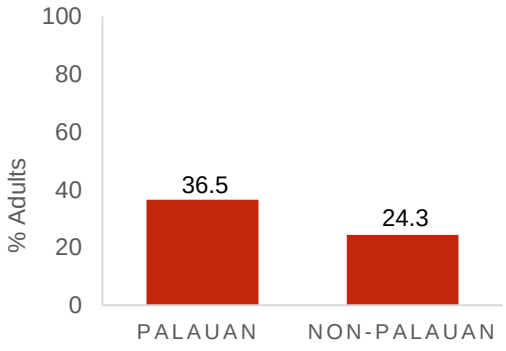
Hypertension, by age



Hypertension, by education

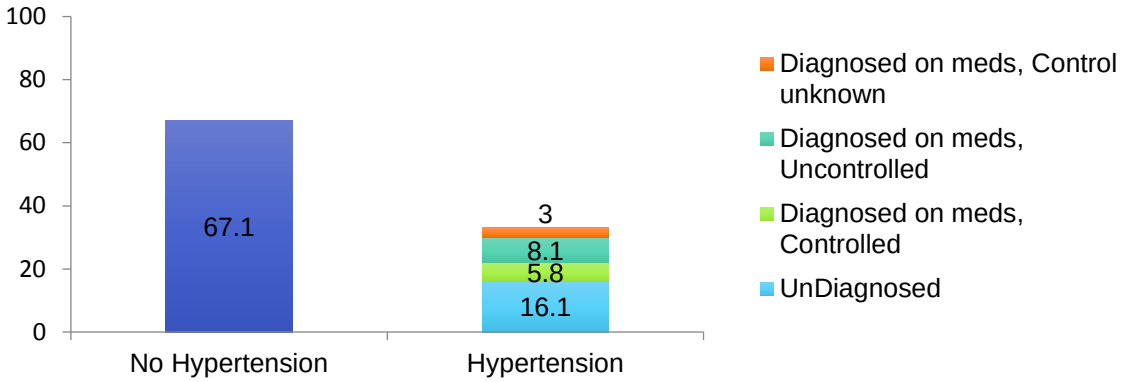


Hypertension, by ethnicity

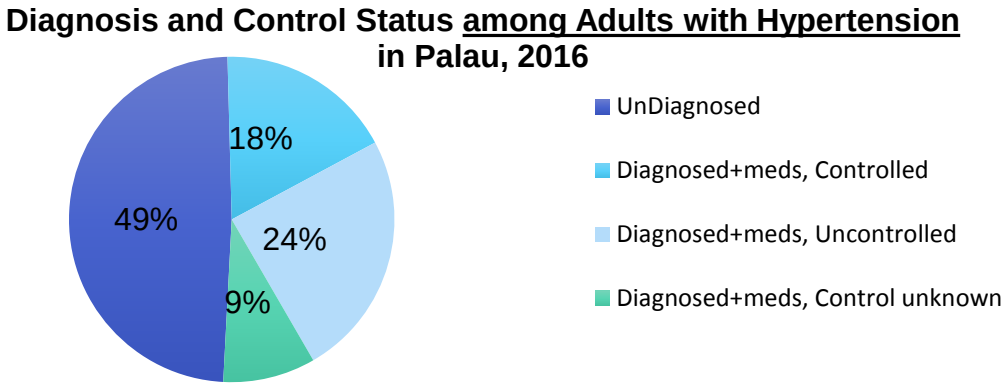


Hypertension Control

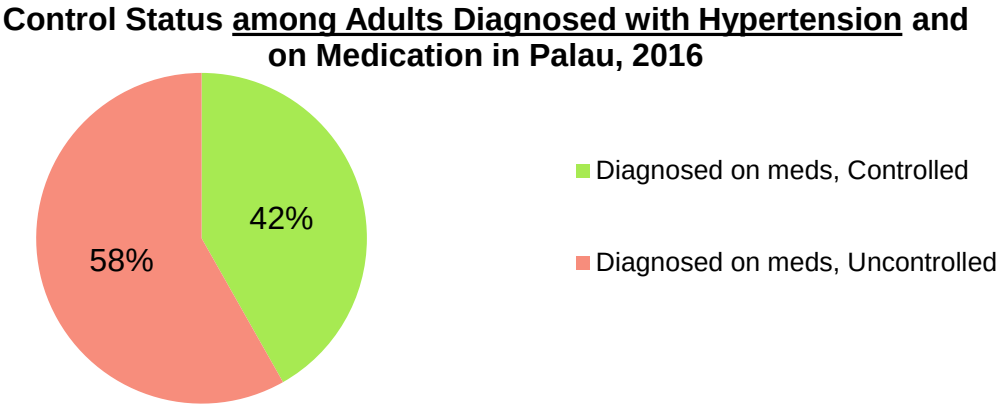
32.9% of the overall population has hypertension. It is estimated that 16.1% of the adult population in Palau has undiagnosed hypertension.



Among those adults with hypertension, about half of adults (49%) with hypertension in Palau are undiagnosed.

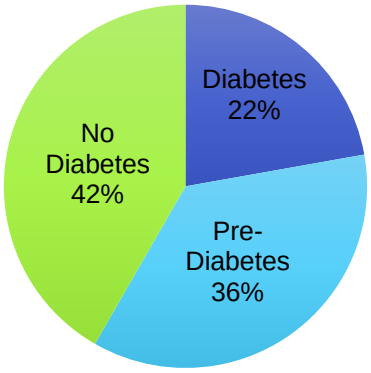


Among those adults who are diagnosed and taking medication, over half (58%) remain uncontrolled.

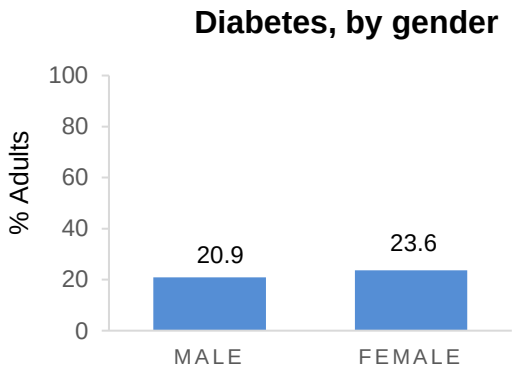


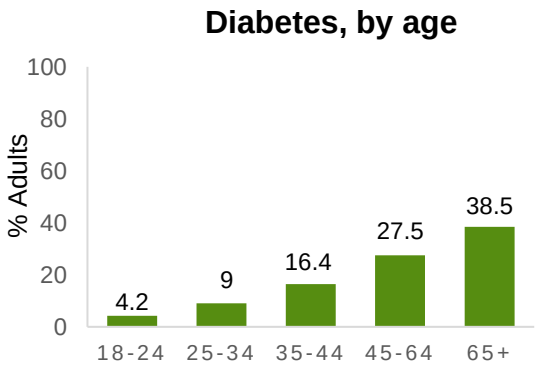
High Blood Sugar / Diabetes

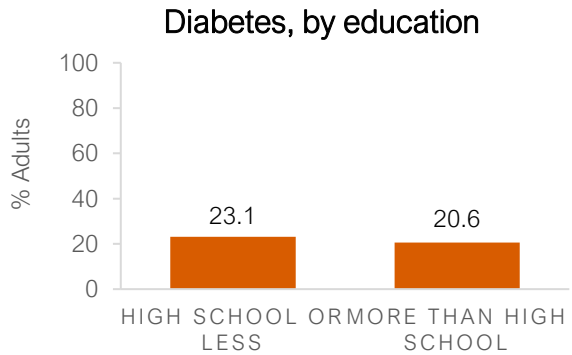
22.2% of adults had measured high fasting blood sugar (≥126mg/dL) or self-reported having diabetes for which they were taking medication. 36.1% of adults self-reported having pre-diabetes or had a fasting blood sugar ≥100mg/dL.

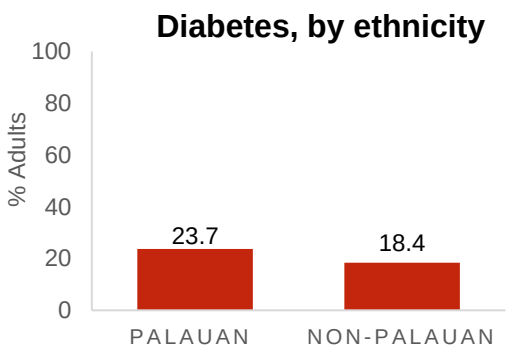


High blood sugar / diabetes prevalence increases with age, and is more prevalent in Palauans compared to non-Palauans.



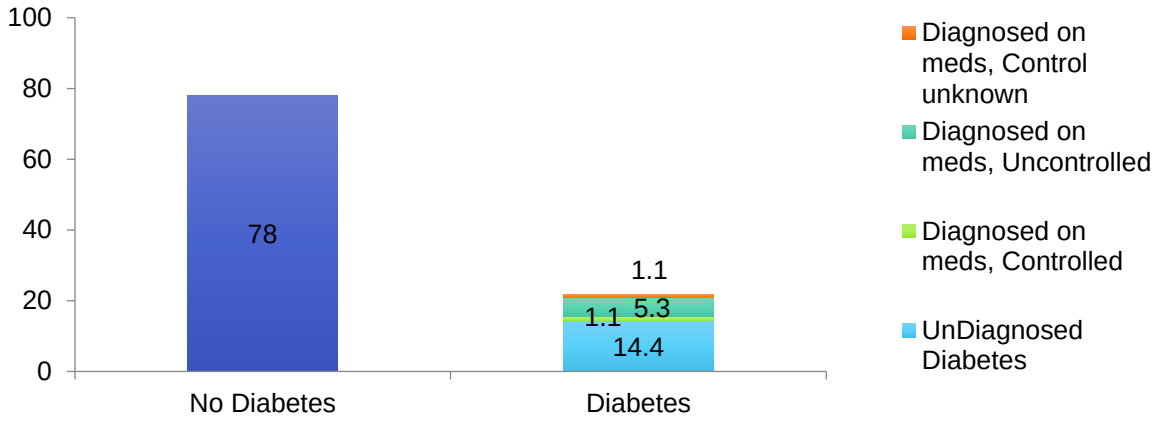




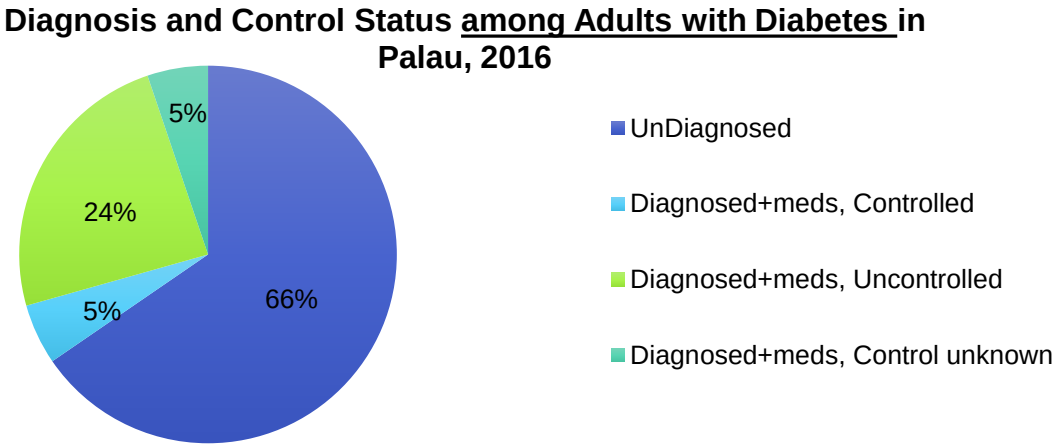


High Blood Sugar / Diabetes Control

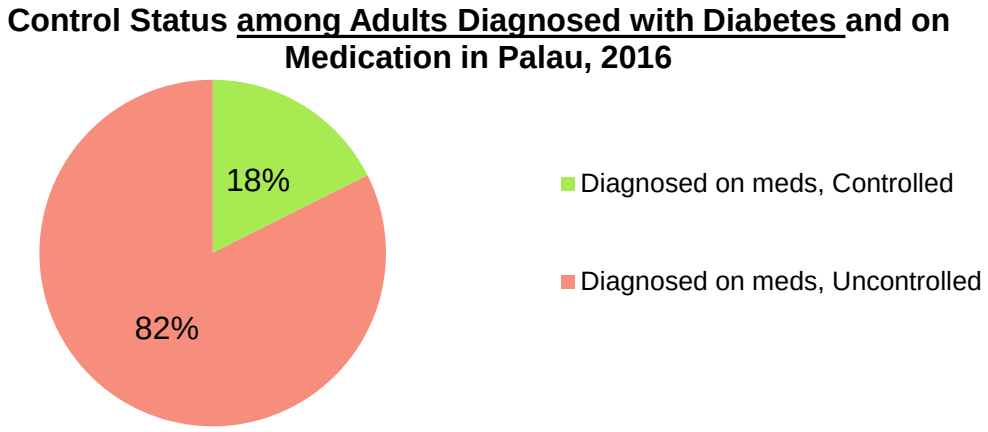
22% of the adult population in Palau is estimated to have diabetes. It is estimated that 14.4% of the adult population in Palau has undiagnosed diabetes.



Among those adults in Palau classified as having diabetes, two-thirds of these adults (66%) are undiagnosed.

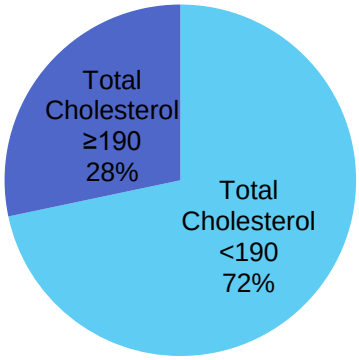


Among those adults who are diagnosed and taking medication, the majority of these adults (82%) remain uncontrolled

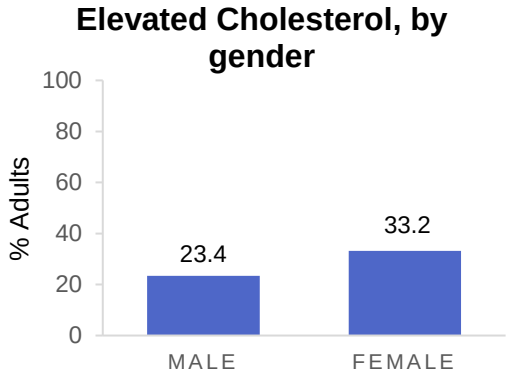


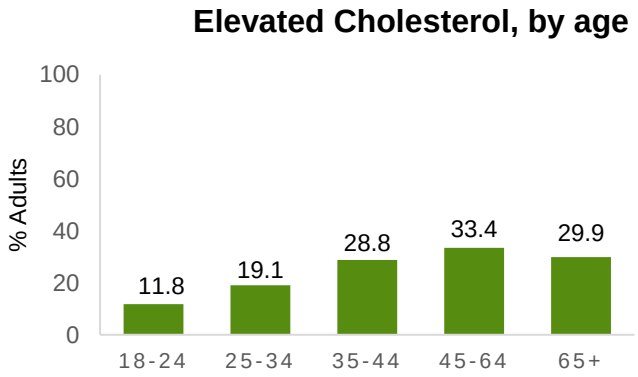
Total Cholesterol (LDL+HDL)

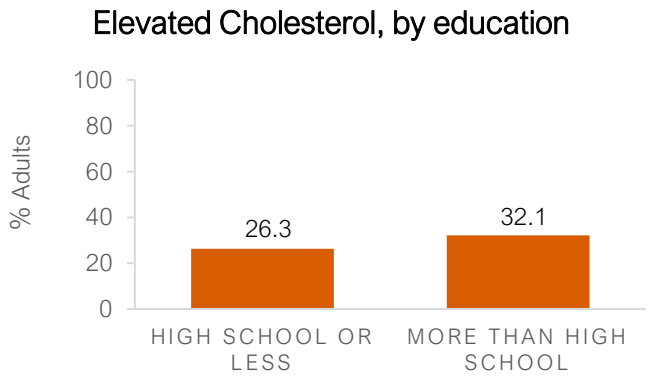
About one-third (28%) of adults in Palau had "elevated" total cholesterol (≥190mg/dL) during screening. However, only 4.9% had "high" total cholesterol (≥240mg/dL).

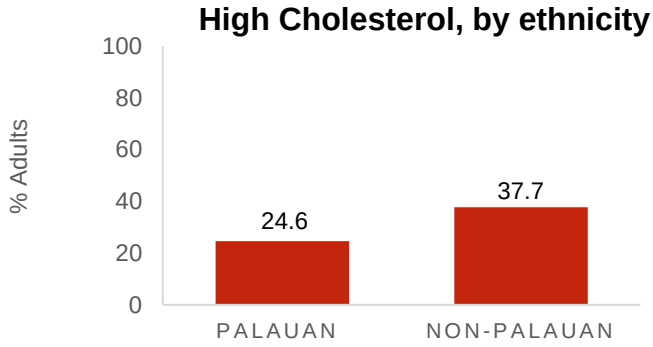


Elevated total cholesterol prevalence was highest among women, older adults, more educated individuals, and non-Palauans.



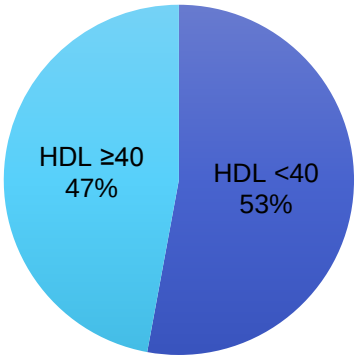

Elevated Cholesterol, by age
% Adults
100
80
60
40
20
0
11.8
19.1
28.8
33.4
29.9
18-24
25-34
35-44
45-64
65+


Elevated Cholesterol, by education
% Adults
100
80
60
40
20
0
26.3
32.1
HIGH SCHOOL OR LESS
MORE THAN HIGH SCHOOL

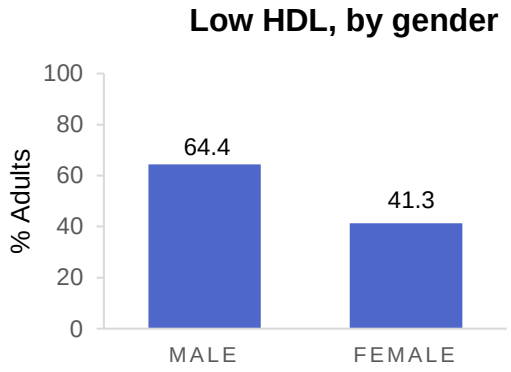

High Cholesterol, by ethnicity
% Adults
100
80
60
40
20
0
24.6
37.7
PALAUAN
NON-PALAUAN

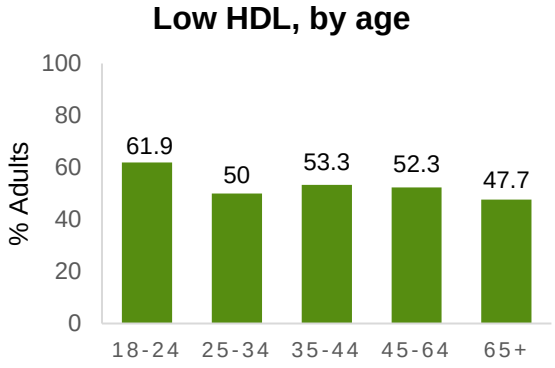
HDL ("Good") Cholesterol

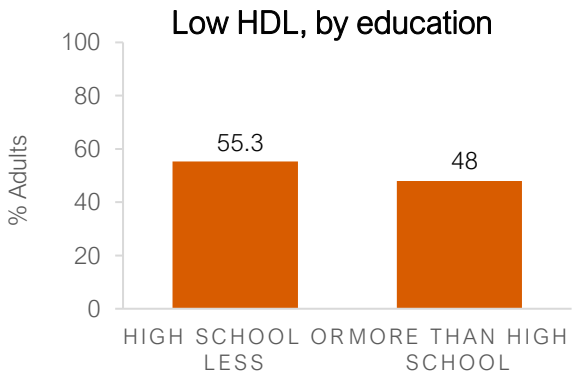
HDL is considered "good" cholesterol, and low levels increase risk for heart disease. Over half (53%) of adults in Palau had low levels (<40mg/dL) of HDL cholesterol during screening.

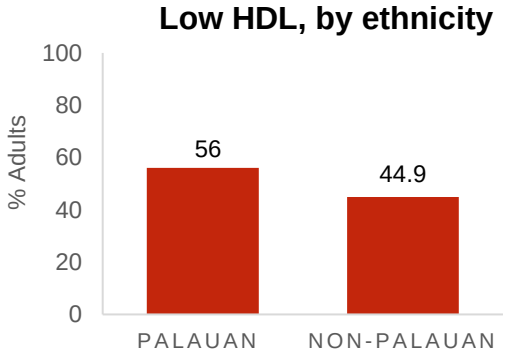


Low HDL prevalence was highest among men, young adults, less educated individuals, and Palauans.









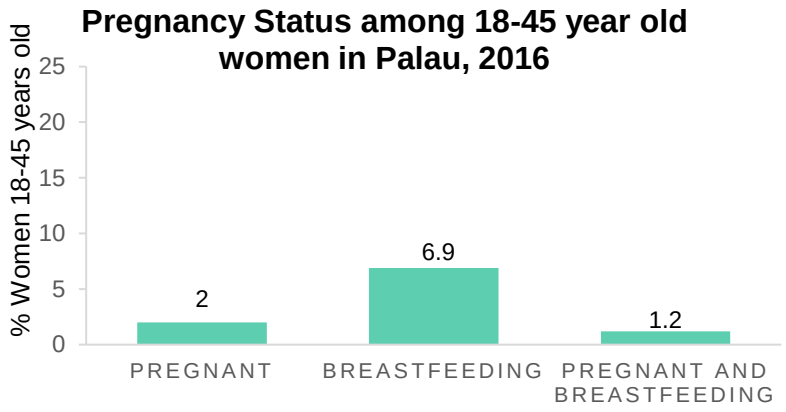
Self-reported Chronic Disease

Self-reported chronic disease is organized below by most prevalent to least. We also explored those who are at greater risk for these chronic diseases by gender, age, ethnicity, and education.

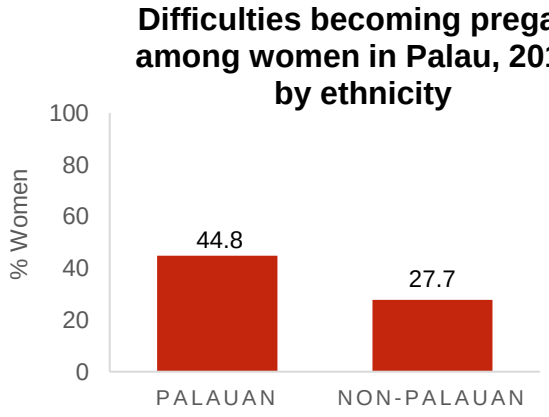
	%	Gender	Age	Palauan	Edu
Gout	8.8	Men (12.4 v 5.4%)	Older	Palauan (10.6 v 4.5%)	□
Arthritis	8.2	Women (10.6 v 5.8%)	Older	Palauan (9.3 v 5.5%)	□
Asthma	7.7	□	□	Palauan (9.4 v 3.7%)	□
Ulcer	5.6	□	Older	Palauan (6.9 v 2.5%)	□
Other heart disease	5.1	□	Older	Palauan (6.1 v 2.5%)	□
Heart disease	4.6	□	Older	Palauan (5.6 v 2.3%)	□
Tuberculosis	3.8	□	Older	Palauan (4.7 v 1.6%)	□
Depression	2.9	Women (3.6 v 2.2%)	□	□	□
Stroke	2.4	□	Older	□	Higher edu (3.4 v 1.9%)
Lung Disease	1.8	□	Older	Palauan (2.2 v 0.6%)	□
Cancer	1.3	□	Older	□	Higher edu (2.5 v 0.6%)

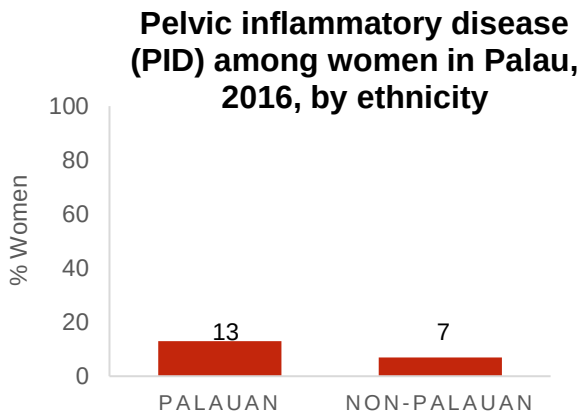
Women's Reproductive Health

Among women 18-45 years old, 2% were pregnant, 6.9% were breastfeeding, and 1.2% were both pregnant and breastfeeding.



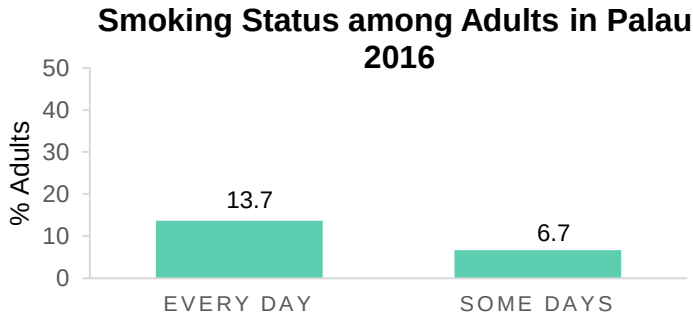
Almost 40% of women have experienced difficulties becoming pregnant (defined as tried to become pregnant for 12 months and not got pregnant). Palauan women report higher prevalence than non-Palauan women (44.8% vs. 27.7%). 11% of women reported having had pelvic inflammatory disease (PID). Palauan women had increased prevalence compared to non-Palauan women (13% vs. 7%).



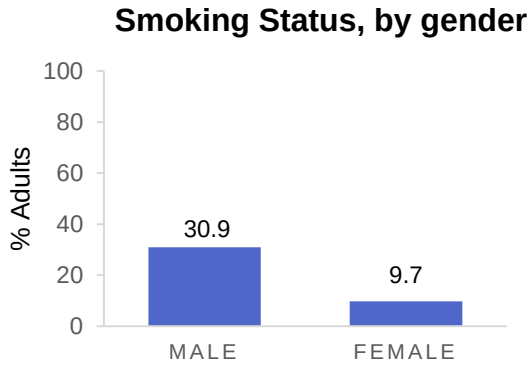


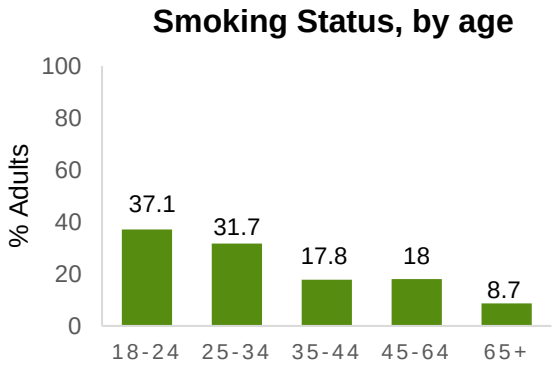
Cigarette Smoking

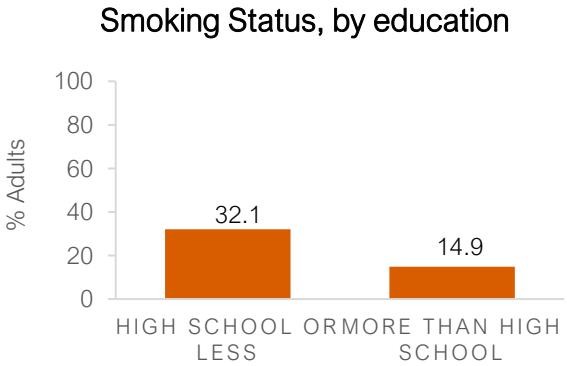
1 out of 5 adults (20.4%) in the Palau reported cigarette smoking in the last 30 days. The majority of these adults smoke every day. 71% of these smokers reported that they want to quit.

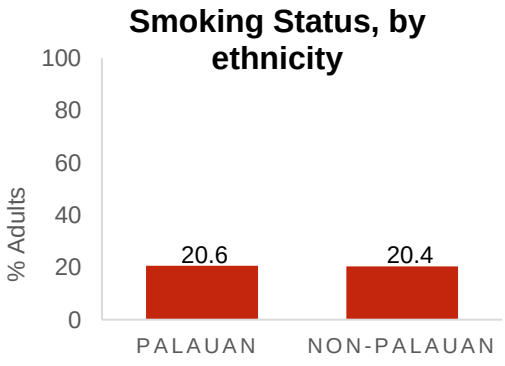


Smoking prevalence was highest among men, young adults, and less educated individuals.



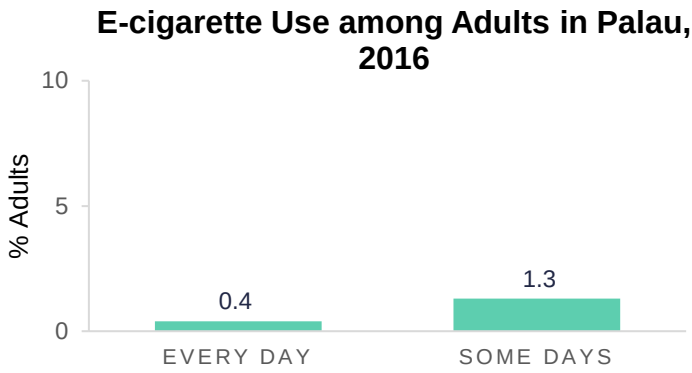




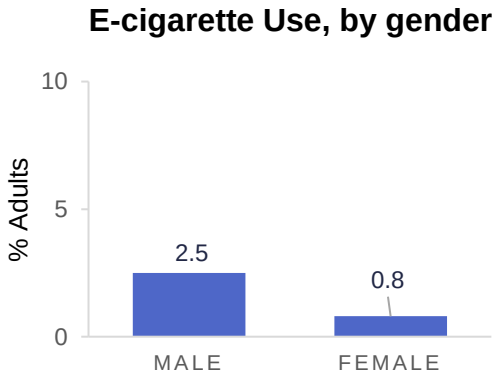


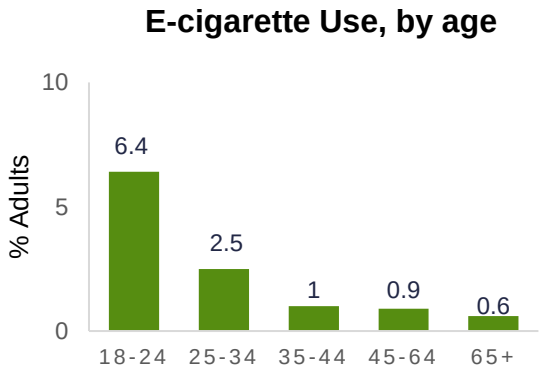
E-Cigarette Use

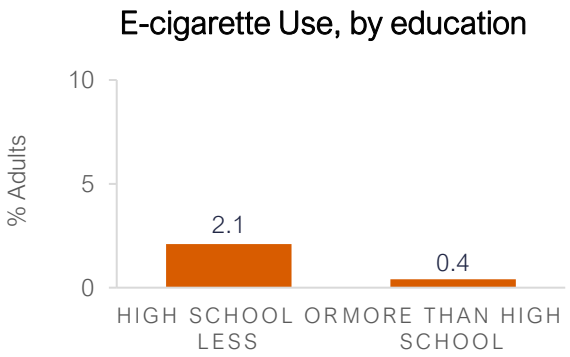
1.6% of adults in the Palau reported use of e-cigarettes in the past 30 days, and only one-quarter of these were every day users.

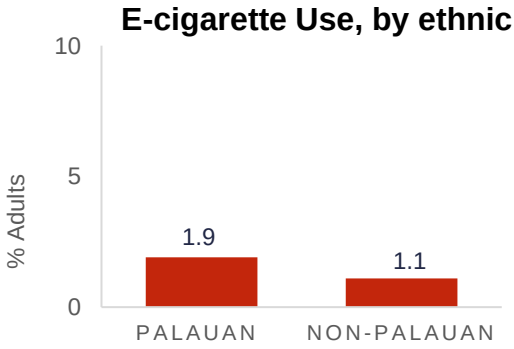


Although e-cigarette use prevalence is relatively low in Palau compared to cigarette smoking, it appears that men, young adults, and less educated individuals are taking up this habit.



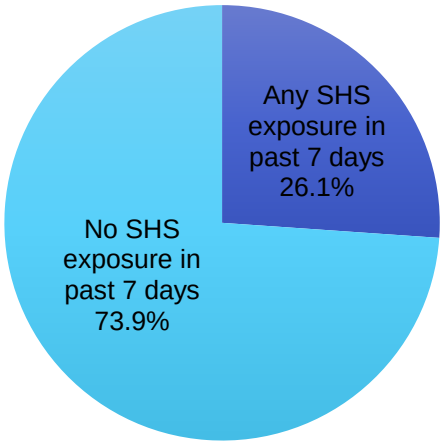




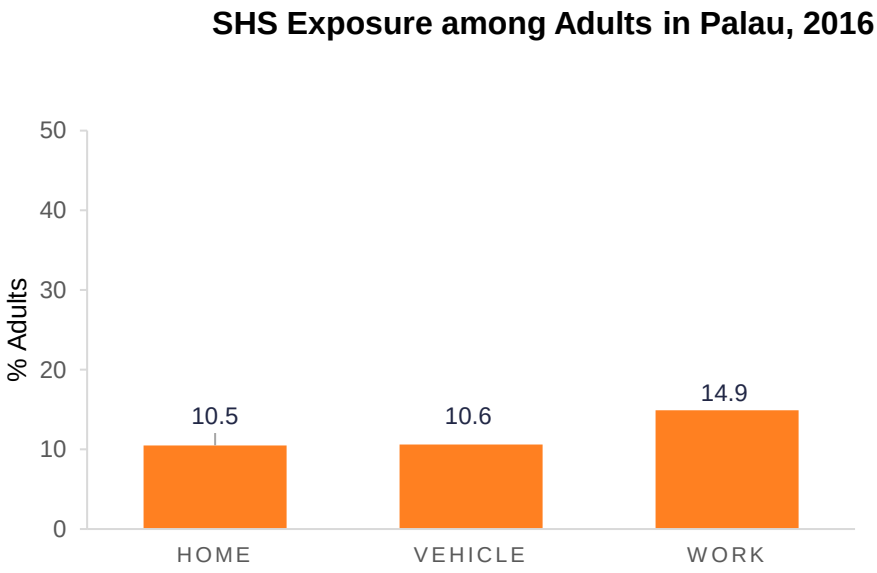


Second-Hand Smoke Exposure

Over one-quarter (26.1%) of all adults in the Palau reported some sort of exposure to second-hand smoke (SHS) at home, in a vehicle, or at work in the past 7 days.

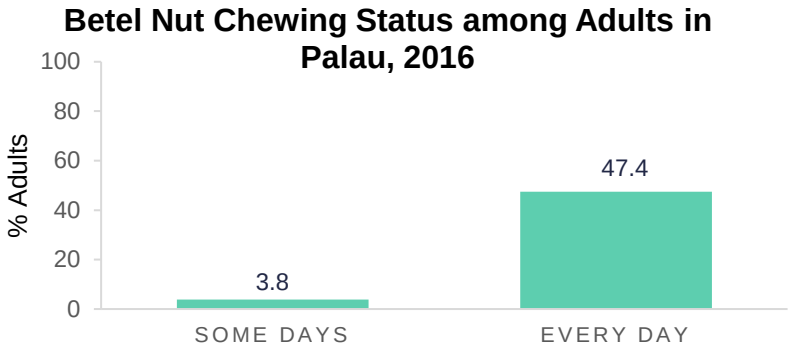


The most common place of second-hand smoke exposure was at work, although over 10% of adults reported second-hand smoke exposure at home and in a vehicle.

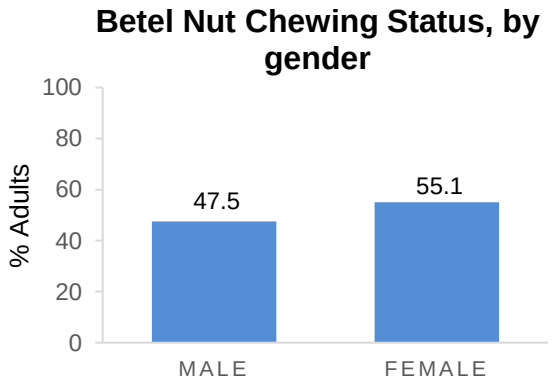


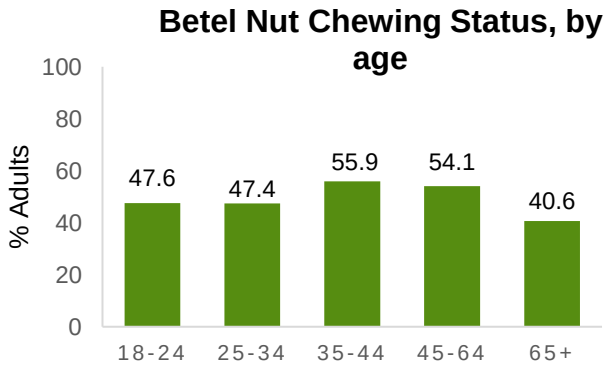
Betel Nut Use

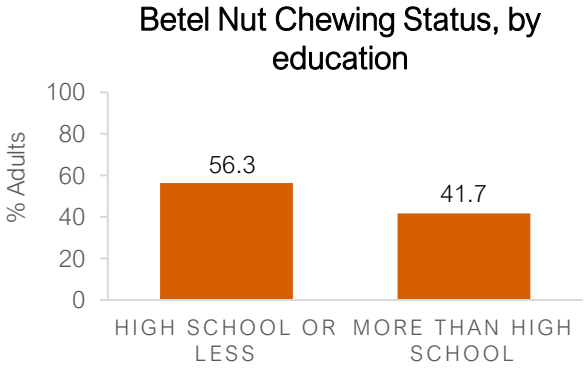
Over half (52.6%) of adults in Palau reported betel nut use in the past 30 days. Most betel nut chewers chew every day. 87% of respondents who use betel nut add tobacco. 60% of respondents who used betel nut said they wanted to quit.

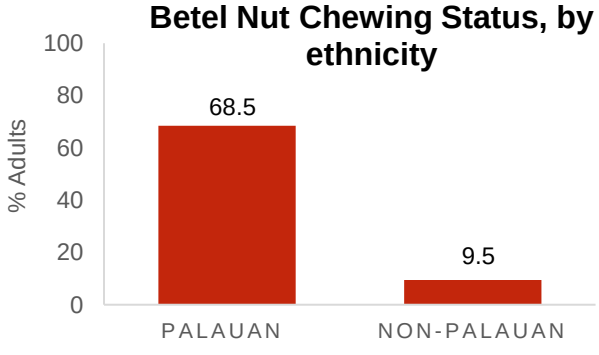


Betel nut chewing is more prevalent among women and those individuals with a lower education. Betel nut chewing is highly prevalent among Palauans (68.5%).





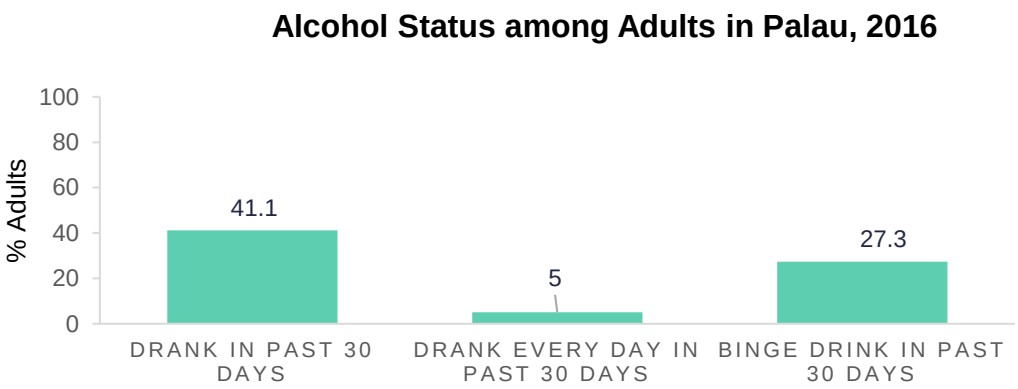




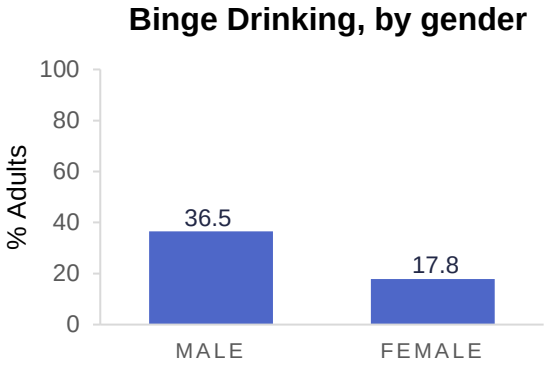
Alcohol Use & Binge Drinking

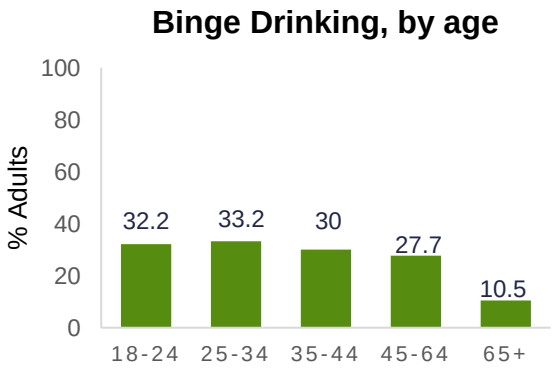
Almost half of adults in Palau (41.1%) reported alcohol use in the past 30 days. 5% of all adults reported drinking alcohol every day in the past 30 days. Almost one-third of adults (27.3%) reported binge drinking* in the past 30 days.

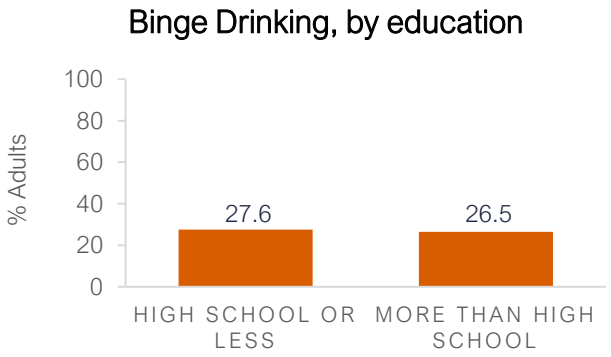
*(binge drinking is defined as drinking 4 or more standard drinks on one occasion for women and 5 or more standard drinks on one occasion for men)

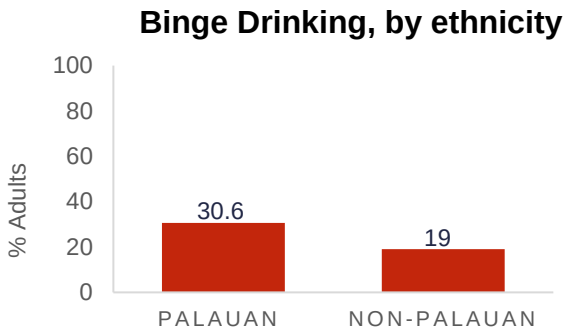


Binge drinking is more prevalent among men compared to women and more Palauans compared to non-Palauans.



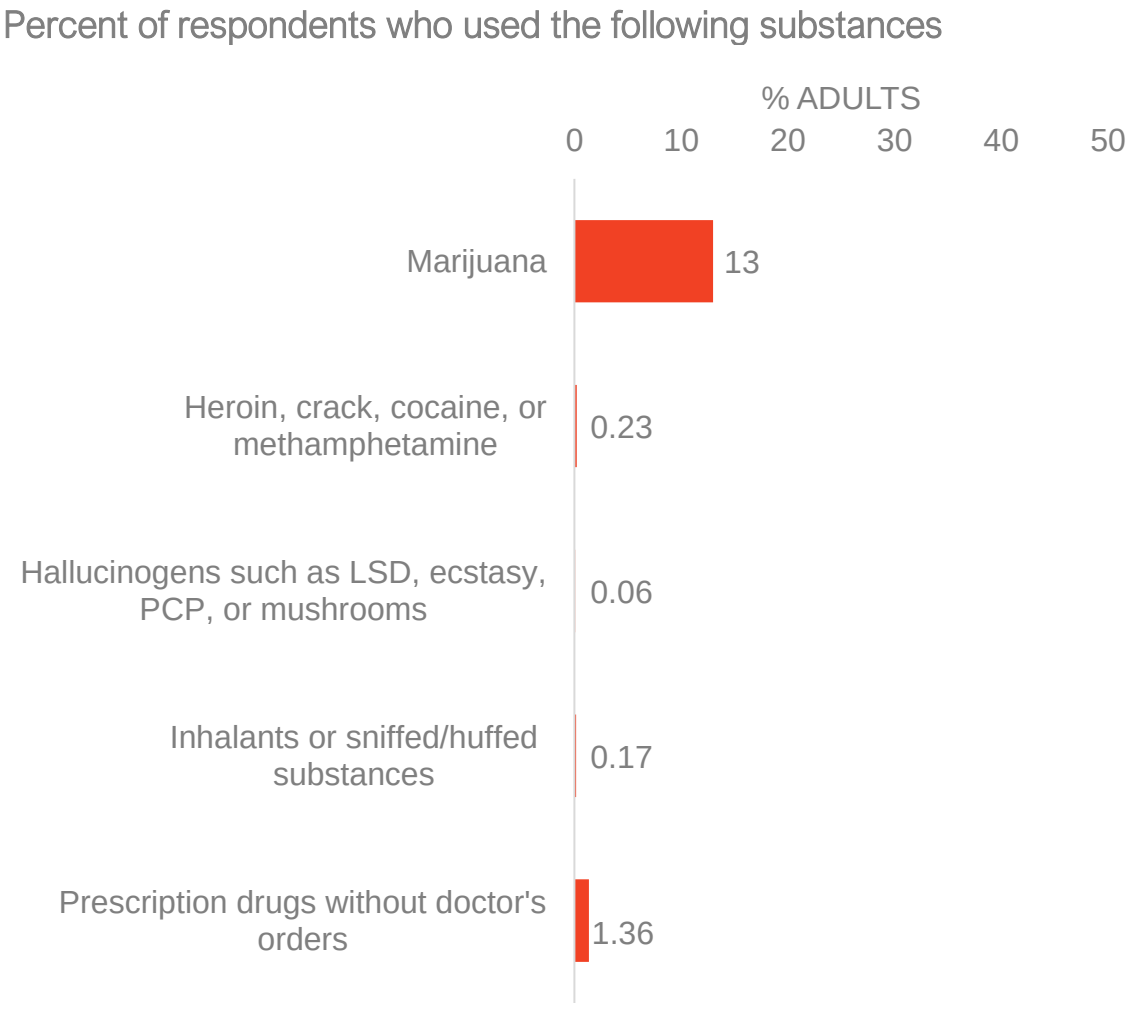






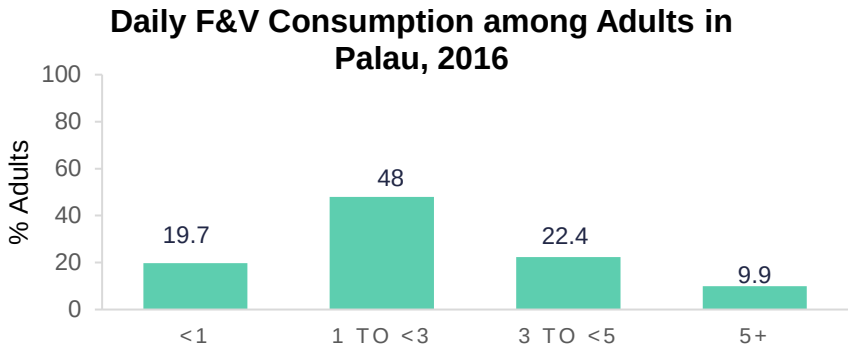
Drug Use

13% of adults in Palau used marijuana in the past 30 days, 1.3% used prescription drugs without doctor's orders, and less than 1% used inhalants, hallucinogens, or heroin / crack / cocaine / methamphetamine.

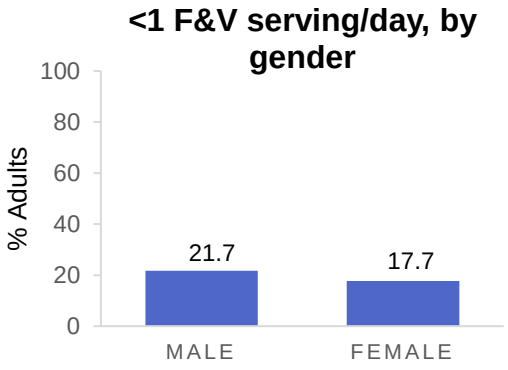


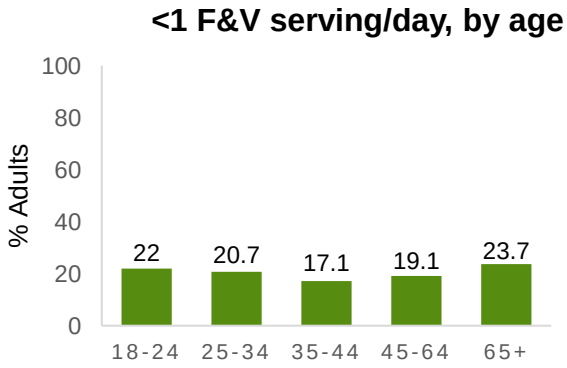
Fruit & Vegetable Consumption

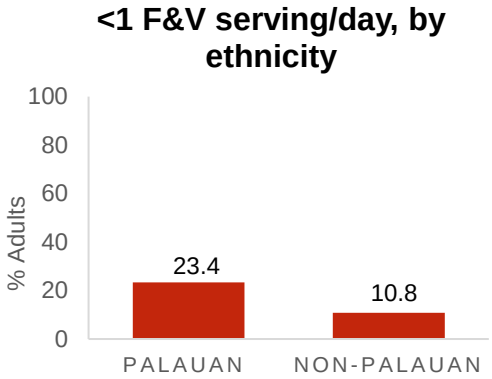
9 out of 10 (90.1%) adults in Palau consume less than the recommended daily servings of fruits and vegetables (5 per day), and 2 out 10 (19.7%) consume <1 serving of fruits and vegetables daily.

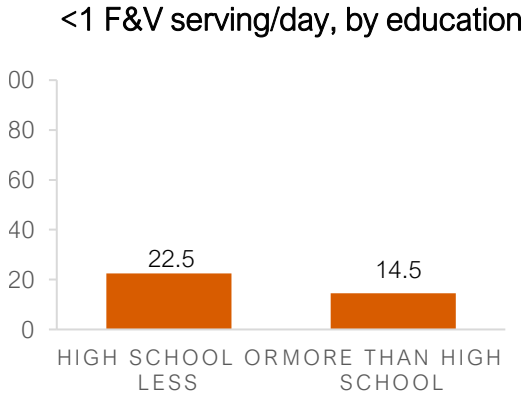


Very low fruit and vegetable consumption (<1 serving per day) was more prevalent among less educated individuals and Palauans.



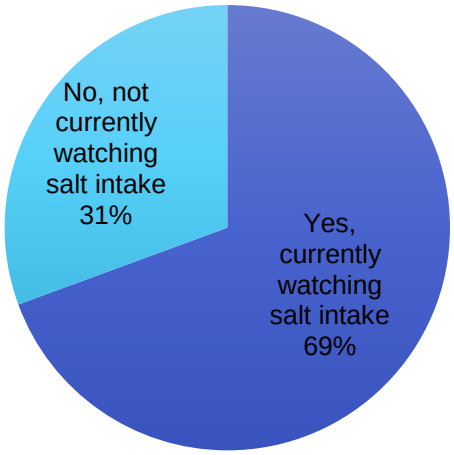


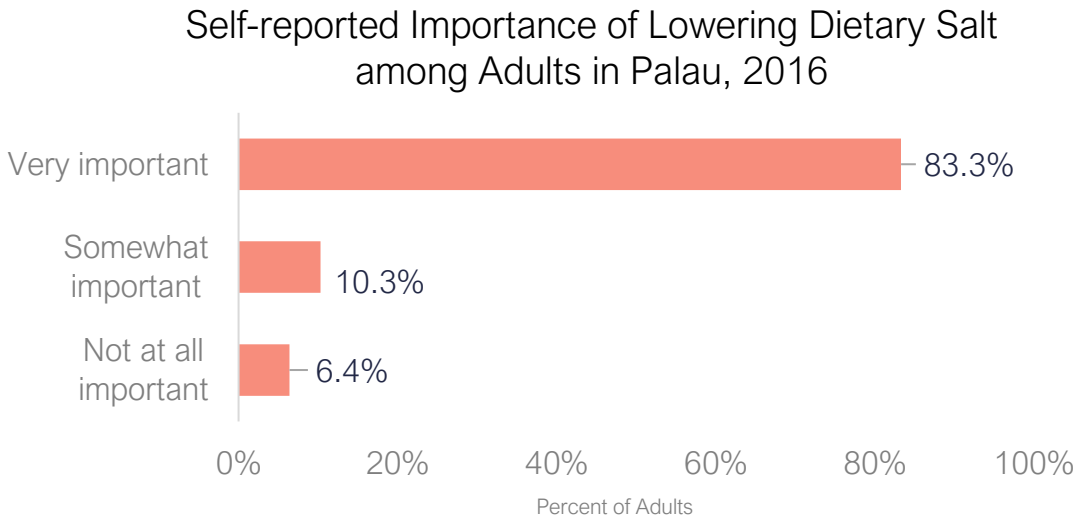




Sodium

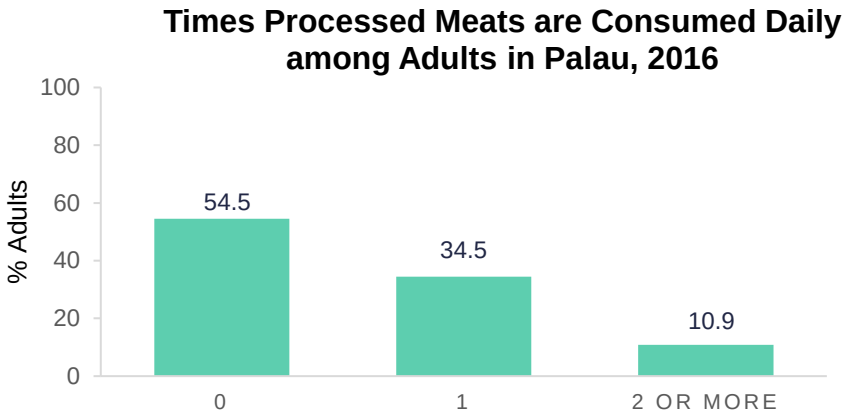
2 out of 3 adults (69.4%) in the Palau say they are currently watching their salt intake. The majority of adults in Palau (83.3%) feel that lowering their dietary salt is very important.



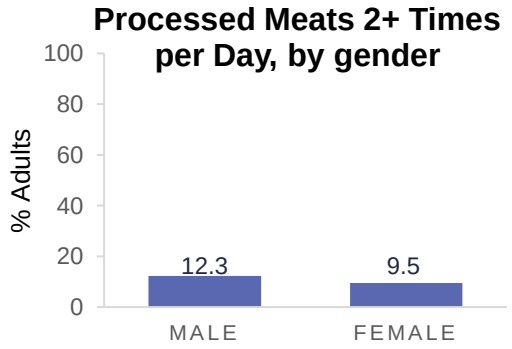


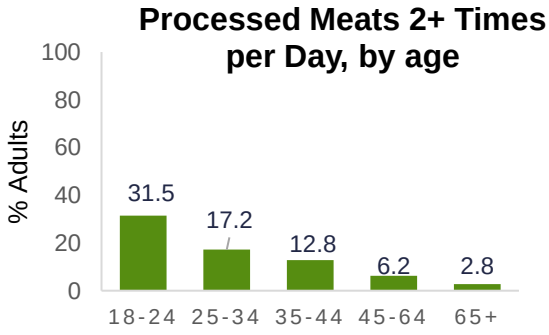
Processed meat consumption

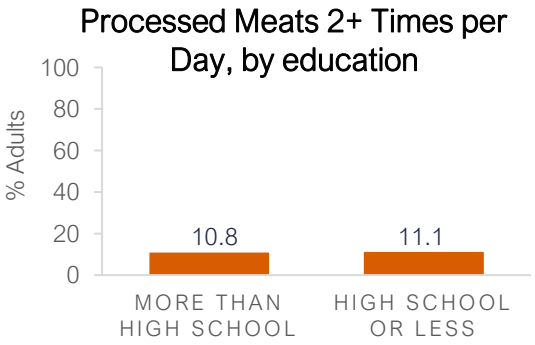
Almost half (45.5%) of adults in Palau consume processed meat at least once per day.

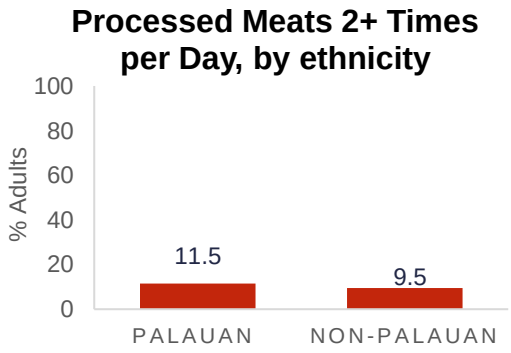


Heavy consumption of processed meats (2+ times per day) is most prevalent among younger adults, especially those 18-24 years old.



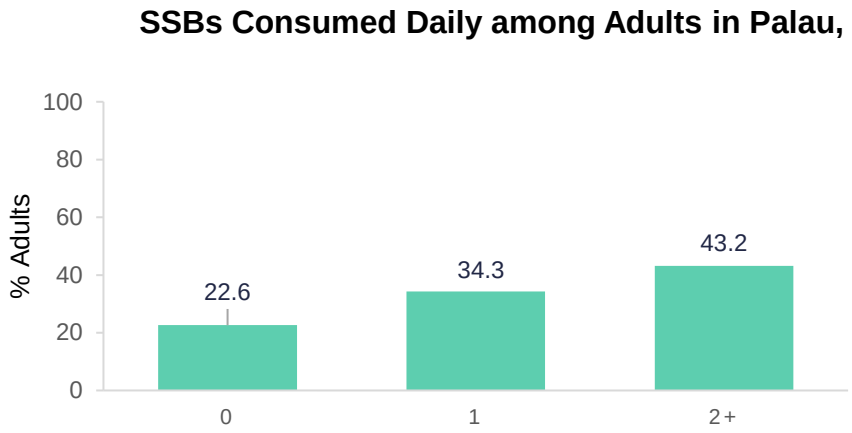




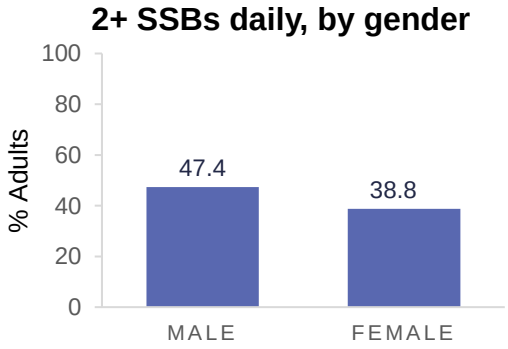


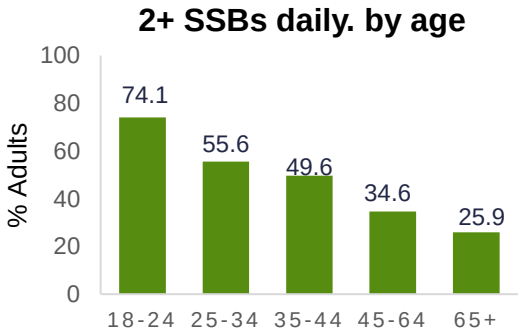
Sugar-sweetened beverages

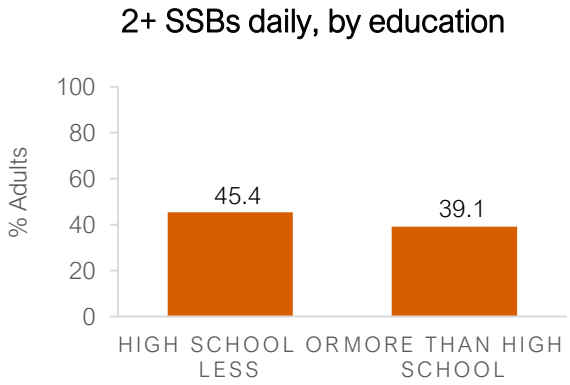
More than 3 out 4 adults (77.4%) in Palau consume at least one sugar-sweetened beverage (SSB) each day. Almost half of adults (43.2%) consume 2 or more SSBs daily.

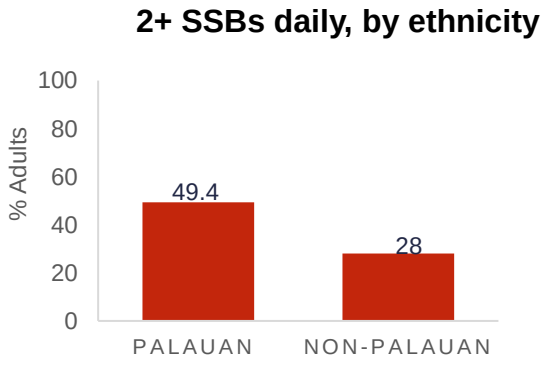


Heavy consumption of SSBs is most prevalent among males, younger individuals, less educated individuals, and Palauans.



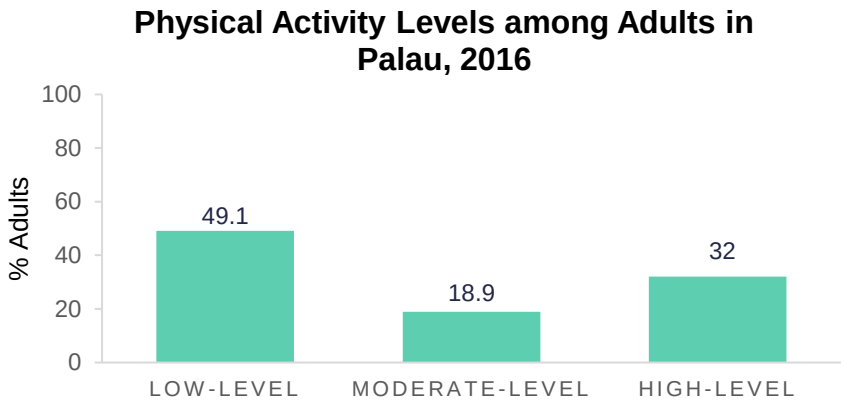




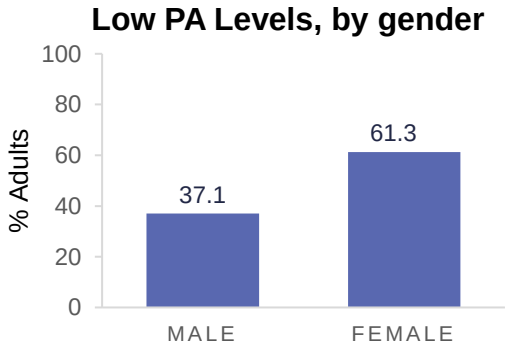


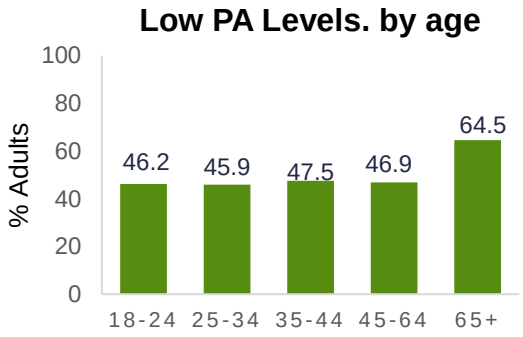
Physical Activity

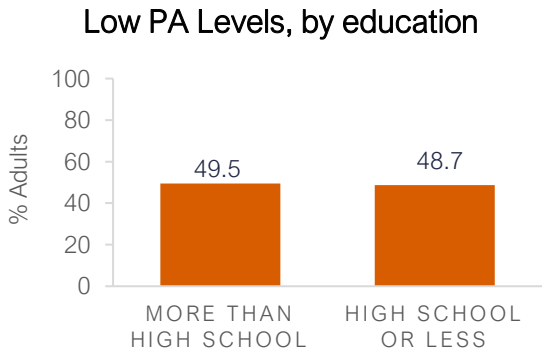
Physical activity is defined by amount of time spent being physically active through work, transportation, or leisure. Based on a comprehensive assessment, 1 out of 2 adults in the Palau are classified as having a low-level of physical activity.

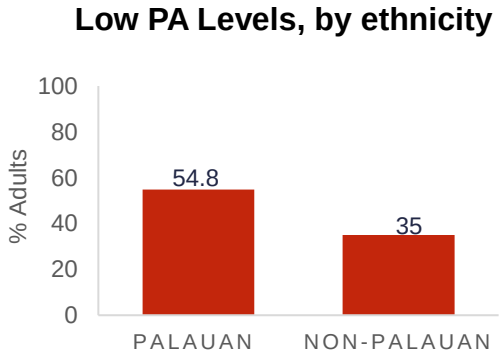


Low-level physical activity is most prevalent among women, older adults, and Palauans.





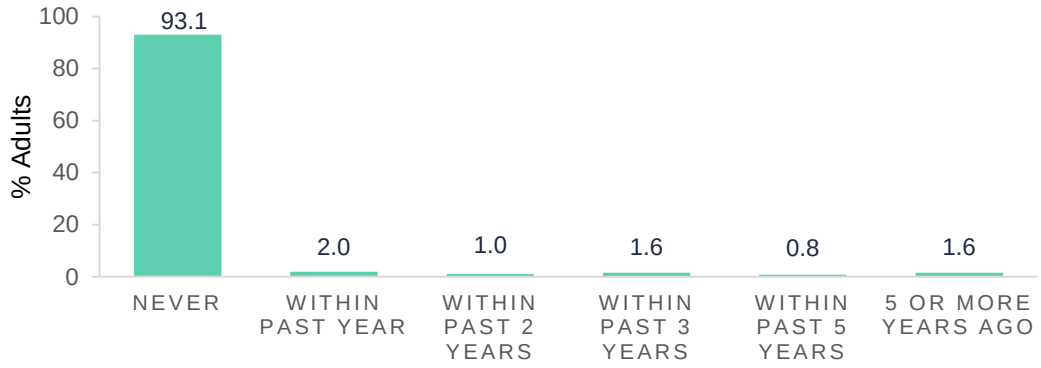




Colon Cancer Screening

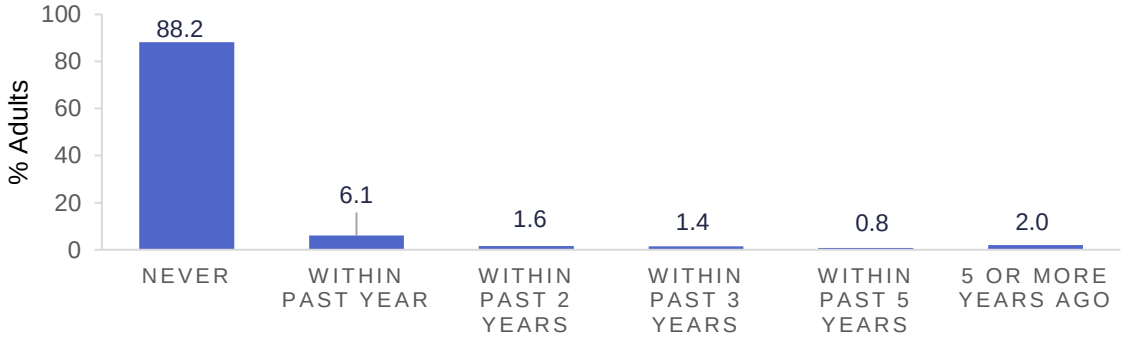
Most adults 50 years and older in Palau (93.1%) have never received a colonoscopy.

Last Colonoscopy among Adults (50+ years) in Palau, 2016



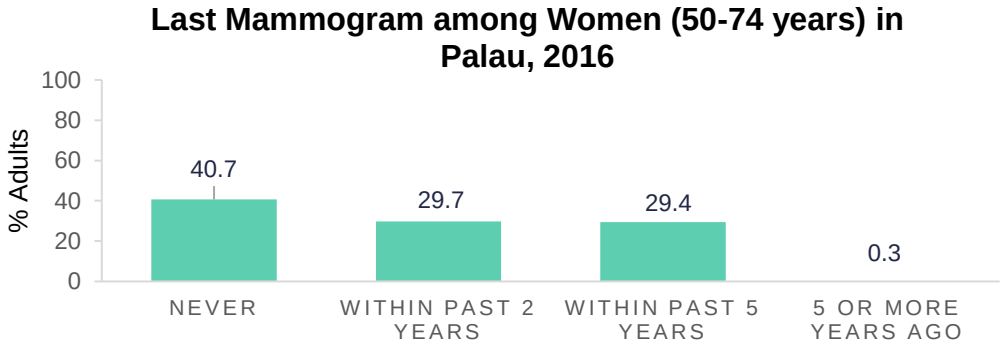
Most adults in 50 years and older in Palau (88.2%) have never received a Blood Stool Test

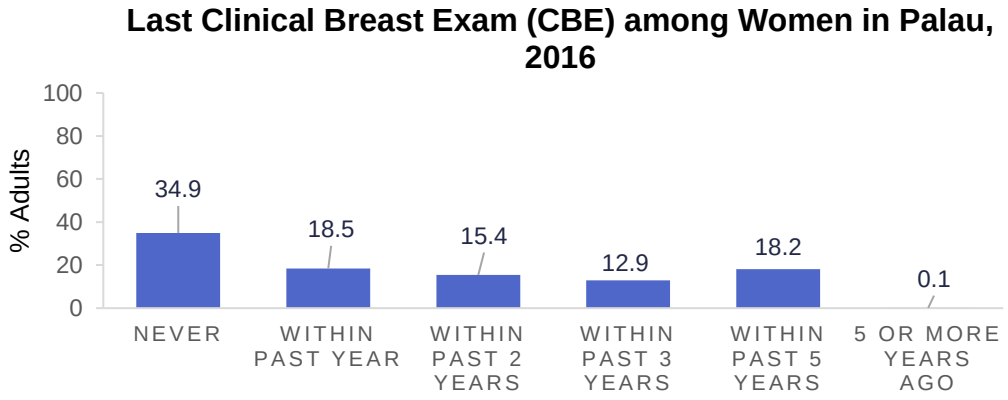
Last Blood Stool Test among Adults (50+ years) in Palau, 2016



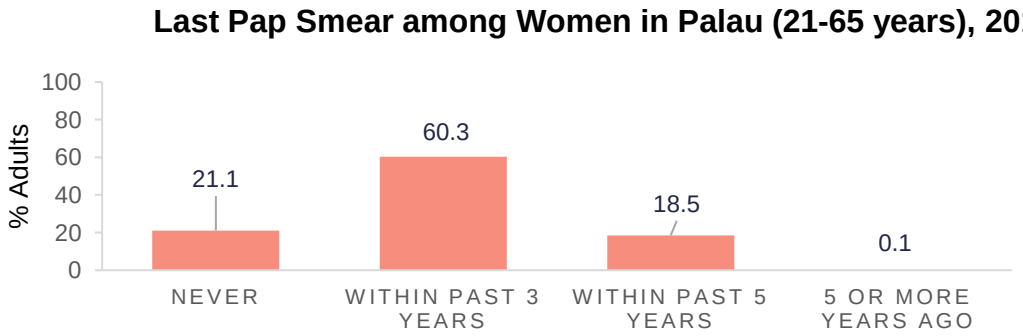
Female Cancer Screening

Fewer than one-third (29.7%) of women aged 50-74 years in Palau have received a mammogram in the past two years (per USPTF recommendation); 2 out of 5 (40.7%) have never received a mammogram.



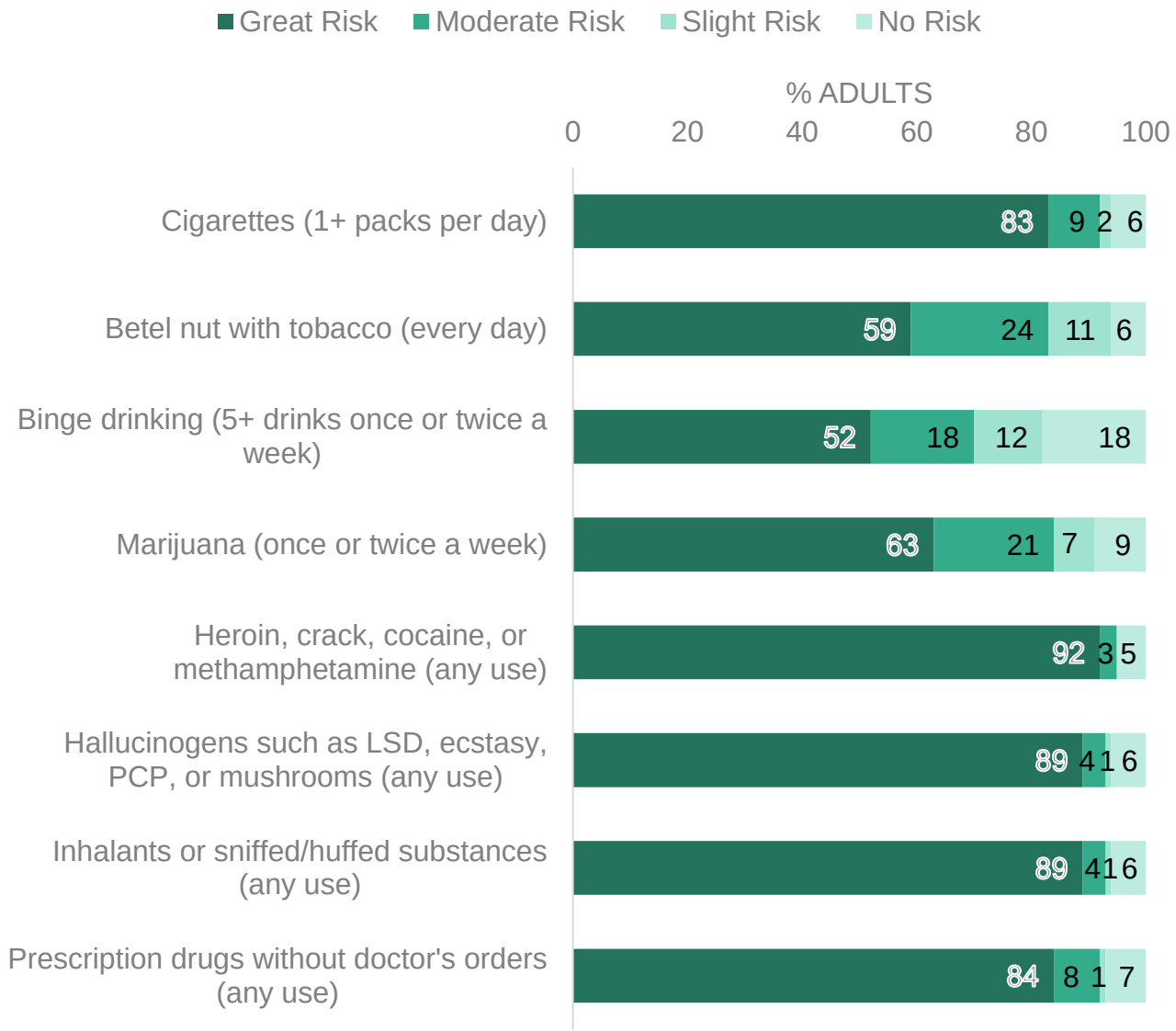


Almost two-thirds (60.3%) of women aged 21-65 years in Palau have had a Pap Smear in the past 3 years (per USPTF recommendation); 1 out of 5 have never had a Pap Smear



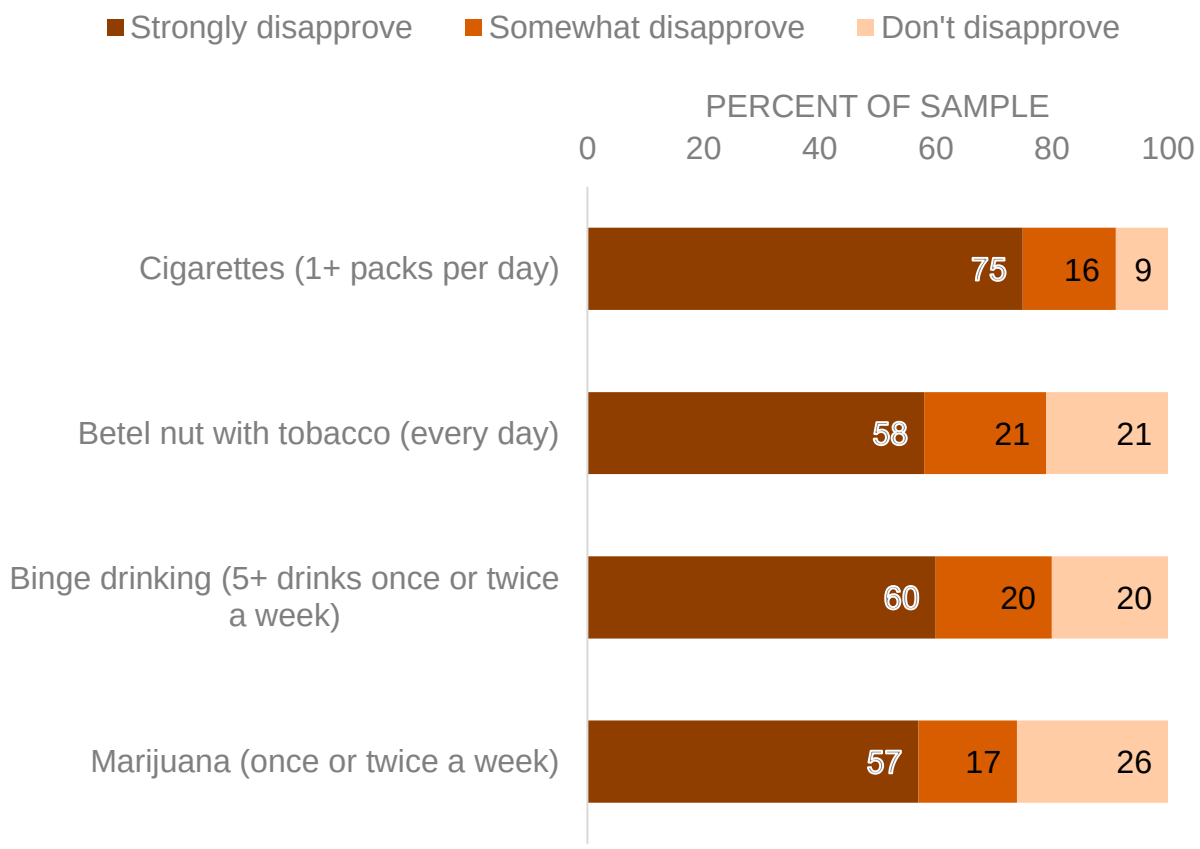
Perceptions of Substance Risk

Participants were asked to evaluate risk of certain substances. Illicit substances were perceived as most risky, followed by cigarette smoking and marijuana use. Chewing betel nut with tobacco and binge drinking were perceived as least risky.



Disapproval of Substances

Participants were asked to assess disapproval of certain substances. There was highest disapproval of cigarette smoking, and somewhat lower disapproval of betel nut with tobacco chewing, binge drinking, and marijuana use.



Important notes about survey

Limitations

- Most data collected were based on self-report so bias may exist
- Not all of the original sample was surveyed (73.4%) due to missing households, off-island residents, refusals, etc.

Strengths

- Thorough training of enumerators
- Standardization of anthropometric measures (height and weight)
- Successful collaboration between Palau MOH NCD Bureau, Palau MOH Prevention Unit, Palau Office of Planning and Statistics, University of Hawaii, and University of Rochester
- Support and collaboration of partners, specifically CDC, PIHOA, SAMHSA, and WHO
- Collection of physical and biochemical measurement for NCD prevalence estimation rather than just self-report
- Data collection using tablets was timely and effective

Challenges

- Not enough enumerators were recruited and trained and enumerator retention was an issue
- Household sample from 2015 census was challenging to use due to rapidly changing households and changes in current owners/renters due to recent influx of tourism and foreign workers
- Some difficulties with language barriers with some foreign workers (survey was only available in English and Palauan)

Recommendations

As previously mentioned, non-communicable diseases are the leading causes of morbidity and mortality in the U.S. Affiliated Pacific Islands, which includes the Palau [1]. Based on the results found, it is apparent that many Palau residents are currently suffering from various NCDs and their lifestyle may be contributing to these morbidities. Cigarette smoking, betel nut chewing, low vegetable and fruit consumption, and overweight/obesity have been identified as prevalent risk factors of NCDs in Palau. Evidence-based programs and policies targeting adults as well as youth may be particularly effective in reducing the prevalence of NCDs in the Palau.

High prevalence of NCDs, specifically diabetes is apparent. Additionally, there appear to be many individuals with undiagnosed NCDs in the population. Among those diagnosed with diabetes or hypertension, control of these conditions appears to be poor. Programs that encourage individuals to seek professional care for screening and treatment of NCDs are recommended. Additionally, evidence-based self-management programs could be considered.

Prevalence of NCDs may also be impacted by limited medical resources in this small island nation such as lack of medical specialists, lack of appropriate equipment and technicians, and lack of laboratory testing supplies and capacity. This is especially true in the smaller outer islands. These limited resources may be contributing to the low prevalence of medical screenings, including mammograms and colonoscopies.

Additionally, it is evident that there are striking ethnic disparities with most NCDs and NCD risk factors. Programs targeting native Palauans should be considered.

Priority areas for health improvement in the Palau include:

1. Reducing overweight and obesity by improving diet/nutrition and increasing physical activity using evidence-based programs
2. Strengthening NCD clinical screening and management programs among adults in Palau.
3. Providing appropriate cessation services for substance use, specifically tobacco and alcohol.
4. Consider policy approaches to reduce certain risk factors.
5. Support chronic disease self-management programs to help individuals with NCDs control their disease.

Acknowledgements

Within Palau

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Gregorio Ngirmang, Former Minister of Health

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Sherilynn Madraisau, Director, Bureau of Public Health

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Survey Planning and Development
Palau State Epidemiological Outcomes Workgroup

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World Health Organization
Dr. Wendy Snowden, Team Coordinator-Pacific NCD and Health through the Life-Course

Pacific Island Health Officers' Association
Dr. Haley Cash, Regional USAPI Epidemiologist
Emi Chutaro, Executive Director

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University of Rochester
Dr. Tim Dye, Professor
Dr. Margaret Demment, Staff Scientist

And a HUGE THANKS to all of the residents in Palau who participated in the Hybrid Survey!

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APPENDIX: Details on indicators

Variable	Source question	Classifications used in this report
General Health	Would you say that your general health is…	The following responses were used: • Excellent • Very good • Good • Fair or okay • Poor or not good
Last doctor visit	About how long has it been since you last visited a medical provider for an annual checkup? An annual checkup is a general physical exam, not an exam for a specific injury, illness, or condition.	The following responses were used: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Last dental visit	How long has it been since you last visited a dentist or a dental clinic for any reason? Include visits to dental specialists, such as orthodontists.	The following responses were used: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago Never
Teeth missing	How many of your permanent teeth have been removed because of tooth decay or gum disease? Include teeth lost to infection, but do not include teeth lost for other reasons, such as injury or orthodontics.	• 1 to 5 • 6 or more but not all • All • None
Body Mass Index category	Measured height and weight were used.	BMI is calculated by taking your weight (in kilograms) over your height squared (in centimeters). We used CDC categories: • Underweight <18.5 • Normal 18.5-24.9 • Overweight 25-29.9 • Obese 30+
Hypertension	Measured blood pressure and self-reported high blood pressure and medication status was used to categorize hypertension.	Individuals were categorized as having hypertension if their measured BP was ≥140/90 and/or if they self-reported being diagnosed with hypertension and were taking medication for their hypertension
High blood sugar or diabetes	Measured fasting blood glucose and self-reported diagnosis of diabetes and medication status was used to categorize high blood sugar/diabetes.	Individuals were categorized as having diabetes if their fasting blood glucose was ≥126mg/dL and/or if they self-reported being diagnosed with diabetes and were on medication for their diabetes.

High Total Cholesterol	Measured total cholesterol was used.	If total cholesterol was ≥190mg/dL the individual was classified as having elevated total cholesterol. If total cholesterol was ≥240mg/dL the individual was classified as having high total cholesterol.
Low HDL Cholesterol	Measured HDL cholesterol was used.	If HDL cholesterol was <40mg/dL the individual was classified as having low HDL.
Gout	Have you ever been told by a doctor that you have _____?	Yes or no
Arthritis		
Asthma		
Ulcer		
Other heart disease		
Heart disease		
Tuberculosis		
Depression		
Stroke		
Lung Disease		
Cancer		
Infertility	At any time did you try for more than 12 months and not become pregnant?	Yes or no
Ectopic pregnancy	Were you ever told that you had an ectopic pregnancy (tubal pregnancy that resulted in a miscarriage)?	Yes or no
Pelvic Inflammatory Disease	Have you ever been treated with antibiotics for an infection in your fallopian tubes, womb, or ovaries, also called a pelvic infection, pelvic inflammatory disease, or P.I.D.?	Yes or no
Cigarette Use	During the past 30 days, on how many days did you smoke cigarettes?	0 days= no use 1-29 days= some use 30 days= Everyday use
Quit cigarette use	Do you want to quit smoking cigarettes?	Yes or no
E-cigarette use	During the past 30 days, on how many days did you use E-Cigarettes or a personal vaporizer (PV), or electronic nicotine?	0 days= no use 1-29 days= some use 30 days= Everyday use
Home 2nd hand smoke	During the past 7 days, on how many days did someone other than you smoke tobacco inside your home while you were at home?	0 days= no exposure 1-7 days= some exoposure
Work 2nd hand smoke	During the past 7 days, on how many days did you breathe tobacco smoke at your workplace from someone else other than you who was smoking tobacco?	0 days= no exposure 1-7 days= some exoposure
Vehicle 2nd hand smoke	During the past 7 days, on how many days did you ride in a vehicle where someone other than you was smoking tobacco?	0 days= no exposure 1-7 days= some exoposure
Any 2nd hand smoke exposure	Answered yes to any of the 2nd hand smoke questions	Yes or no
Betel nut use	During the past 30 days, on how many days did you chew betel nut?	0 days= no use 1-29 days= some use 30 days= Everyday use

Use tobacco in betel nut use	What kind of tobacco do you most often add to your betel nut chew?	If they answered yes to any of the following they were categorized as using tobacco with betel nut: • Cigarette Sticks • Imported loose tobacco • Locally grown tobacco • Other type of tobacco
Quit betel nut use	Do you want to quit chewing betel nut with tobacco?	Yes or no
Alcohol consumption	During the past 30 days, on how many days did you have at least one standard drink of any alcohol?	0 days= no use 1-29 days= some use 30 days= Everyday use
Binge alcohol frequency	During the past 30 days, how many days did you have: • for men: o Five or more standard alcoholic drinks? • for women: o Four or more standard alcoholic drinks?	0 days= no binge 1-29 days= some binge 30 days= Everyday binge
Fruit and vegetable consumption	Sum of usual daily fruit consumption and daily vegetable consumption.	<1 servings 1-<3 servings 3-<5 servings 5 or more servings
Watching salt intake	Most of the sodium or salt we eat comes from processed foods and foods prepared in restaurants. Salt also can be added in cooking or at the table. Are you currently watching or reducing your sodium or salt intake?	Yes or no
Importance of lowering salt in diet	How important is lowering salt in your diet?	Very important Somewhat important Not at all important
Processed meat consumption	In a regular day, how many times do you eat processed meats? This does not include canned fish.	0 servings 1 serving 2 or more servings
Sugar-sweetened beverage consumption	In a regular day, how many sugary drinks do you drink? This does not include diet drinks made with artificial sweeteners.	0 servings 1 serving 2 or more servings
Physical activity level	Based on GPAQ questions and calculations which is a combination of how many weeks a person is vigorously or moderately active due to work, transportation, or recreational activities AND the total number of METs in a week. METs are commonly used in the analysis of physical activity. MET (Metabolic Equivalent): The ratio of the work metabolic rate to the resting metabolic rate. One MET is defined as 1	High-level • If vigorous PA due to work or leisure on more than 3 days a week and Total physical activity MET minutes per week is greater than or equal to 1500 • If moderate PA due to work or leisure on 7 days a week and Total physical activity MET minutes per week is greater than or equal to 3000 Moderate-level

	kcal/kg/hour and is equivalent to the energy cost of sitting quietly. A MET is also defined as oxygen uptake in ml/kg/min with one MET equal to the oxygen cost of sitting quietly, around 3.5 ml/kg/min.	• If vigorous PA due to work or leisure on more than 3 days a week that totals 60 or more minutes • If moderately PA due to work or leisure on 5 days a week that totals 150 or more minutes • If moderate PA due to work or leisure at least 5 days a week and Total physical activity MET minutes per week is greater than or equal to 600 Low-level • Doesn't meet any of the above criteria
Colonoscopy screening	How long has it been since your last colonoscopy?	The following responses were used for those adults 50+: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Blood stool test	A blood stool test is a test that determines whether the stool contains blood. How long has it been since your last blood stool test?	The following responses were used for those adults 50+: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Mammogram screening	How long has it been since you had your last mammogram?	The following responses were used for those women 50-74: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Clinical breast exam	A clinical breast exam is when a doctor, nurse, or other health professional feels the breasts for lumps. How long has it been since your last clinical breast exam?	The following responses were used for those women: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Pap smear screening	How long has it been since you had your last Pap test?	The following responses were used for those women 21-65: • Within past year • Within past 2 years • Within last 5 years • 5 or more years ago • Never
Prescription drug use		No use= 0 days Use= 1 or more days
Inhalant drug use		

LSD drug use Heroin drug use Marijuana drug use	During the past 30 days, report on how many days you used any of the following substance: _____.	
Perceptions of drugs as risky	How much do people risk harming themselves physically and in other ways when they engage in the following behaviors? • Cigarettes • Alcohol • Marijuana • Betel nut with tobacco • Heroin • LSD • Inhalants Prescription drugs without doctor's orders	The following response were used: • Great risk • Moderate • Slight No risk
Disapproval of drug use	How much do you approve or disapprove of the following substances? • More than 1 pack of cigarettes per day • Betel nut with tobacco everyday • Marijuana more than once a month 2 or more alcohol beverages a day	The following response were used: • Strongly disapprove • Somewhat disapprove Don't disapprove (includes: approve, somewhat approve, and neither approve or disapprove)