

Pohnpei

Federated States of Micronesia

Adult Hybrid Survey



2024/2025



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Stuard H. Penias
Director of Health and Social Services

KASELEHLIE and GREETINGS,

I am pleased to provide my formal endorsement of the 2023-2024 Pohnpei NCD Adult Hybrid Survey in Pohnpei.

This survey was conducted by the Department of Health and Social Services under the Primary Health Division, (NCD Program) in collaboration with Pohnpei Women's Council (PWC). This is the first time Pohnpei Department of Health has ventured out in collaboration with NGO's in this survey. I extend my sincere gratitude to The Pacific Island Health Officer's Association (PIHOA) for their support with the United States Affiliated Pacific Islands (USAPI) in guiding non-communicable disease (NCD) surveillance efforts.

The information gathered through the survey is more than just numbers, it is a foundation in which we will build targeted and effective strategies to combat non-communicable diseases like Diabetes, Hypertension, and Cancer, just to name a few in Pohnpei. The inclusion of mental health and community assessment adds a crucial dimension to our understanding of the overall well-being of our community. The data is telling us a story about the status of the health of our people and our department is committed to translate it into a call of action for the based- evidence interventions to at least decrease and even reverse the growing burden of the NCD crisis.

I extend my gratitude to the dedicated team of healthcare professionals, community partners and volunteers who collaborated to bring the survey to its completion. Their commitment to advancing our understanding of non-communicable diseases and mental health is commendable and reinforces our collective mission to foster a healthier and more resilient society.

May this report serve as a catalyst for collaboration, innovation and a renewed commitment to prioritizing and enhancing the health of our communities. As health services can only manage 20% of the NCD crisis, the 80% is addressed by the social and environmental determinants of health. Together, let us embark on a journey for a healthier future in building a "Nan Madol" wall against NCD's.

Kalahngan,

Stuard H. Penias

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Summary

The aim of this report is to assess the current prevalence of non-communicable diseases (NCDs) and selected risk factors for NCDs in Pohnpei, Federated States of Micronesia. We hope that this report enables Pohnpei to better understand its burden of these conditions and risk factors, monitor trends, and determine who is at greatest risk for poor health to improve health through the development of targeted evidence-based interventions.



NCDs such as heart disease, cancer, and diabetes are global issues that result in high burdens of disability and premature death [1]. Additionally, substance use, and poor mental health can also greatly contribute to disability and premature death throughout the world [2]. NCDs, substance use, and poor mental health are highly linked to several key risk factors, such as cigarette smoking, tobacco chewing, excessive alcohol consumption, unhealthy diet, lack of physical activity, and overweight/obesity [1]. Over the past few decades there have been drastic changes in lifestyle in Pohnpei, an island state of the Federated States of Micronesia in the Western Pacific Ocean. Pohnpei has shifted from mostly subsistence living and reliance on locally produced crops and fish to a more Western lifestyle that includes sedentary occupation and more reliance on imported foods. This lifestyle shift has resulted in higher burdens of certain risk factors, NCDs, and poor mental health [3].

The NCDs of concern in the US-Affiliated Pacific Islands (USAPIs) include diabetes, heart disease, stroke, cancer, and chronic obstructive pulmonary disease [1,2]. 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 [4]. However, the four 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 [2]. In the Pacific Islands, betel nut (which is carcinogenic to humans) chewing with or without tobacco is also identified as a significant health problem [4].

Pohnpei undertook its second population-based household survey, the Adult Hybrid Survey, that combined NCDs and associated risk factor indicators between 2024 to 2025. A total of 1102 individuals aged 18 years or older participated in the survey. Respondents answered questions about their alcohol and tobacco use, other substance use, dietary habits, physical activity, health access, oral health, health conditions, mental health, and cancer screening. Additionally, height and weight, fasting blood glucose, total cholesterol, and blood pressure were measured.

Pohnpei vs. USA

The table below compares Pohnpei's 2024 Adult Hybrid prevalence data to relevant U.S. prevalence data using the most comparable sources available.

*Due to lack of raw data from US sources, statistical analysis could not be performed.

Nearly all selected health indicators had a worse prevalence in Pohnpei than in the US. However, e-cigarette use is lower in Pohnpei than in the US. The prevalence of current alcohol consumption is also lower in Pohnpei, but binge drinking prevalence is higher than in the US. The prevalence of high cholesterol is lower in Pohnpei, though, the prevalence of overweight/obesity and diabetes are higher than in the US.

	Pohnpei (%)	US (%)	Comparison
Current tobacco use (past 30 days)			
Cigarette smoking	15.0	14.0	○
E-cigarette use	2.1	7.7	↓
Current alcohol use (past 30 days)			
Alcohol use (any)	25.6	53.6	↓
Binge drinking (5+ drinks per day)	22.2	17.0	↑
Nutrition			
Consuming fruit <1 time per day	71.2	40.8 ¹	↑
Consuming vegetables <1 time per day	62.0	19.7 ¹	↑
Health and healthcare			
Fair or poor health (self-reported)	33.4	17.0	↑
No medical checkup in the past year	53.8	23.2	↑
Oral health			
No dental visit within past year	67.4	34.2	↑
Extracted permanent teeth due to decay/disease	52.3	40.3	↑
Chronic conditions			
Overweight/obesity	77.7	73.1 ²	↑
Diabetes (self-reported + undiagnosed)	23.0	14.7 ³	↑
Hypertension (self-reported + undiagnosed)**	32.1	31.7 ⁴	○
High Cholesterol**	9.6	11.3 ⁵	↓
Cancer screening			
No Pap smear in the past 3 years (women 21-65 yo)	79.0	22.3 ⁶	↑
No mammogram in the past 2 years (women 50-74 yo)	91.4	21.7 ⁶	↑

**Diabetes prevalence is estimated based on either a self-report of diabetes for which the patient is taking medication and/or an A1c of $\geq 6.5\%$ during the survey

**Hypertension prevalence is estimated based on either a self-report of hypertension for which the patient is taking medication and/or a measured average blood pressure (of 2 readings) of $\geq 140/90$.

**High cholesterol is based on a measurement of total cholesterol of $\geq 240\text{mg/dL}$.

Source for US comparison: BRFSS 2022 unless noted with:

¹BRFSS 2021

²NHANES 2017-2018 (adults 20+)

³CDC National Diabetes Report 2022 (includes diagnosed and undiagnosed diabetes)

⁴NHANES 2017-2018 (adults 18+; includes diagnosed and undiagnosed hypertension)

⁵NHANES 2013-2018 (adults 20+)

⁶BRFSS 2020

Surveillance in Pohnpei : 2019 vs. 2024

The table below compares the 2019 Pohnpei Hybrid Survey results to the 2024 Pohnpei Hybrid Survey.

Chi-square analysis ($p < 0.05$ considered statistically significant) was used for comparisons with:

red indicating a worsening trend

yellow indicating no significant change

green indicating an improving trend

	2019 (%)	2024 (%)	Comparison
Current tobacco use			
Cigarette smoking in the past 30 days	19.8	15.0	↓
Chewing betel nut with tobacco in the past 30 days	43.1	40.4	○
E-cigarette use	1.2	2.1	○
Current alcohol use			
Alcohol use in the past 30 days	25.1	25.6	○
Binge drinking in the past 30 days	23.3	22.2	○
Nutrition			
<5 servings of fruits and vegetables per day	87.4	88.8	○
2+ sugar-sweetened beverages per day	59.2	62.3	○
Health and Healthcare			
Self-reported fair or poor health	29.1	33.4	↑
Medical checkup in the past year	46.0	46.2	○
Oral Health			
Dental visit within past year	29.7	32.6	○
Any permanent teeth extracted due to decay/disease	70.8	52.3	↓
Cancer Screening			
Up-to-date Pap (women 21-65 yo) ¹	28.1	21.0	↓
Up-to-date mammogram (women 50-74 yo) ²	3.5	8.6	↑
Chronic conditions			
Overweight/obesity ³	77.2	77.7	○
Diabetes ⁴	22.7	23.0	○
Hypertension ⁵	22.5	32.1	↑
High cholesterol (240mg/dL or higher)	5.8	9.6	↑

¹up-to-date is a Pap within the past 3 years per USPTF guidelines

²up-to-date mammogram is a mammogram within the past 2 years per USPTF guidelines

³Overweight/obesity determined as a BMI ≥ 25 based on measured height and weight

⁴2019: diabetes was determined by a self-report of medicated diabetes and/or fasting blood glucose of ≥ 126 mg/dL; 2023: diabetes was determined by a self-report of medicated diabetes and/or an A1c of $\geq 6.5\%$

⁵Hypertension was determined by a self-report of medicated hypertension and/or an average blood pressure reading (out of 3 readings) of $\geq 140/90$

Introduction

Non-communicable diseases (NCDs) are the leading causes of morbidity and mortality for adults 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]).



In 2010, the Pacific Island Health Officers Association (PIHOA) declared a regional health emergency due to the epidemic of NCDs in the USAPIs [1]. The NCDs of concern in the USAPIs include diabetes, heart disease, stroke, cancer, and chronic obstructive pulmonary disease [2]. 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 [3]. 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 [2]. In the Pacific Islands, betel nut (which is carcinogenic to humans) chewing with or without tobacco is also identified as a significant health problem [4].

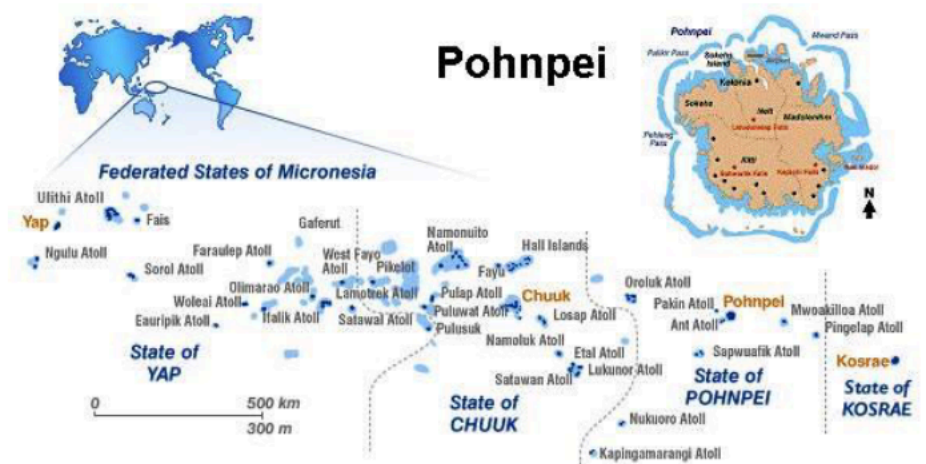
Key components of PIHOA's response to the NCD crisis include strengthening NCD surveillance systems and building epidemiologic capacity to improve data quality and reporting in the USAPIs.

Due to the need for current NCD and risk factor prevalence data, the Pohnpei Department of Health and Social Services developed and implemented an adult population-based Hybrid Survey initially in 2019, then again in 2024. The Hybrid Survey was designed to assess NCD risk factors and conditions through self-diagnosis, as well as physical and biochemical measurements.

Background on Pohnpei

Pohnpei is one of four states that make up the Federated States of Micronesia (FSM), along with the states of Chuuk, Pohnpei, and Yap.

The Federated States of Micronesia (FSM) is an island country in Micronesia that is affiliated with the US under a Compact of Free Association, which became effective on November 3, 1986. Within the FSM there are four states: Chuuk, Kosrae, Pohnpei, and Yap - which are geographically separated and have their own unique languages and cultures.



Pohnpei is home to the capital of FSM, Palikir. With an area of 129 square miles, it is the largest island in the FSM and also the most developed. Pohnpei is divided into six municipalities: Kitti, Kolonia, Madolenihmw, Nett, Sokehs, and U.



The total population of Pohnpei is 36,196 (2010 census). The majority of the population (34,789) reside on the main island, whereas 1,407 reside in the outer islands. Over half (56.2%) of the population of Pohnpei is less than 25 years of age [7]. According to the 2010 census, there were 18,371 males (50.8%) and 17,825 (49.2%) females.

As of 2010, the growth rate of Pohnpei was 0.45%.

Survey Methodology

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

Objectives

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




Target group

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

Data collection

Data collection began on November 15, 2024, and ended on June 30, 2025. A total of 1102 respondents completed the survey and measurements. All interviews and measurements were performed by trained surveyors hired by the Pohnpei State Department of Health and Social Services.

<p>Sample size determination</p> 	<p>The original sample included 1100 households. 'Household' sample size was determined based on the adult population sizes of all states in Pohnpei based on the 2010 Census.</p>
<p>Sampling procedures</p> 	<p>Multi-stage sampling was be used to recruit participants in this survey. This procedure is described in detail below</p> <p>Stage 1: Household Sampling All municipalities were sampled based on adult population size within these municipalities based on most recent estimates from the Census (2010).</p> <p>Stage 2: Selection of the individual from the household for the Hybrid survey</p> <p>Kish methodology was used for random selection of one adult per selected household. Step 1: Ask for the age and sex of all adults living the household (Start with youngest person in the household, exclude those visiting and do not live in the household; also exclude those who would be unable to provide consent) Step 2: Put a rank for each individual aged 18 years and over following the rules below: First put a rank for males from the oldest to the youngest Second put a rank for females from the oldest to the youngest Step 3: Use Kish grid to identify selected participant based on rank.</p>
<p>Data collection</p> 	<p>Surveys were translated and available in Pohnpeian and English. Data were collected by trained surveyors using face-to-face questionnaires and anthropometric and other physical and biochemical measurements. Quality control of completed questionnaires was ensured at different stages during the questionnaire-processing phase.</p>
<p>Data entry</p> 	<p>All data were collected electronically using a tablet. Tablets were uploaded on a weekly basis by the Pohnpei State Department of Health and Social Services.</p> <p>A data dictionary was created to explain the indicators and data codes.</p>
<p>Data cleaning</p> 	<p>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.</p>
<p>Data analysis</p> 	<p>Descriptive data analysis was conducted. Chi-squared analysis was used to analyze differences by:</p> <ul style="list-style-type: none"> • age group (18-24 yo, 25-34 yo, 35-44 yo, 45-65 yo, or 65+ yo) • gender (male or female) • education (less than high school education, completed high school education, or more than high school education) • municipality (Kitti, Kolonia, Madolenihmw, Nett, Sokehs, or U) <p>Due to the age of the most recent Census data, large sample size, and ability to analyze locally, these data were not weighted.</p>

Sample Summary

The sample collected was similar to population estimates based on the 2010 Census. Although the sample appears to be a bit older, the comparison population statistics are over a decade old. Therefore, these data were not weighted.

	<u>Survey sample</u>	<u>2010 Census data (18 and older)</u>
	n = 1102	n = 20,799
Gender		
Male	484 (43.9%)	10,475 (50.4%)
Female	618 (56.1%)	10,324 (49.6%)
Age group		
18-24 years	123 (11.2%)	4,960 (23.9%)
25-34 years	172 (15.6%)	5,002 (24.1%)
35-44 years	249 (22.6%)	4,287 (20.6%)
45-54 years	224 (20.3%)	3,461 (16.6%)
55-64 years	192 (17.4%)	1,991 (9.6%)
65+ years	142 (12.9%)	1,098 (5.3%)
Municipality		
Kitti	207 (18.8%)	6,470 (18.7%)
Kolonia	212 (19.2%)	6,068 (17.6%)
Madolenihmw	224 (20.3%)	5,662 (16.4%)
Nett	139 (12.6%)	6,542 (18.9%)
Sokehs	208 (18.9%)	6,640 (19.2%)
U	112 (10.2%)	3,192 (9.2%)

*Municipality data for Pohnpei is for all ages on Pohnpei proper only

Demographics

Gender	<u>n</u>	<u>%</u>
Male	484	43.9
Female	618	56.1
<i>Education</i>		
Less than high school	485	44.3
High school	406	37.1
Associate's degree	150	13.7
Bachelor's degree	28	2.6
Graduate or professional degree	26	2.4
<i>Ethnic Background</i>		
Pohnpeian	1056	95.9
Other	45	4.1
<i>Marital Status</i>		
Single, never married	221	20.1
Married	713	65.0
Widowed	132	12.0
Divorced/separated	31	2.8
<i>Employment Status</i>		
Government employee	220	20.0
Non-government employee	128	11.6
Self-employed	391	35.5
Non-paid (volunteer, subsistence, etc.)	4	0.4
Student	43	3.9
Homemaker	37	3.4
Retired	44	4.0
Unemployed (able to work)	164	14.9
Unemployed (unable to work)	70	6.4

NOTE: some Ns may not total 1102 due to responses of “don’t know” or “refused”

Demographics

Military Status

	<u>n</u>	<u>%</u>
Active Duty	21	1.9
Reservist	3	0.3
Veteran	8	0.7
Retired	3	0.3
Never Served	1063	96.8

Religion

Congregational Christian Church	7	0.6
Catholic	608	55.3
UCCP Protestant	400	36.4
Seventh Day Adventist	11	1.0
LDS/Mormon	24	2.2
Pentecostal/AOG	3	0.3
Baptist	15	1.4
Other	29	2.6
None	3	0.3

Household Income

< \$5,000	567	68.9
\$5,000 to < \$10,000	124	15.1
\$10,000 to < \$15,000	66	8.0
\$15,000 to < \$20,000	30	3.6
\$20,000 or more	36	4.4

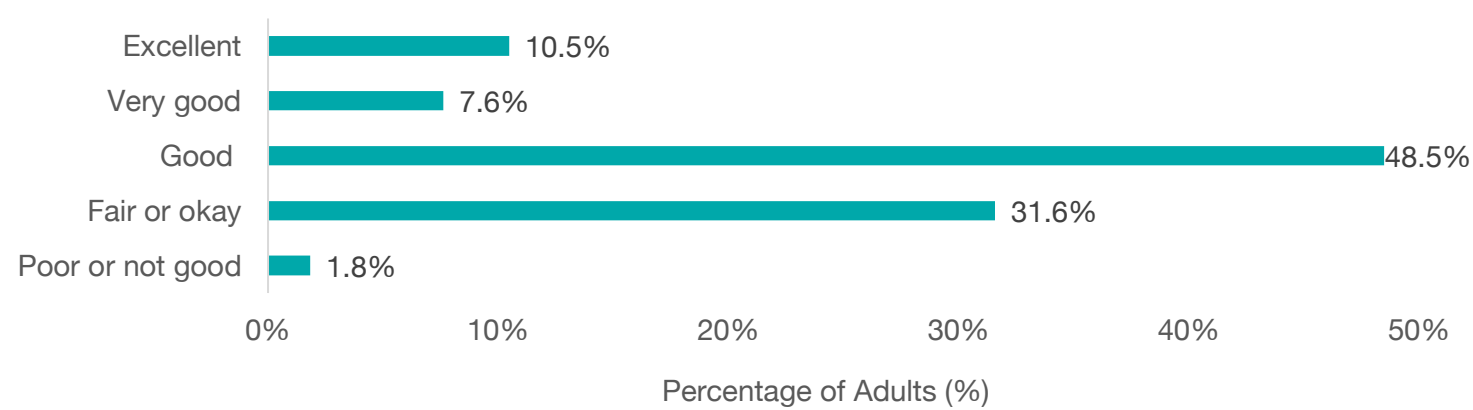
NOTE: some Ns may not total 1102 due to responses of “don’t know” or “refused”

General Health

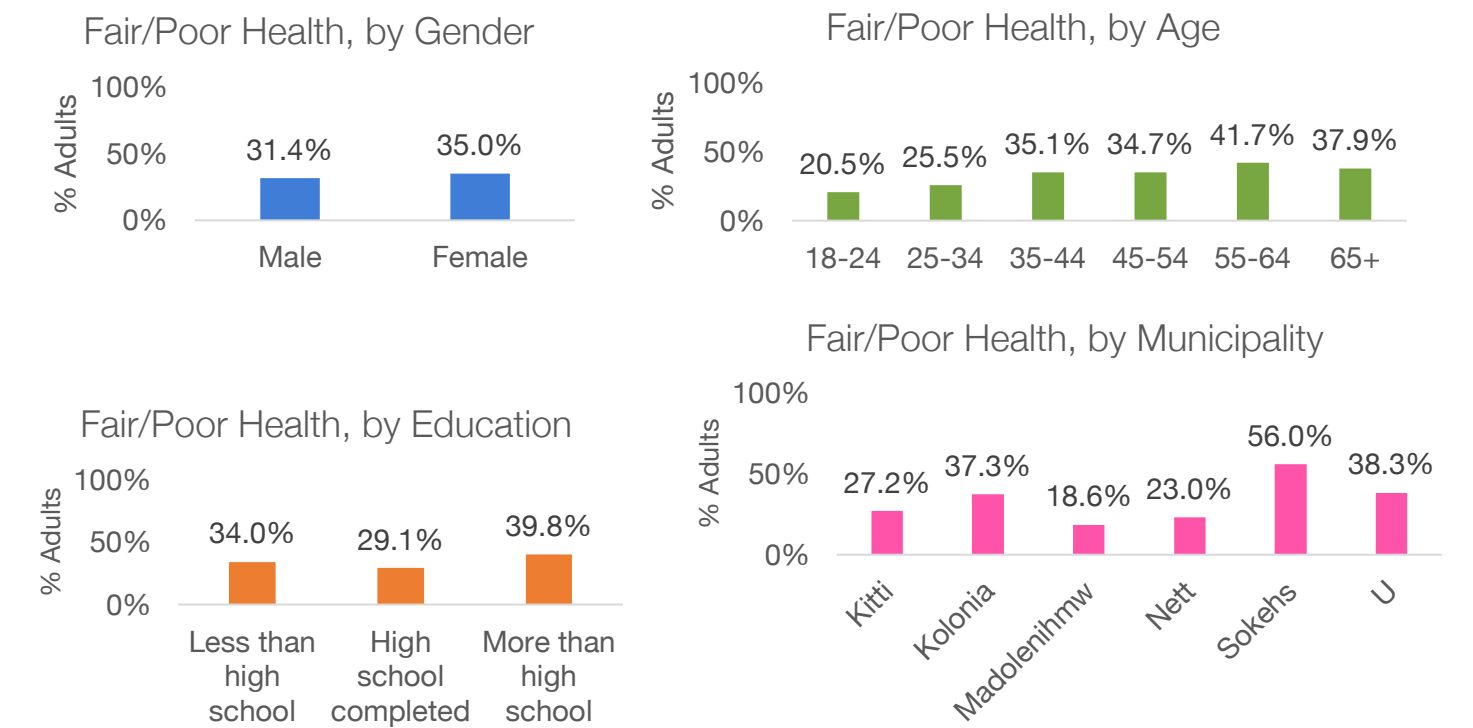
A third (33.4%) of adults in Pohnpei self-reported their general health to be fair or poor.*

*(33.4%; 95% CI: 30.7% - 36.3%)

Self-reported Health Status Among Adults in Pohnpei, 2024



Perception of fair or poor health was higher among older adults, those with more than a high school education, as well as those living in Sokehs.

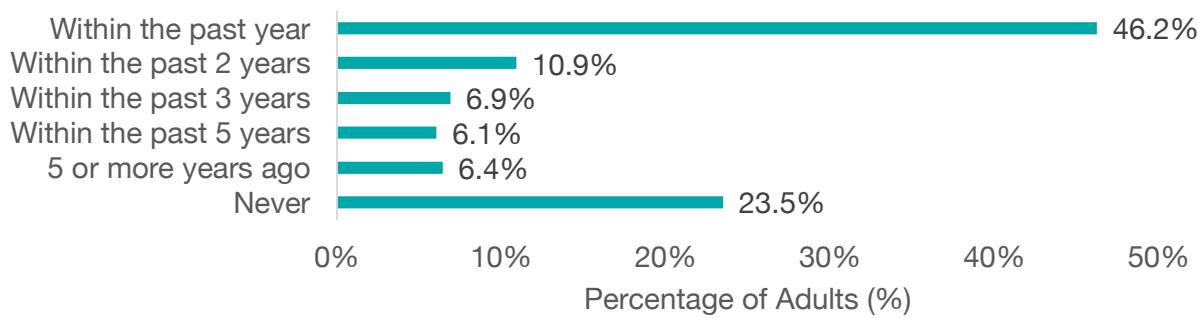


Access to Care: Annual Exam

Over half (53.8%) of adults in Pohnpei did not receive an annual exam in the past year.* Nearly a quarter (23.5%) of adults have never had an annual exam.

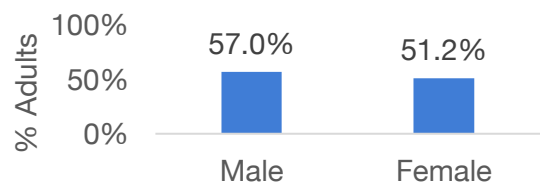
*(53.8%; 95% CI: 50.8% – 56.7%)

Last Annual Exam Among Adults in Pohnpei, 2024

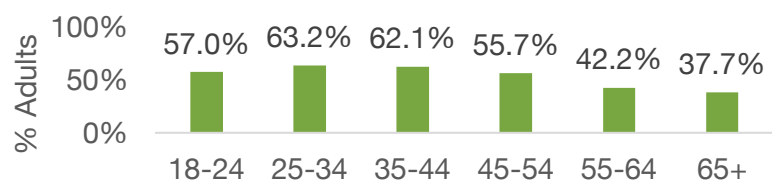


Younger adults and those with a high school education were significantly more likely to not have had an annual exam in the past year.

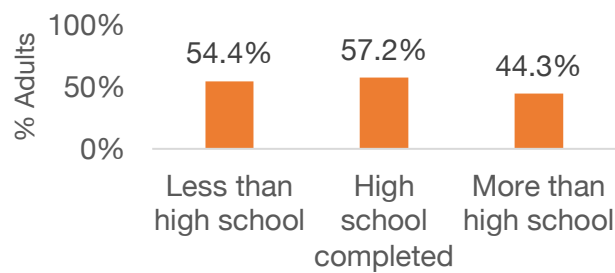
No Annual Exam, by Gender



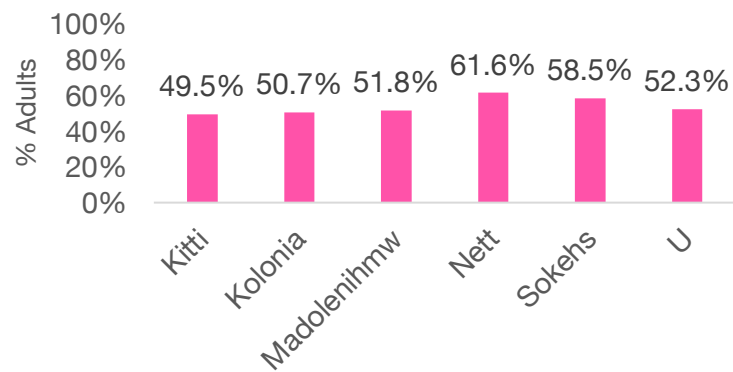
No Annual Exam, by Age



No Annual Exam, by Education



No Annual Exam, by Municipality

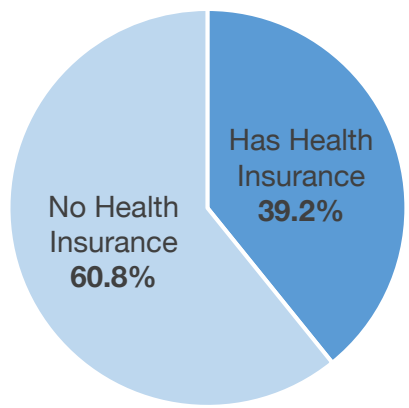


Access to Care: Health Insurance

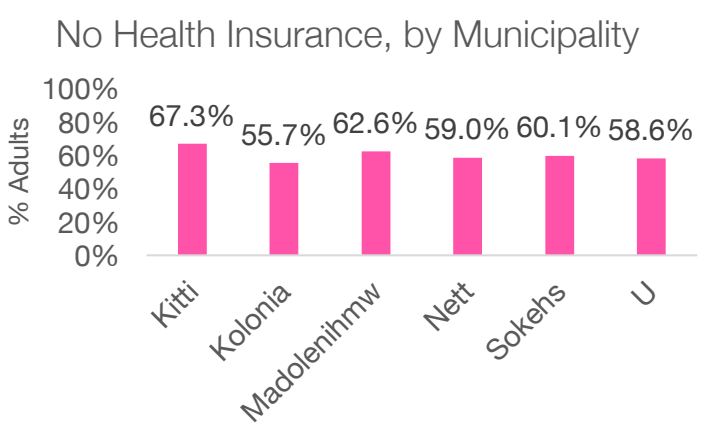
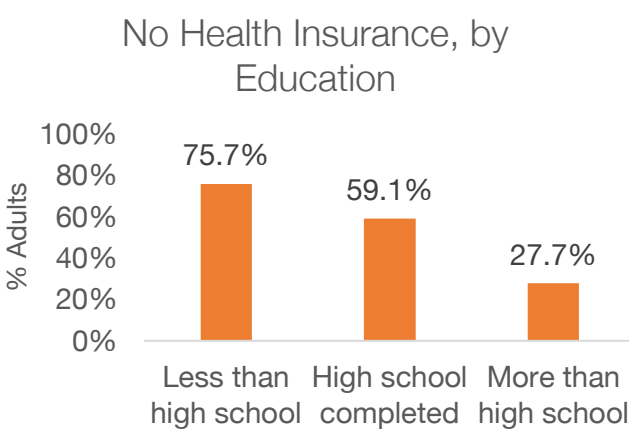
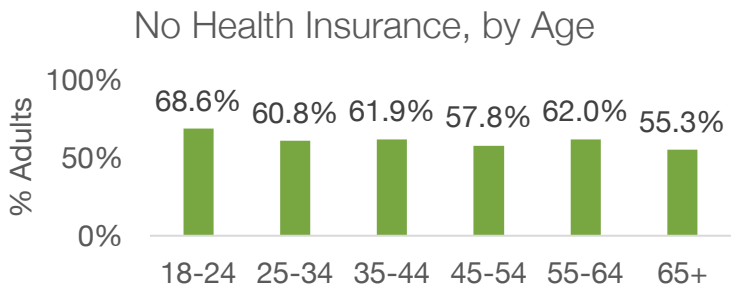
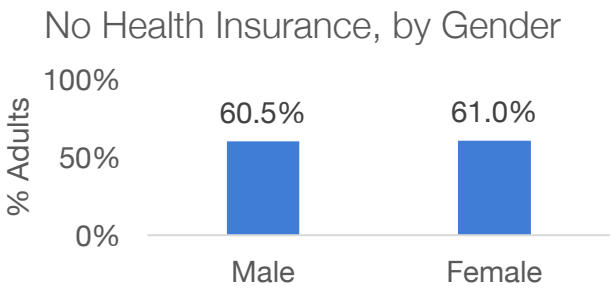
Over half of adults (60.8%) in Pohnpei reported not having health insurance.*

*(60.8%; 95% CI: 57.9% - 63.7%)

Health Insurance Status Among Adults in Pohnpei, 2024



Being uninsured was significantly higher among those with lower education levels.

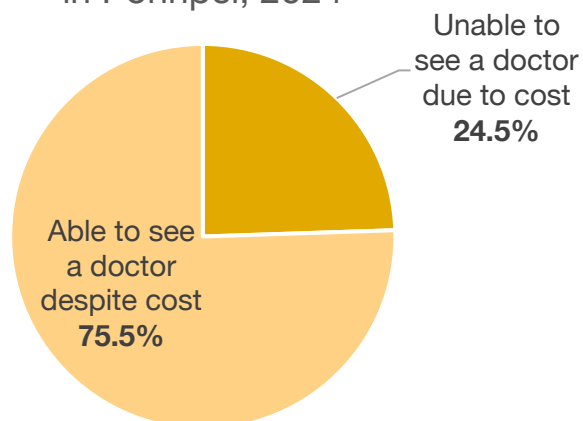


Access to Care: Cost as a Barrier

In the past year, nearly a quarter of adults (24.5%) in Pohnpei did not see a doctor due to health care costs.*

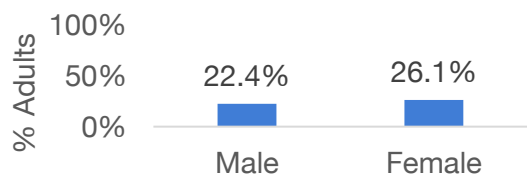
*(24.5%; 95% CI: 22.0% - 27.1%)

Cost as a Barrier to Healthcare Access in Pohnpei, 2024

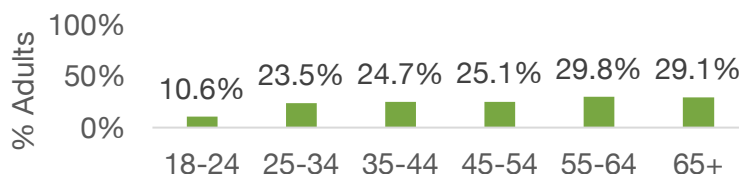


Lack of access to care due to cost was significantly higher among those 55 and older, with less than a high school education and those living in Kitti, Kolonia, and Madolenihmw.

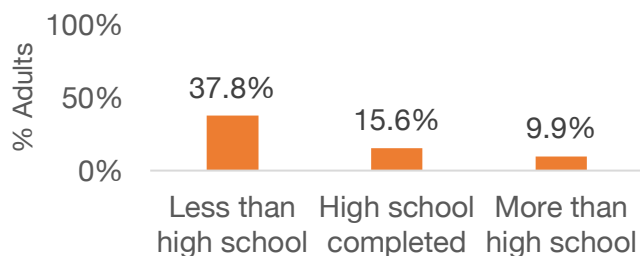
Unable to See Doctor Due to Cost, by Gender



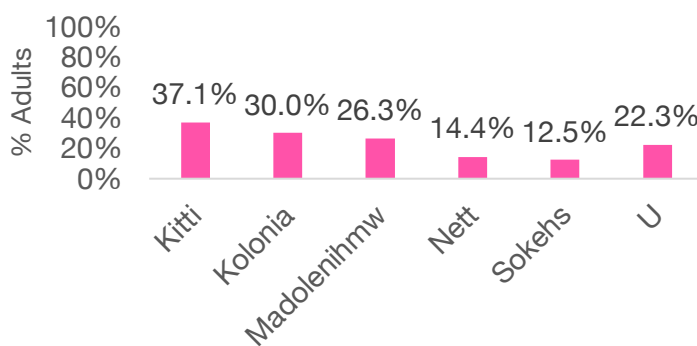
Unable to See Doctor Due to Cost, by Age



Unable to See Doctor Due to Cost, by Education



Unable to See Doctor Due to Cost, by Municipality

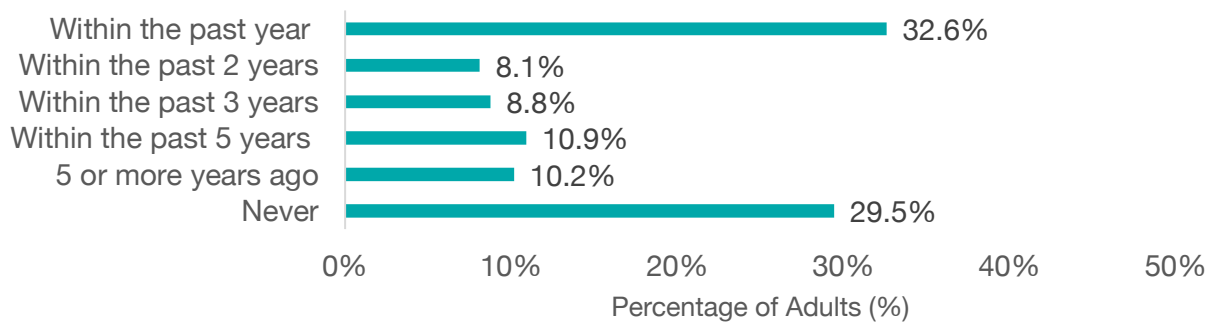


Oral Health: Last Dental Exam

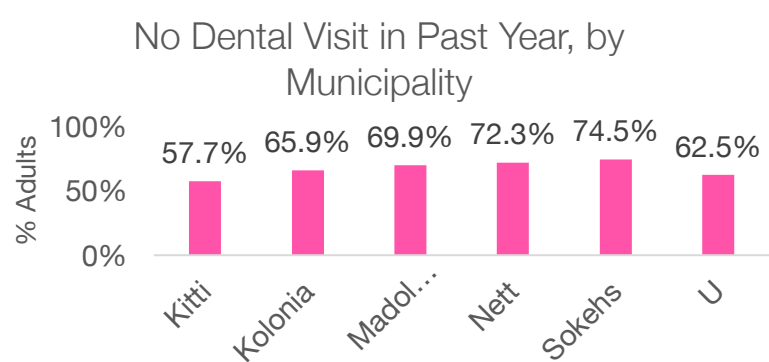
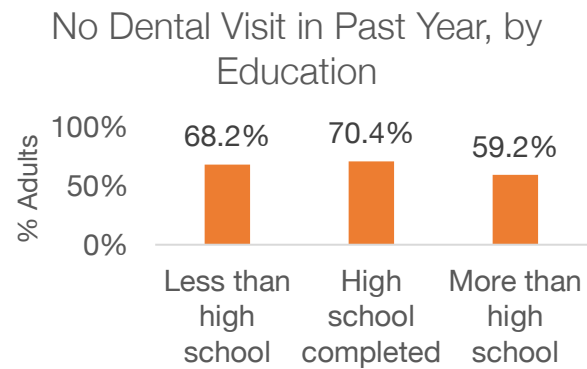
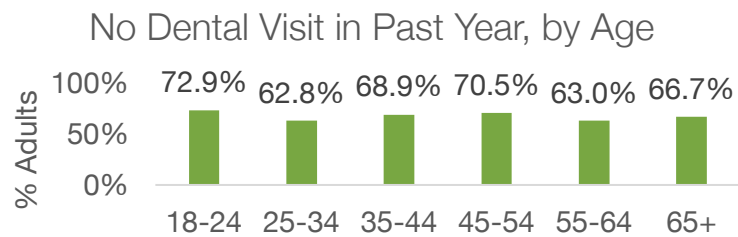
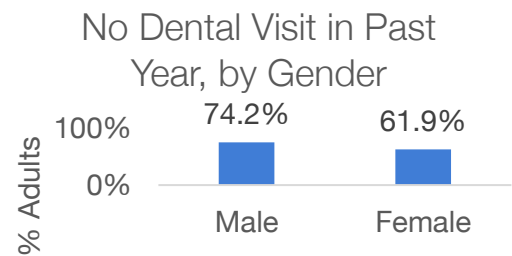
Nearly two-thirds of adults (67.4%) in Pohnpei did not have a dental visit in the past year.* Additionally, 29.5% of adults reported that they have never had a dental visit.

*(67.4%; 95% CI: 64.5% - 70.1%)

Last Dental Exam Among Adults in Pohnpei, 2024



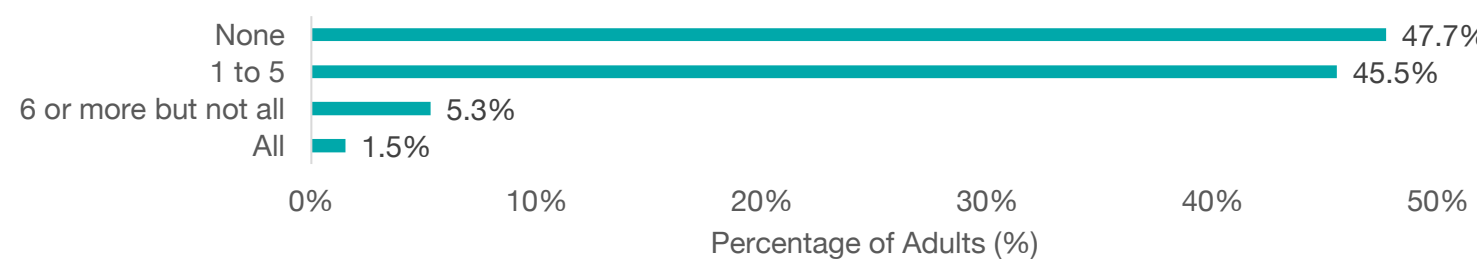
Not having a dental exam in the past year was significantly higher among males, those with a high school education or less, and those living in Nett and Sokehs.



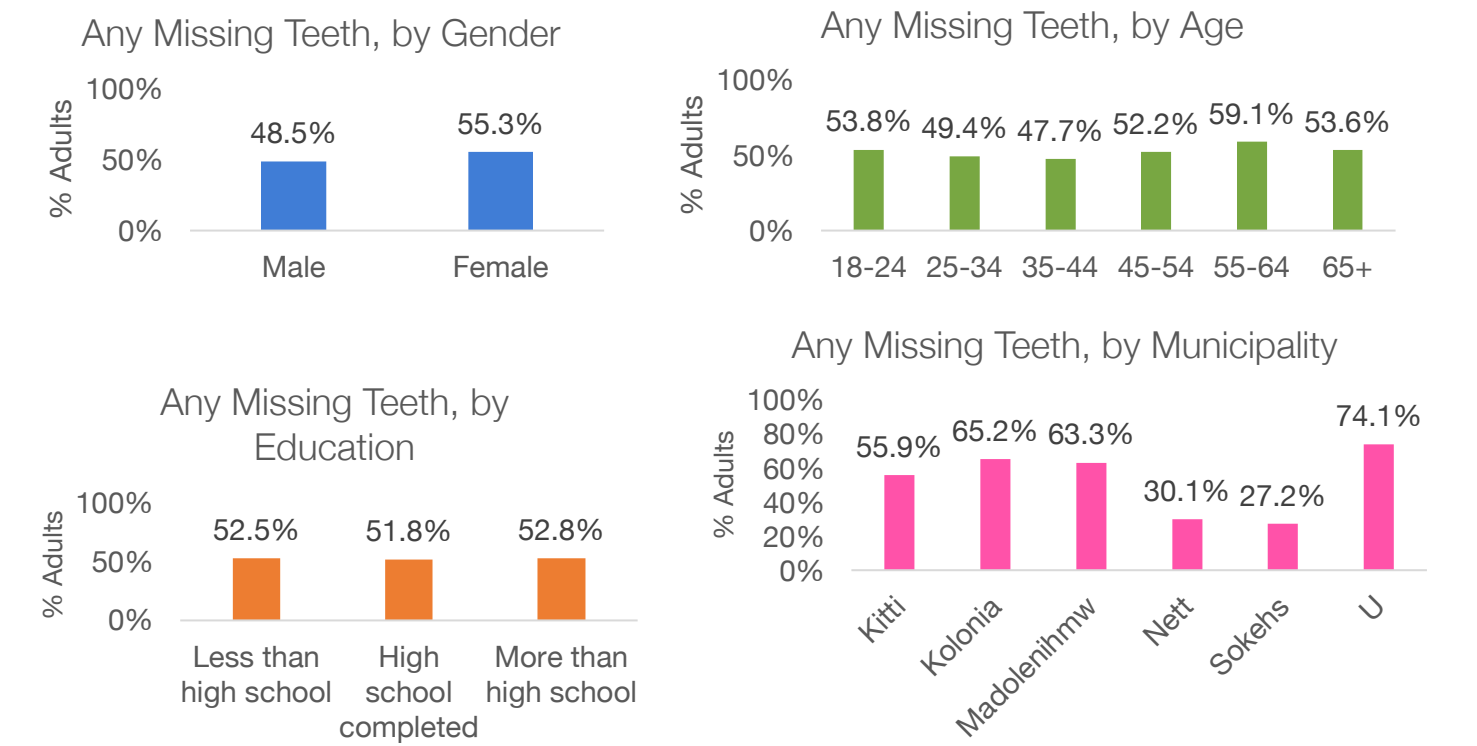
Oral Health: Missing Teeth

Over a half of adults (52.3%) in Pohnpei have self-reported that they have at least one missing tooth due to tooth decay or gum disease.*
*(52.3%; 95% CI: 49.3% - 55.3%)

Number of Self-reported Missing Teeth Among Adults in Pohnpei, 2024



Having at least one missing tooth is significantly higher among females and those living in Kolonia and Madolenihmw.



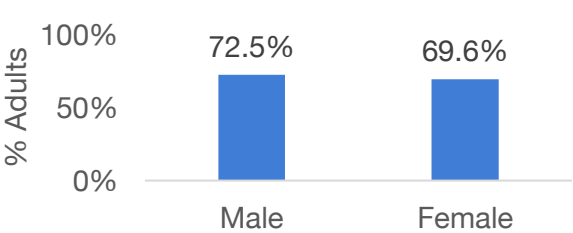
Flu Vaccination

Nearly three out four adults (70.8%) in Pohnpei reported that they did not receive a flu vaccination in the past 12 months.*

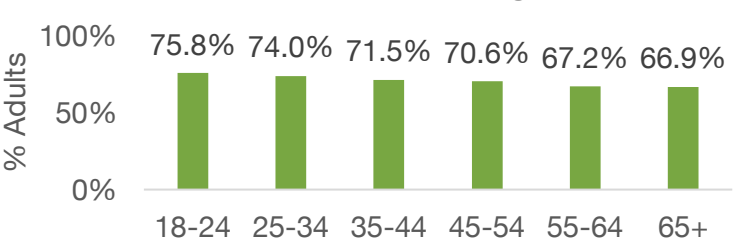
*(70.8%; 95% CI: 68.1% - 73.5%)

Not receiving a flu vaccination in the past 12 months is significantly higher among those with less than a high school education and those living in Sokehs.

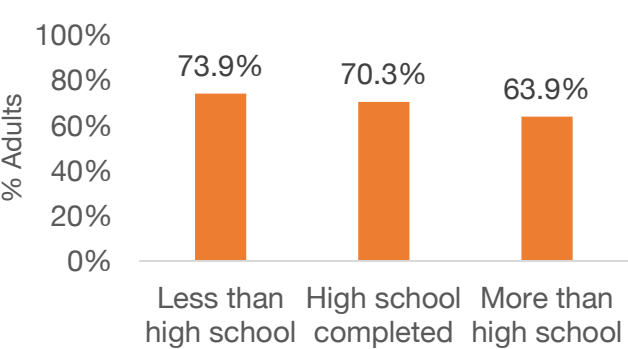
No Flu Vaccine, by Gender



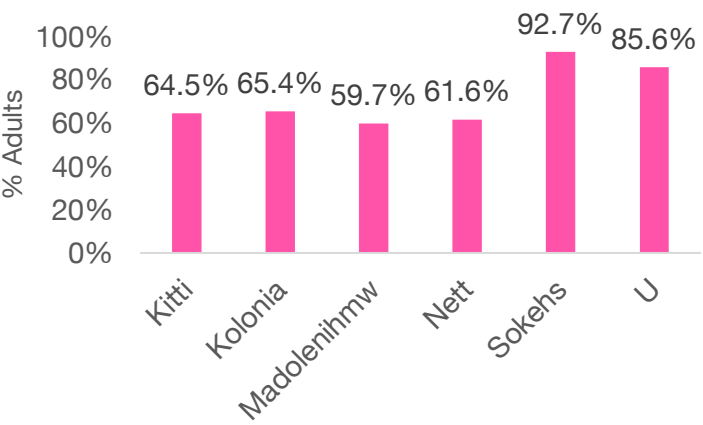
No Flu Vaccine, by Age



No Flu Vaccine, by Education



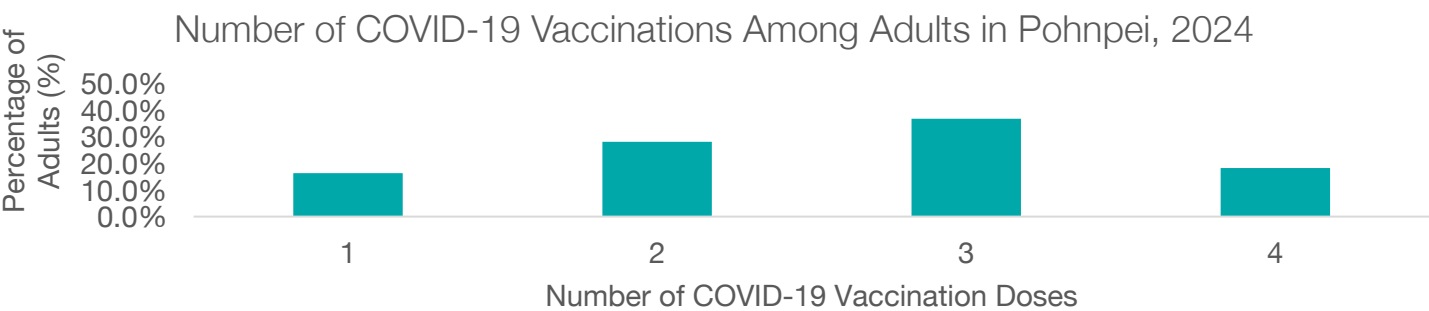
No Flu Vaccine, by Municipality



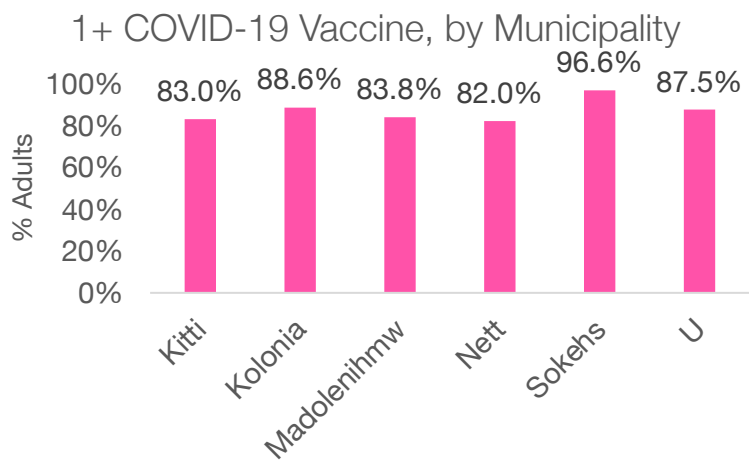
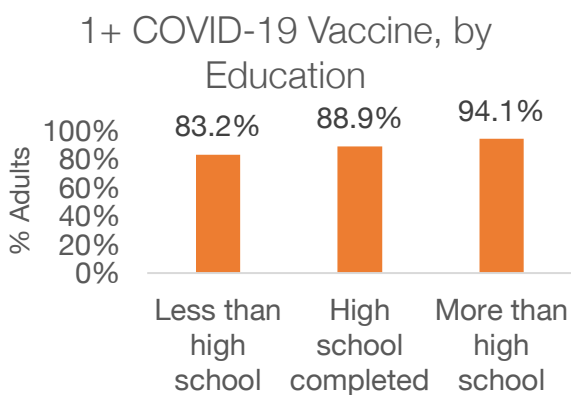
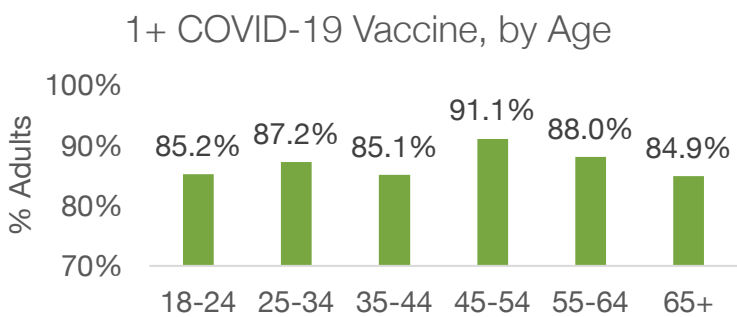
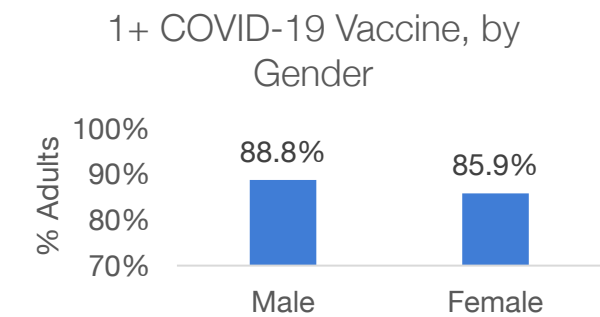
COVID-19 Vaccination

Nearly nine out of ten adults (87.1%) in Pohnpei have received at least one dose of the COVID-19 vaccination.* Four out of five adults (83.5%) have received more than two doses of COVID-19 vaccinations.

*(87.1%; 95% CI: 85.0% - 89.0%)



Receiving at least one dose of the COVID-19 vaccination is significantly higher among those with more than a high school education and those living in Sokehs.

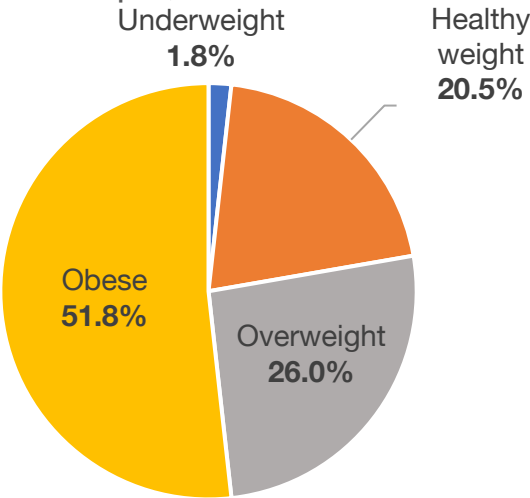


Overweight / Obesity

Body Mass Index (BMI) is calculated based on height and weight measurements. Over three-quarters of adults (77.7%) adults in Pohnpei are overweight or obese.*

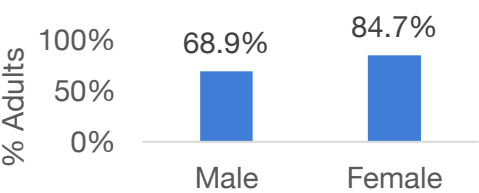
*(77.7%; 95% CI: 75.2% - 80.1%)

BMI Categories Among Adults in Pohnpei, 2024

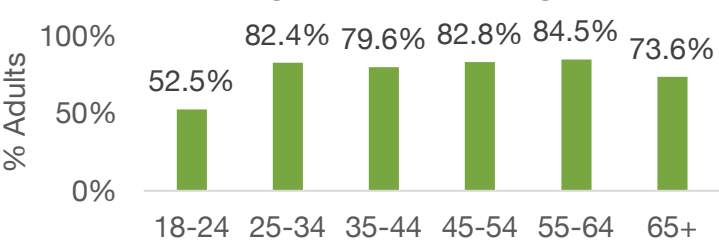


Overweight/obesity prevalence was significantly higher among females, with increasing levels of age and education as well as in Kitti and Kolonia.

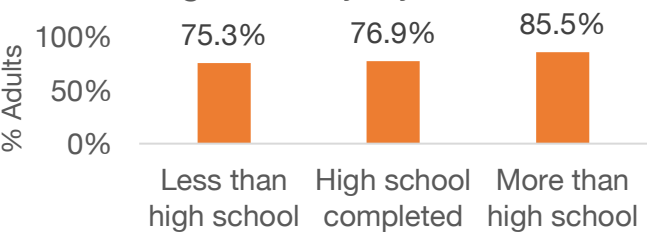
Overweight/obesity, by Gender



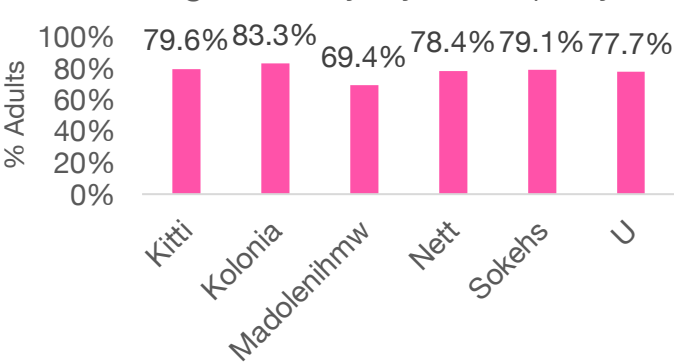
Overweight/obesity, by Age



Overweight/obesity, by Education



Overweight/obesity, by Municipality



Hypertension

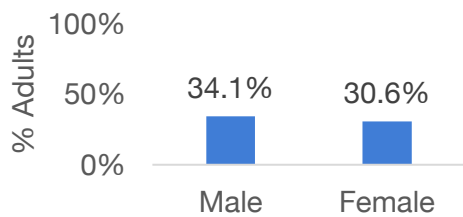
Nearly a third of adults (32.1%) in Pohnpei had high blood pressure ($\geq 140/90$) during screening or self-reported having hypertension for which they took medication.*

*(32.1%; 95% CI: 29.5% - 35.0%)

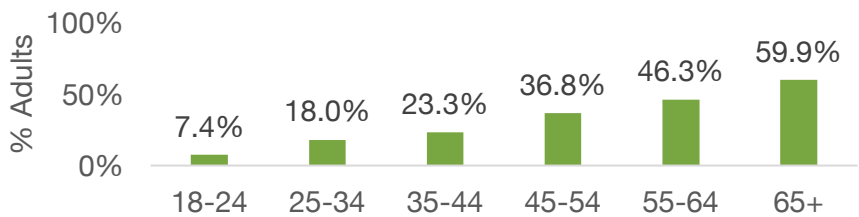
Hypertension prevalence is estimated based on either a self-report of hypertension for which the patient is taking medication and/or a measured average blood pressure reading (of 3 readings) of $\geq 140/90$.

Prevalence of hypertension was significantly increased with age.

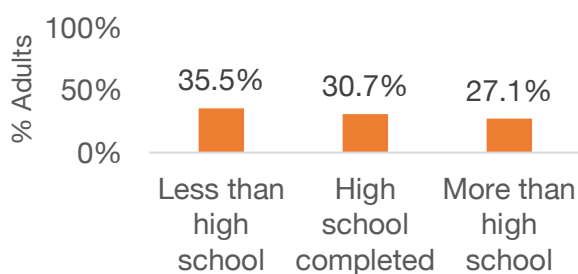
Hypertension, by Gender



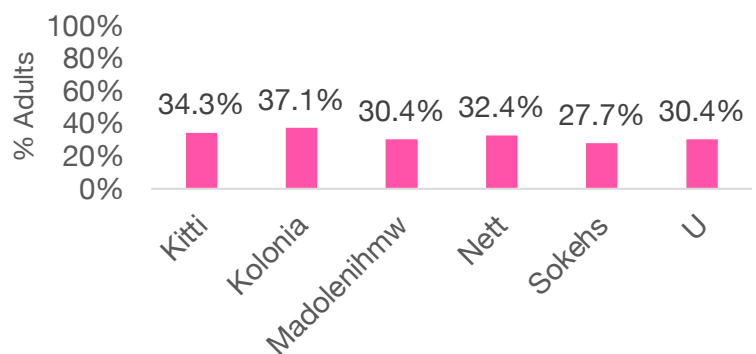
Hypertension, by Age



Hypertension, by Education



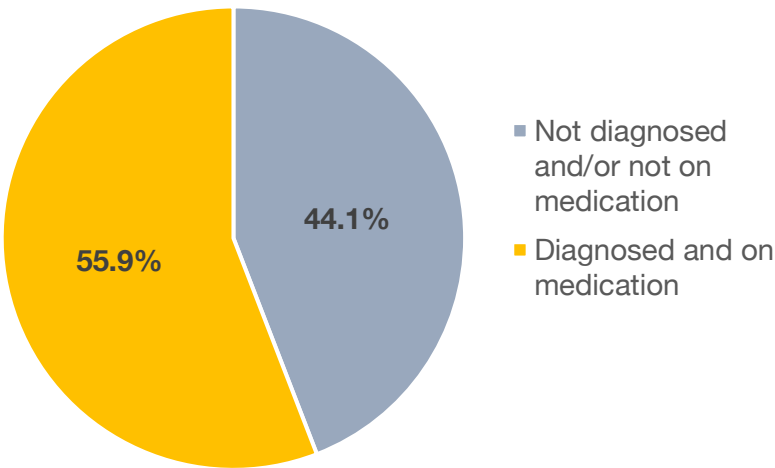
Hypertension, by Municipality



Hypertension Diagnosis & Control

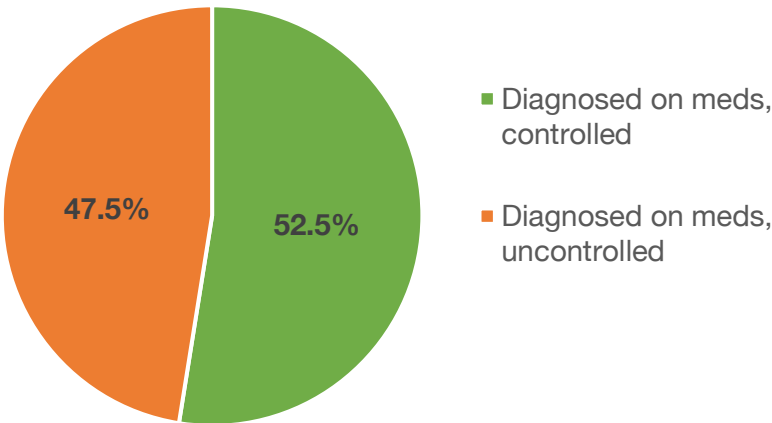
32.1% of the adult population in Pohnpei is estimated to have hypertension. Among those adults estimated to have hypertension in Pohnpei, nearly half (44.1%) reported that they either were undiagnosed, or diagnosed and not taking medication for hypertension.

Diagnosis and Medication Status Among Hypertensives in Pohnpei, 2024



Among those adults who reported that they were diagnosed and taking medication for their hypertension, 47.5% had an uncontrolled blood pressure measurement.

Blood Pressure Levels Among Diagnosed Hypertensives on Medication in Pohnpei, 2024



*Uncontrolled blood pressure status was defined as having an average blood pressure measurement that was $\geq 140/90$. This indicates that these individuals with hypertension who are on medication are not controlled.

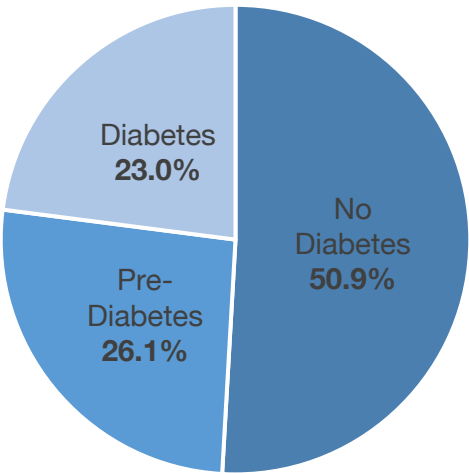
Diabetes

Nearly a quarter of adults (23.0%) in Pohnpei were estimated to have diabetes.*

*(23.0%; 95% CI: 20.6% - 25.5%)

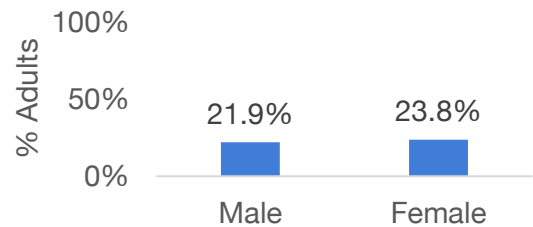
Diabetes prevalence is estimated based on either a self-report of having diabetes for which the patient is taking medication and/or an A1c measurement of 6.5% or higher.

Adult Diabetes in Pohnpei, 2024

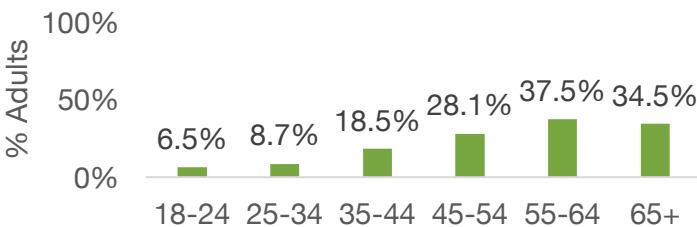


Diabetes prevalence was significantly higher among those with less than or more than a high school education and increased with age.

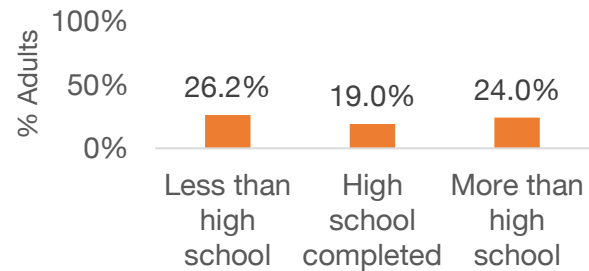
Diabetes, by Gender



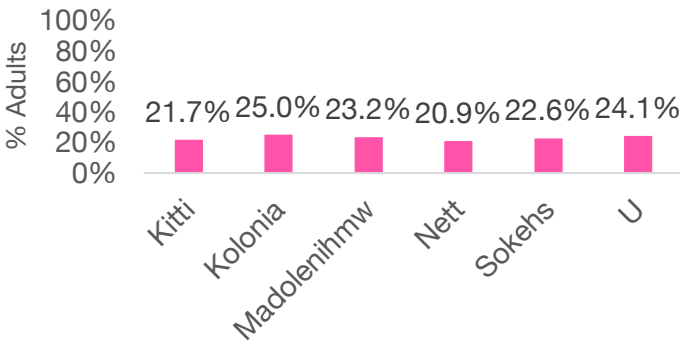
Diabetes, by Age



Diabetes, by Education



Diabetes, by Municipality



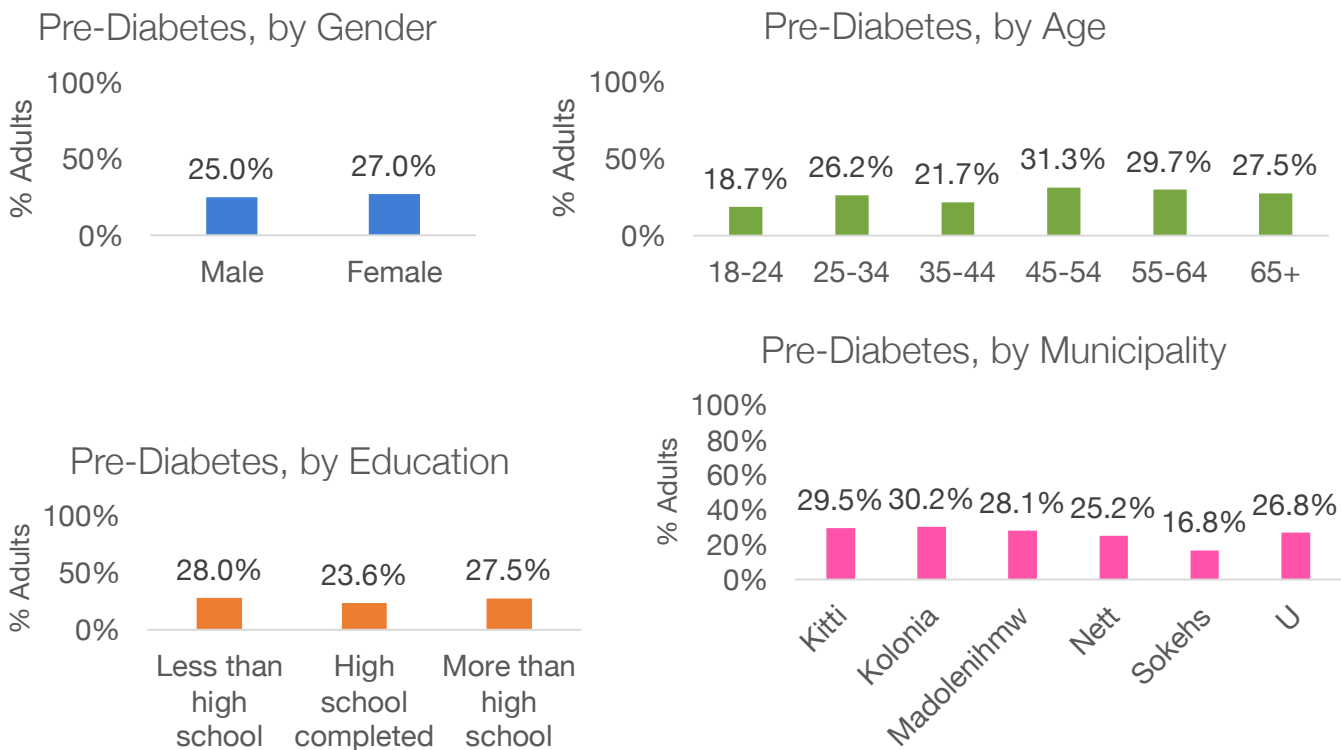
Pre-diabetes

26.1% of adults in Pohnpei were estimated to have pre-diabetes.*

*(26.1%; 95% CI: 23.6% - 28.8%)

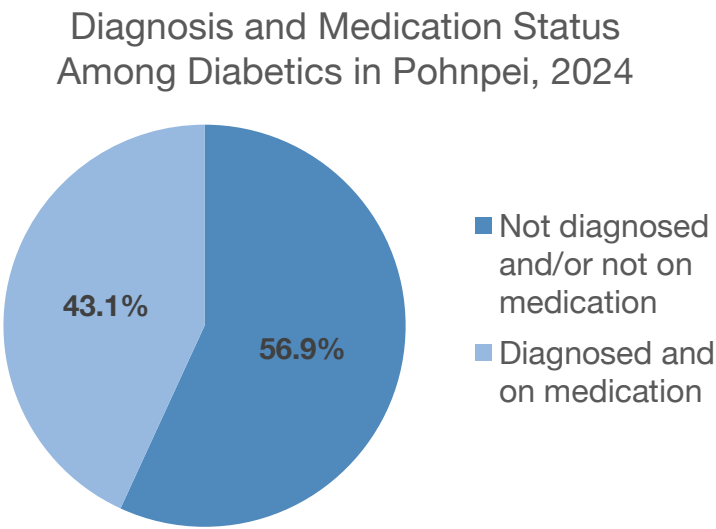
Pre-diabetes prevalence is estimated based on either a self-report of pre-diabetes and/or an A1c measurement of 5.7% - 6.4%).

Prevalence of pre-diabetes was significantly higher among those living in Kolonia and Madolenihmw.

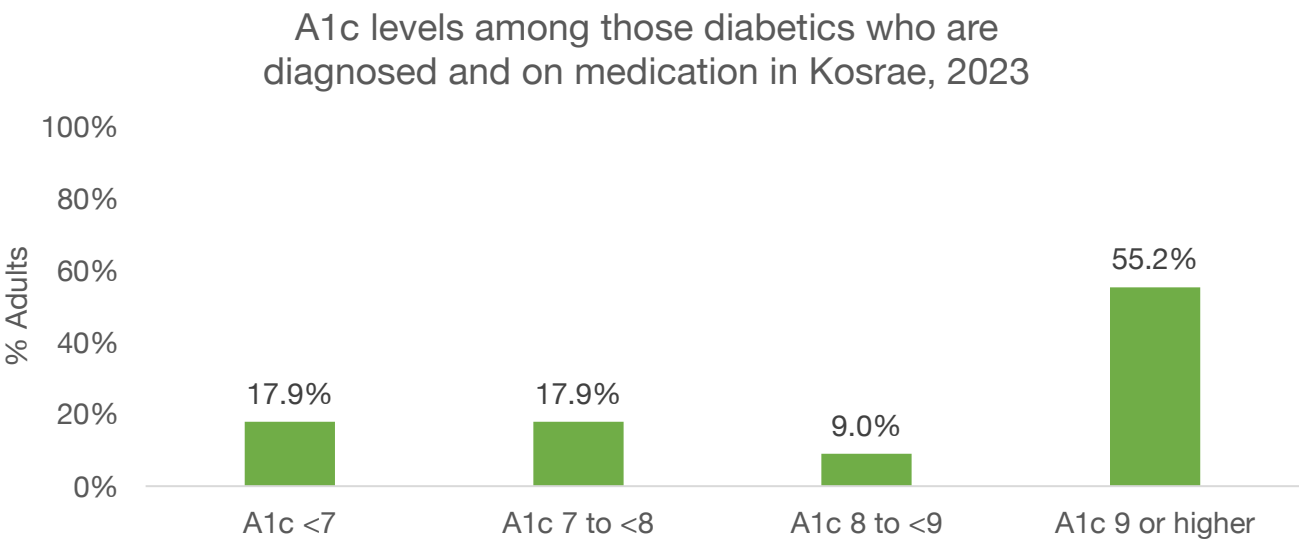


Diabetes Diagnosis & Control

Among the adults in Pohnpei classified as having diabetes, 43.1% reported that they were diagnosed and taking medication for their diabetes. Over half (56.9%) of adults with diabetes in Pohnpei are either not diagnosed or diagnosed and not taking medication.



Among the adults in Pohnpei classified as having diabetes, who have been diagnosed and on medication, one out of four (25.8%) are reaching the American Diabetes Association (ADA) A1c goal for diabetics having an A1c <7%. A majority (74.2%) of the diagnosed and currently medicated diabetics surveyed in Pohnpei had uncontrolled blood sugar levels (HbA1c 7% or higher).



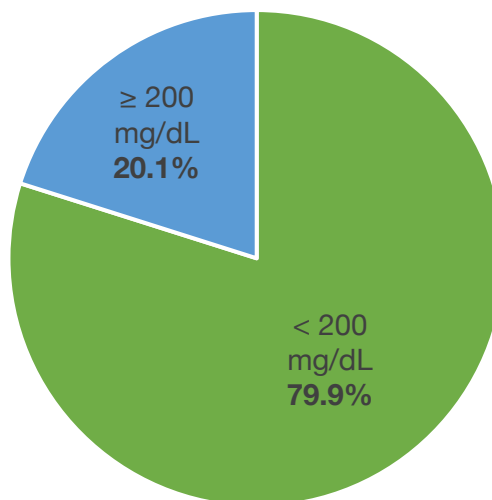
Total Cholesterol

Over one out of four adults (26.7%) in Pohnpei had “elevated” total cholesterol (200 mg/dL or higher) during screening.

*(20.1%; 95% CI: 16.9%-23.7%)

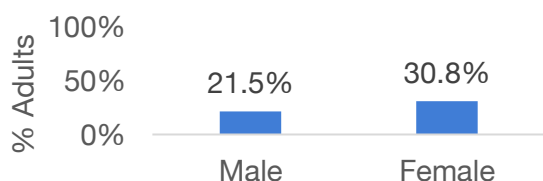
Nearly one out of ten adults (9.6%; 95% CI: 8.0% - 11.5%) had “high” total cholesterol (240 mg/dL or higher).

Adult Total Cholesterol in Kosrae, 2023

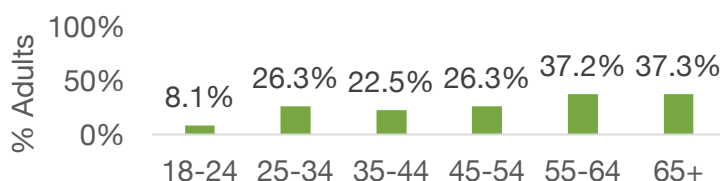


Elevated total cholesterol was significantly higher among females, those 55 and older, and those living in Kolonia.

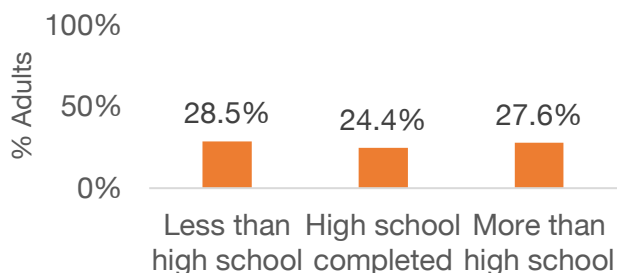
Elevated Cholesterol (≥ 200 mg/dL), by Gender



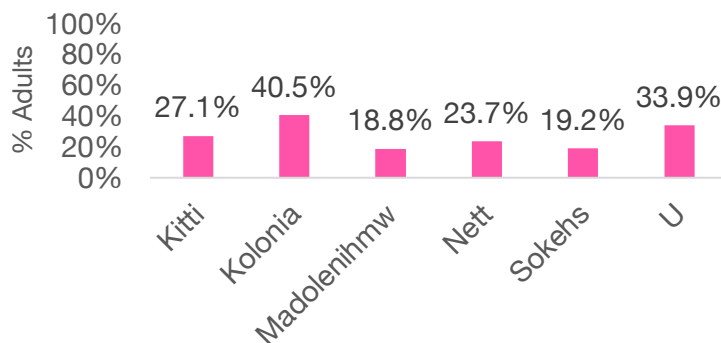
Elevated Cholesterol (≥ 200 mg/dL), by Age



Elevated Cholesterol (≥ 200 mg/dL), by Education



Elevated Cholesterol (≥ 200 mg/dL), by Municipality



Self-Reported Chronic Disease

Selected chronic disease conditions are listed below with their self-reported prevalence.

Condition	Prevalence (%)	95% Confidence Interval (%)	
Gout	9.3	7.7	11.1
Ulcer	8.6	7.0	10.4
Angina	5.5	4.3	7.1
Arthritis	4.5	3.4	5.9
Coronary Heart Disease (CHD)	3.8	2.8	5.1
Asthma	3.7	2.8	5.0
Chronic Obstructive Pulmonary Disease (COPD)	2.9	2.1	4.1
Emphysema	2.8	1.9	3.9
Stroke	2.7	1.9	3.8
Tuberculosis (TB)	2.6	1.9	3.8
Heart attack	2.0	1.3	3.1
Cancer	0.8	0.4	1.6

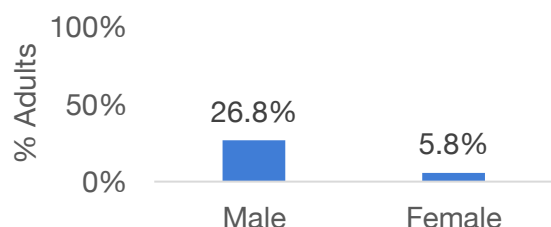
Cigarette Smoking

Nearly one out of five adults (15.0%) in Pohnpei reported cigarette smoking in the last 30 days (current smoking).^{*} Among current smokers, 61.1% reported smoking every day in the past 30 days.

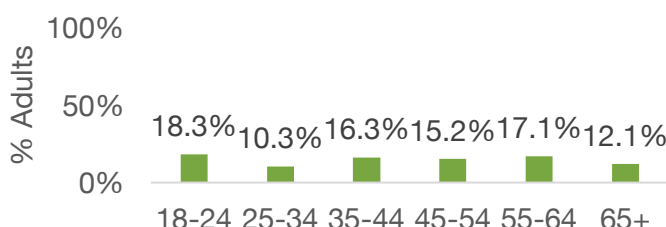
^{*}(15.0%; 95% CI: 13.0% - 17.3%)

Cigarette smoking was significantly higher among males.

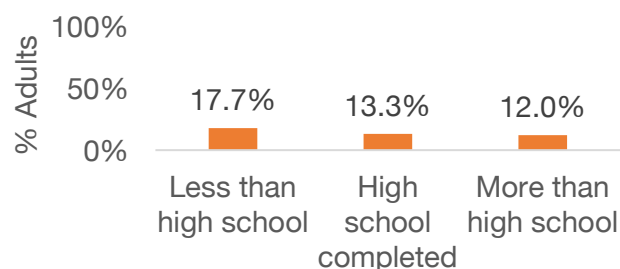
Current Smoking, by Gender



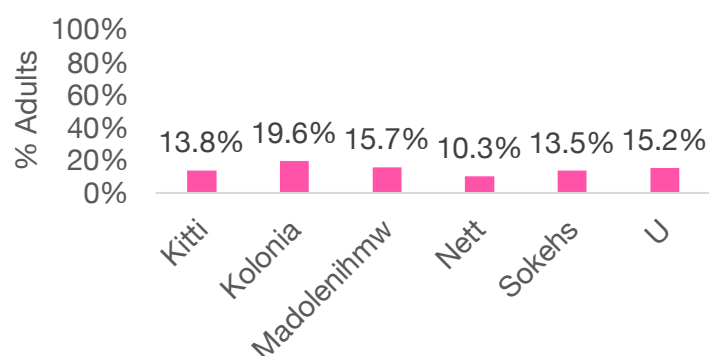
Current Smoking, by Age



Current Smoking, by Education



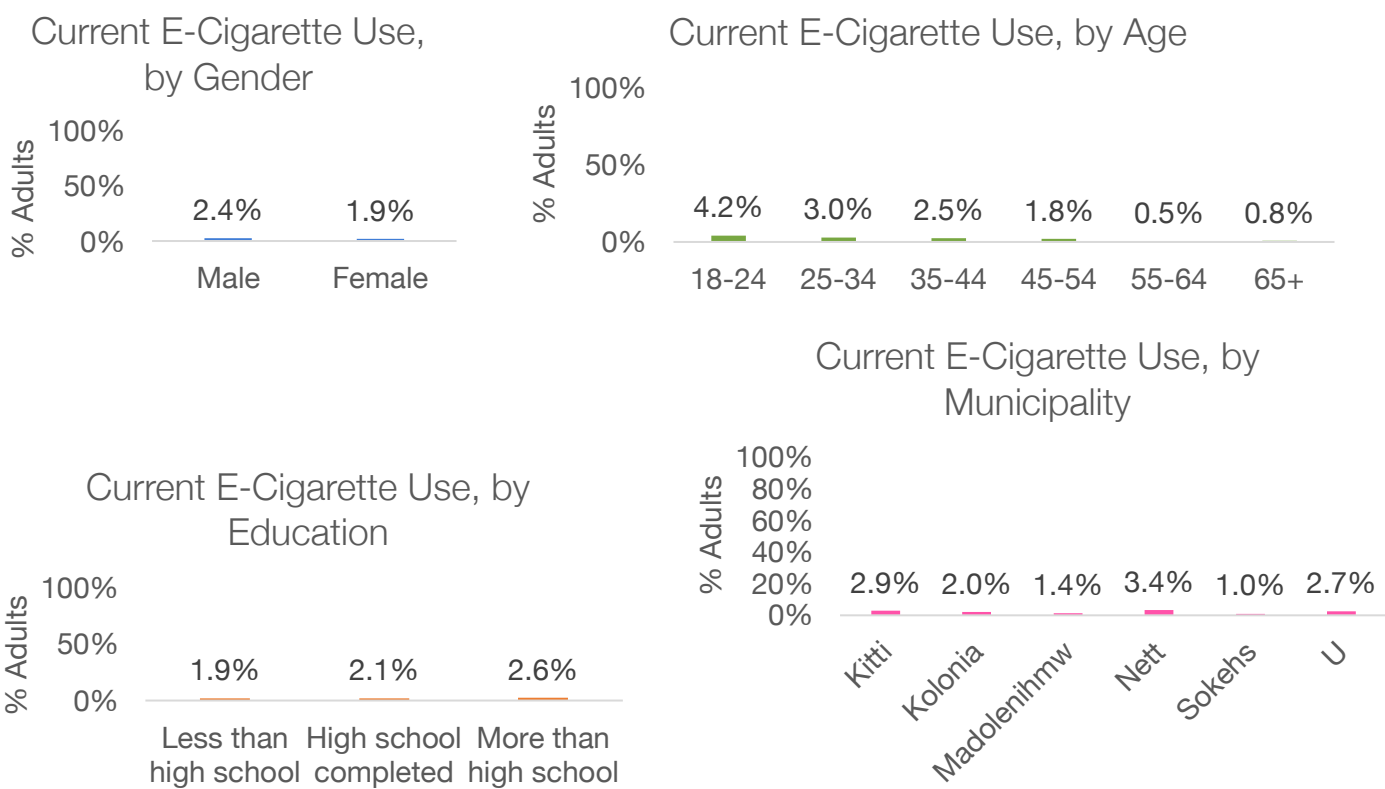
Current Smoking, by Municipality



Electronic Cigarette Use (E-Cigarette)

The prevalence of e-cigarette use among adults in Pohnpei was 2.1%.*
*(2.1%; 95% CI: 1.4% - 3.1%).

There were no statistically significant differences in the prevalence of e-cigarette use in Pohnpei by selected demographic characteristics.

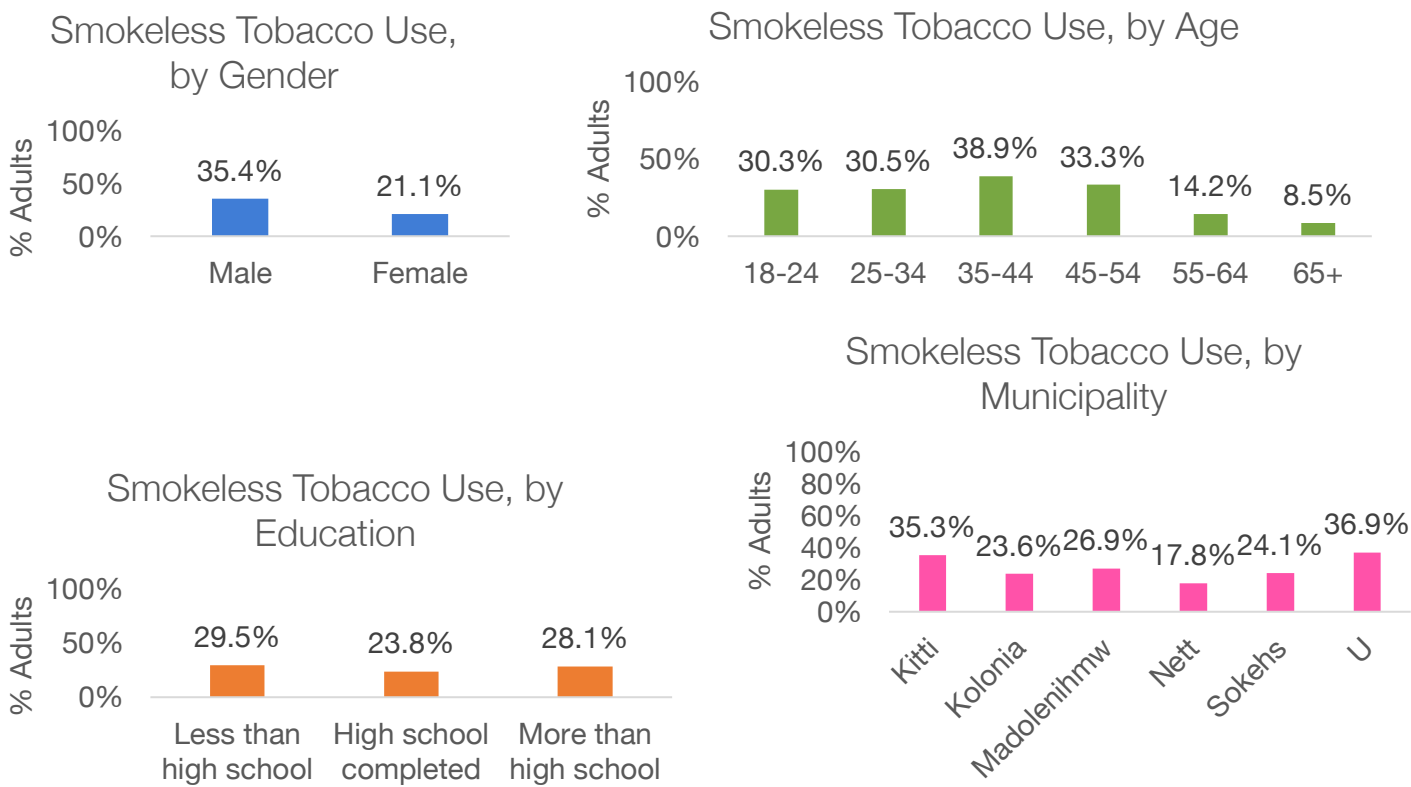


Smokeless Tobacco Use

Nearly 1 out of 3 adults (27.4%) in Pohnpei reported current smokeless tobacco use (use in the past 30 days).*

*(27.4%; 95%CI: 24.8% - 30.2%)

Smokeless tobacco use was significantly higher among males, adults 54 and younger, and among those living in Kitti and U.

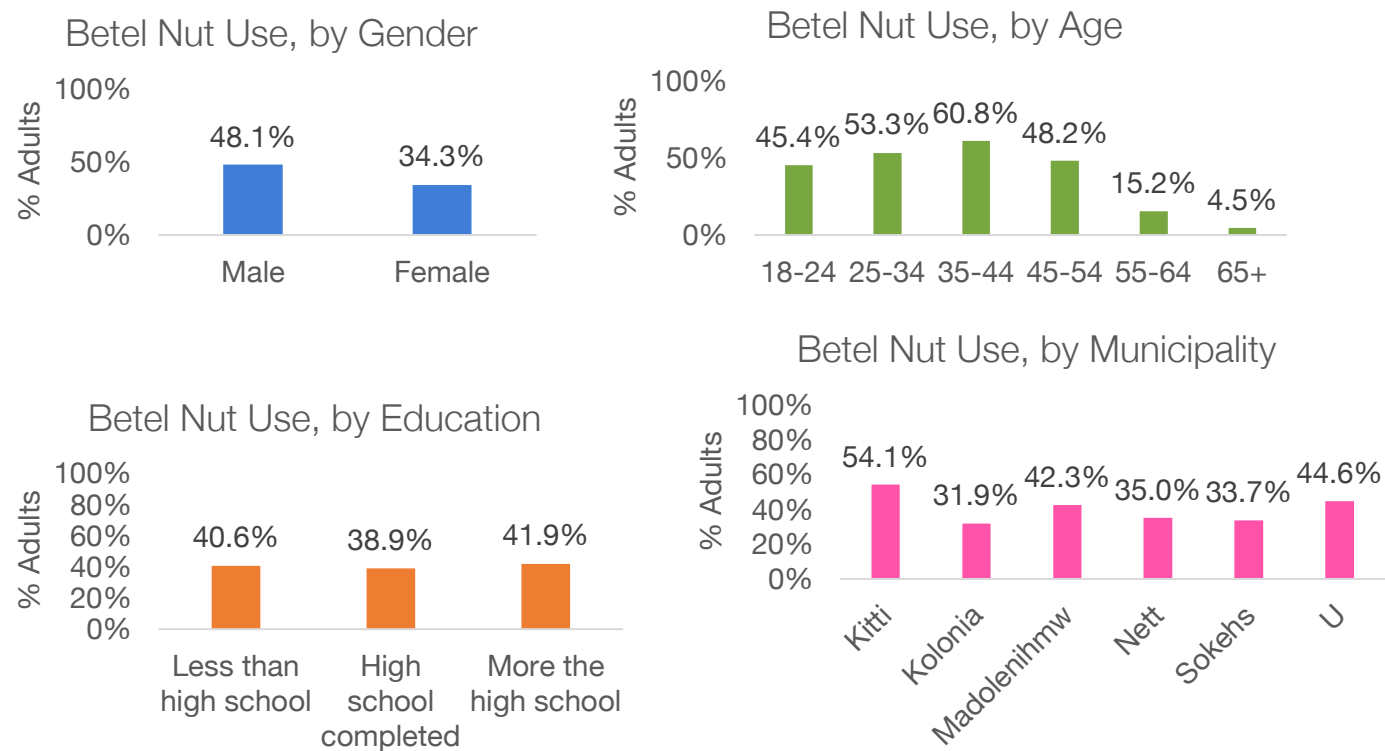


Betel Nut Chewing

Over a third of adults (40.4%) in Pohnpei reported current betel nut use (use in the past 30 days).*

*(40.4%; 95%CI: 37.5% - 43.4%)

Prevalence of betel nut chewing in Pohnpei was significantly higher among males, adults 54 and younger, and those living in Kitt.



Any Tobacco Use

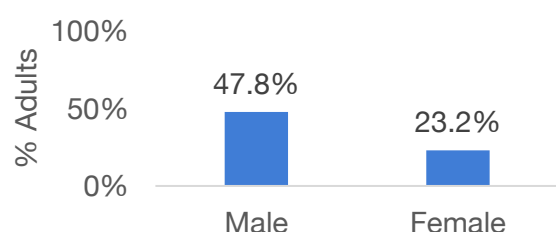
Over a third of adults (36.6%) in Pohnpei reported using any type of tobacco.*

*(36.6%; 95%CI: 31.2% - 36.8%)

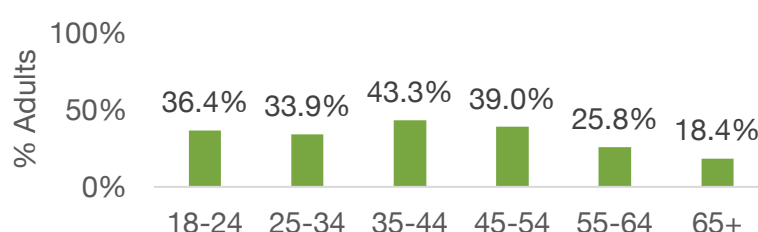
Any tobacco use is defined as smoking cigarettes, chewing smokeless tobacco, chewing betel nut with tobacco, or using another form of tobacco.

Any tobacco use is significantly higher among males, those 35 to 55 years old, and those living in U.

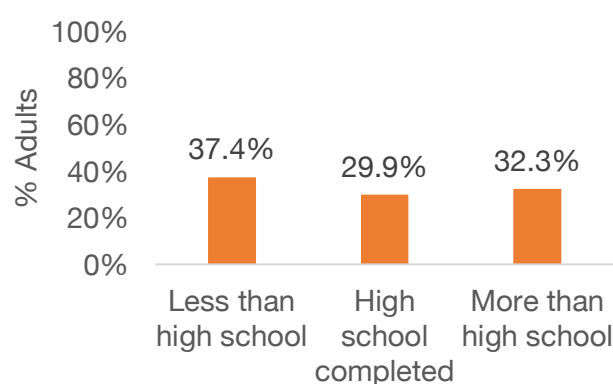
Any Tobacco Use, by Gender



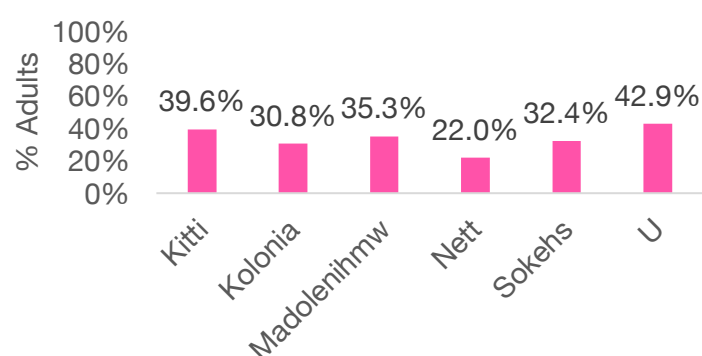
Any Tobacco Use, by Age



Any Tobacco Use, by Education



Any Tobacco Use, by Municipality



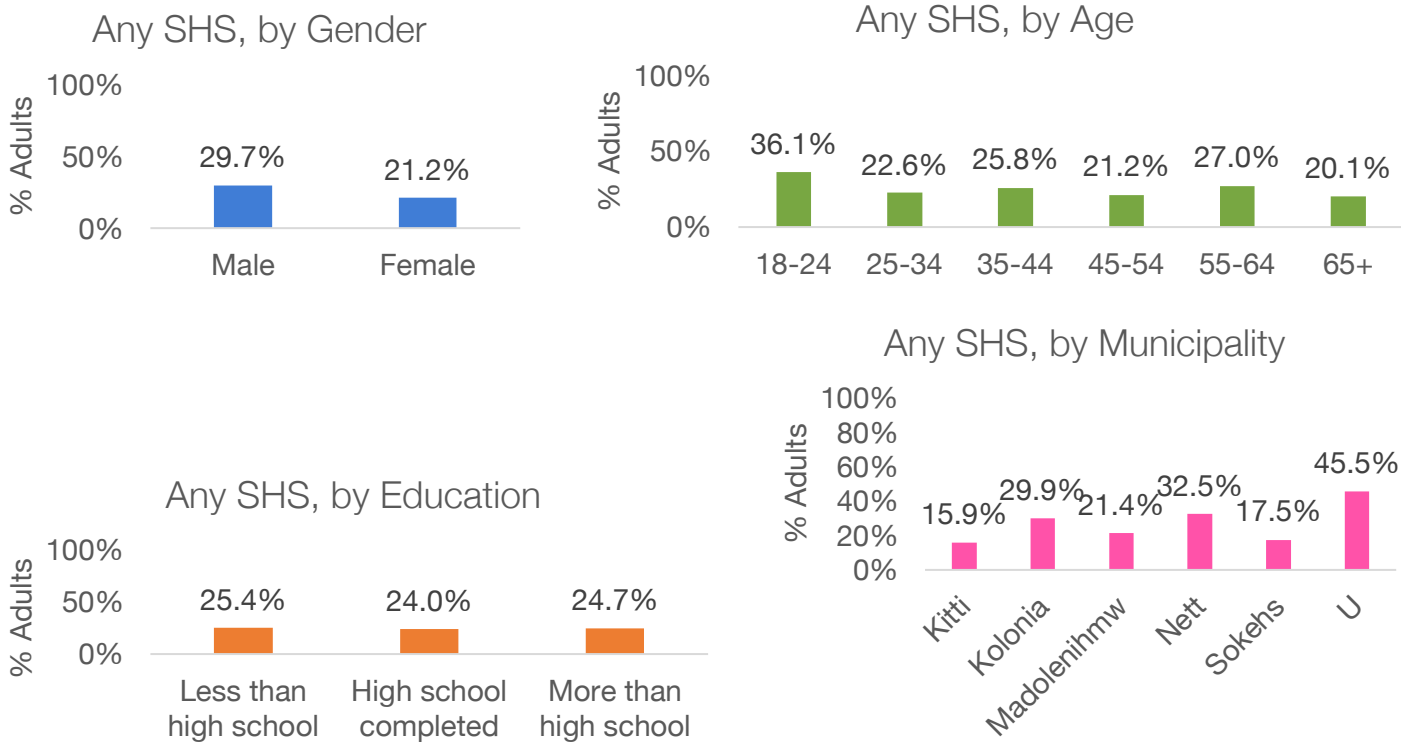
Second-hand Smoke

One out of four adults (25.0%) in Pohnpei reported being exposed to second-hand smoke (SHS) at home, in indoor areas at work, or a vehicle in the past 7 days.*

*(25.0%; 95%CI: 22.5% - 27.7%)

Exposed to second-hand smoke in the home in the past 7 days	14.8%
Exposed to second-hand smoke in indoor areas at work in the past 7 days	11.6%
Exposed to second-hand smoke in a vehicle in the past 7 days	14.1%

Exposure to second-hand smoke was significantly higher among males, those aged 18 – 24, and those living in U.



Alcohol Use in Pohnpei

More than one out of five adults (25.6%) in Pohnpei reported alcohol use in the past 30 days.*

*(25.6%; 95% CI: 23.1% - 28.3%)

Nearly one out of five adults (22.2%) in Pohnpei reported binge drinking in the past 30 days.* 88.0% of current alcohol users binge drank in the past 30 days.

*(22.2%; 95% CI: 19.8% - 24.7%)

Among current drinkers, the average age of alcohol use initiation is 17. The average number of drinks consumed per day is 4 while the average number of days alcohol was consumed in the past 30 days was 7.

Nearly 1 out of 4 adults (24.6%) in Pohnpei reported driving a vehicle after they consumed alcohol in the past 30 days, while 10.9% of adults reported being a passenger in a vehicle with a driver who had consumed alcohol.

Current alcohol use prevalence (alcohol use in past 30 days)	25.6%
Current binge drinking in the past 30 days *Defined as drinking 5+ standard drinks (men) / 4+ standard drinks (women)] on one occasion	22.2%
Average age of first drink among current alcohol users	17
Average number of drinks per day consumed among current alcohol users	4.01
Average number of days current alcohol users consumed alcohol in the past 30 days	7.24
Drove a vehicle after they've consumed alcohol in the past 30 days (among current alcohol users)	24.6%
Been a passenger in a vehicle in the past 30 days with a driver other than themselves who has consumed alcohol	10.9%

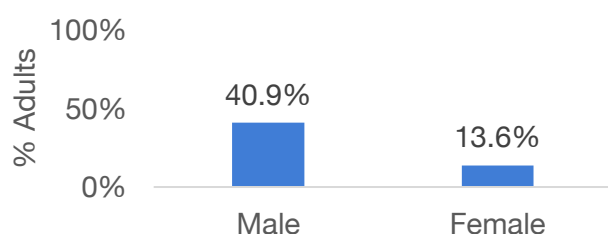
Alcohol Use

Over one out of five adults (25.6%) in Pohnpei reported current alcohol use (any alcohol use in the past 30 days).*

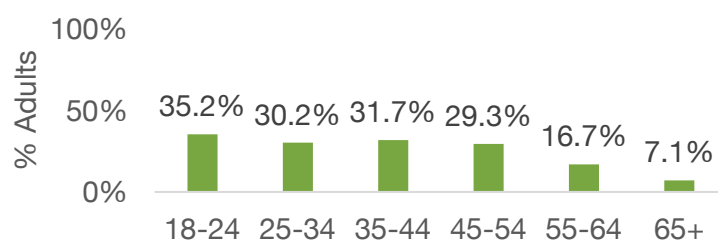
*(25.6%; 95% CI: 23.1% - 28.3%)

Current alcohol use prevalence in Pohnpei was significantly higher among males, with decreasing age, those with more than high school education, and those living in U.

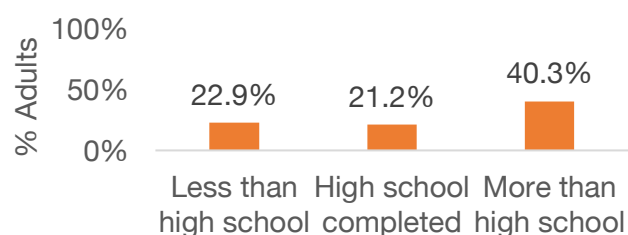
Current Alcohol Use, by Gender



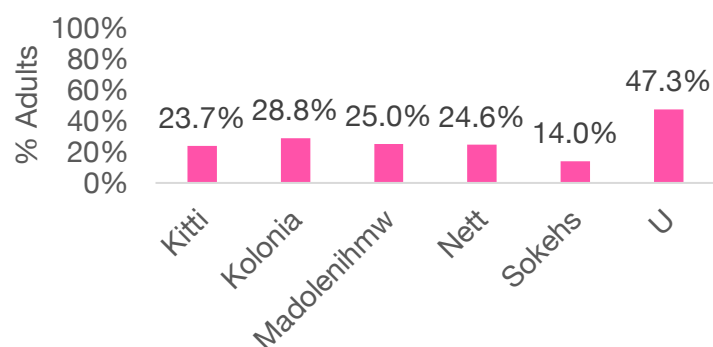
Current Alcohol Use, by Age



Current Alcohol Use, by Education



Current Alcohol Use, by Municipality



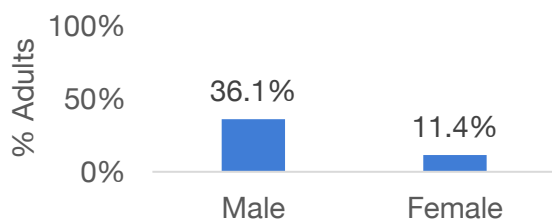
Binge Drinking

Nearly one out of five adults (22.2%) in Pohnpei reported binge drinking in the past 30 days.*

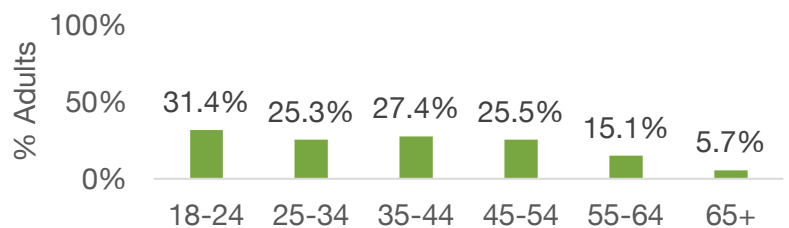
*(22.2%; 95% CI: 19.8% - 24.7%)

Binge drinking prevalence in Pohnpei was significantly higher among males, with decreasing age, those with more than a high school education, and U.

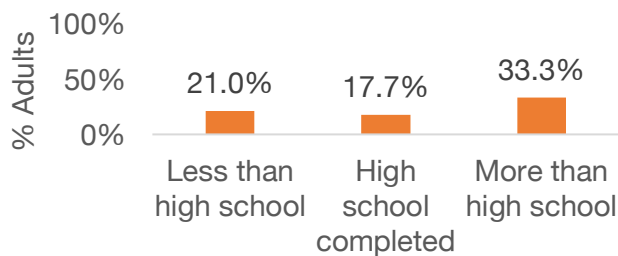
Binge Drinking, by Gender



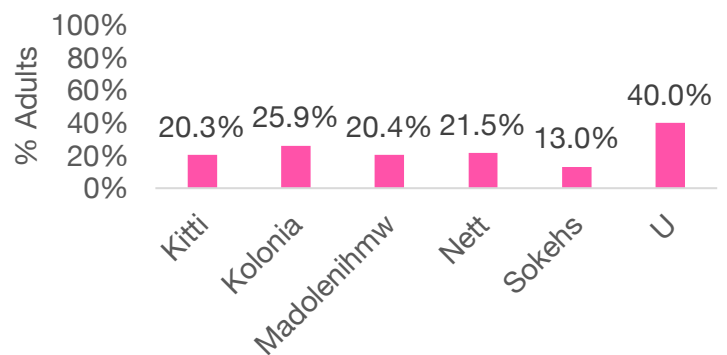
Binge Drinking, by Age



Binge Drinking, by Education



Binge Drinking, by Municipality



Other Substance Use

Adults in Pohnpei reported their use of different types of substances. The substance reported to be most used was marijuana.

Current use (in past 30 days) of non-ceremonial sakau.	43.2%
Current use (in past 30 days) of marijuana	5.4%
Current use (in past 30 days) of prescription drugs such as tramadol, demerol, oxycodone, codeine, or morphine without a doctor's orders	4.5%
Current use (in past 30 days) of inhalants or sniffed/huffed substances such as glue, gasoline, paint thinner, markers, butane, or propane	0.7%

Mental Health: Depression

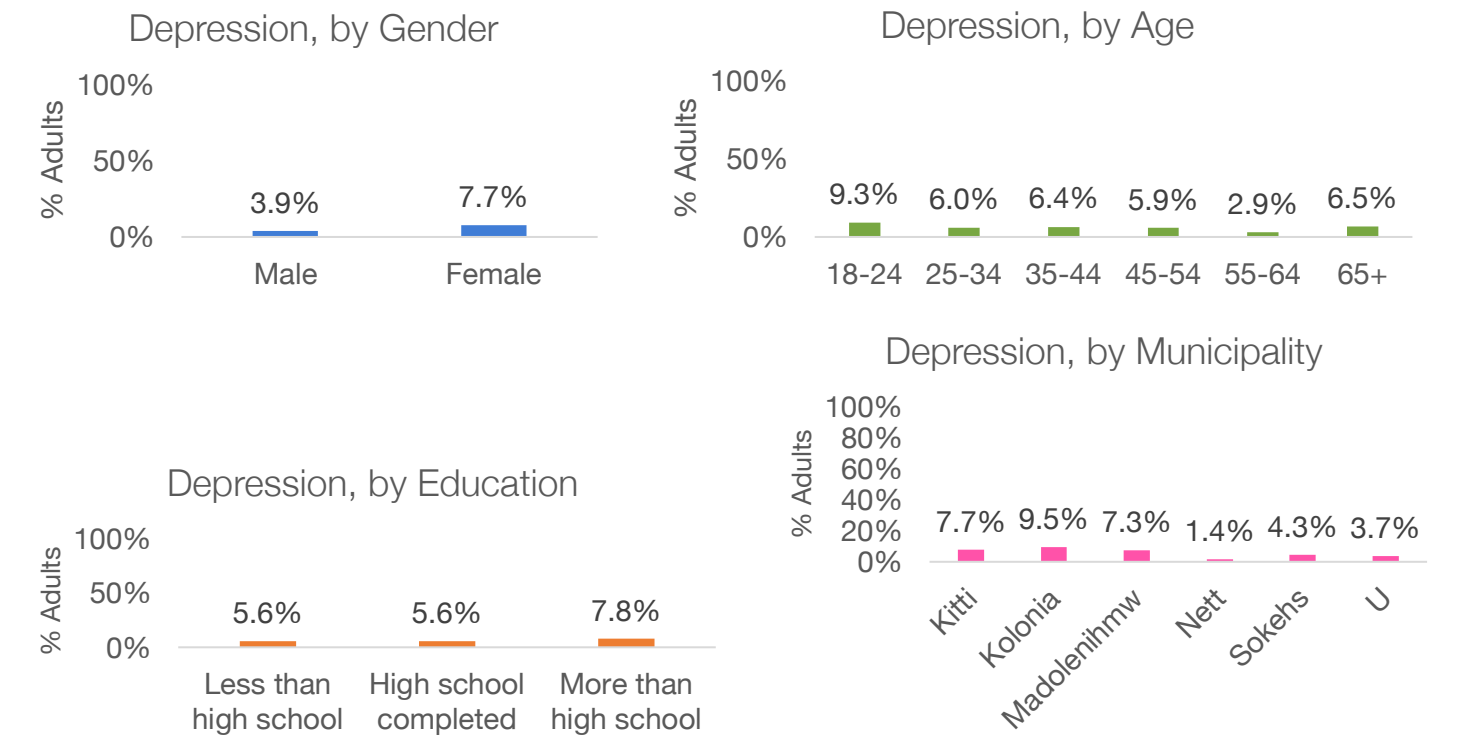
Participants were asked questions regarding their mental health status.

6.0% of adults in Pohnpei reported signs of depression.*

*(6.0%; 95% CI: 4.7% - 7.6%)

Depression was screened using the PHQ-2.

The prevalence of depression in Pohnpei was significantly higher among females and those living in Kolonia.



Mental Health: Anxiety

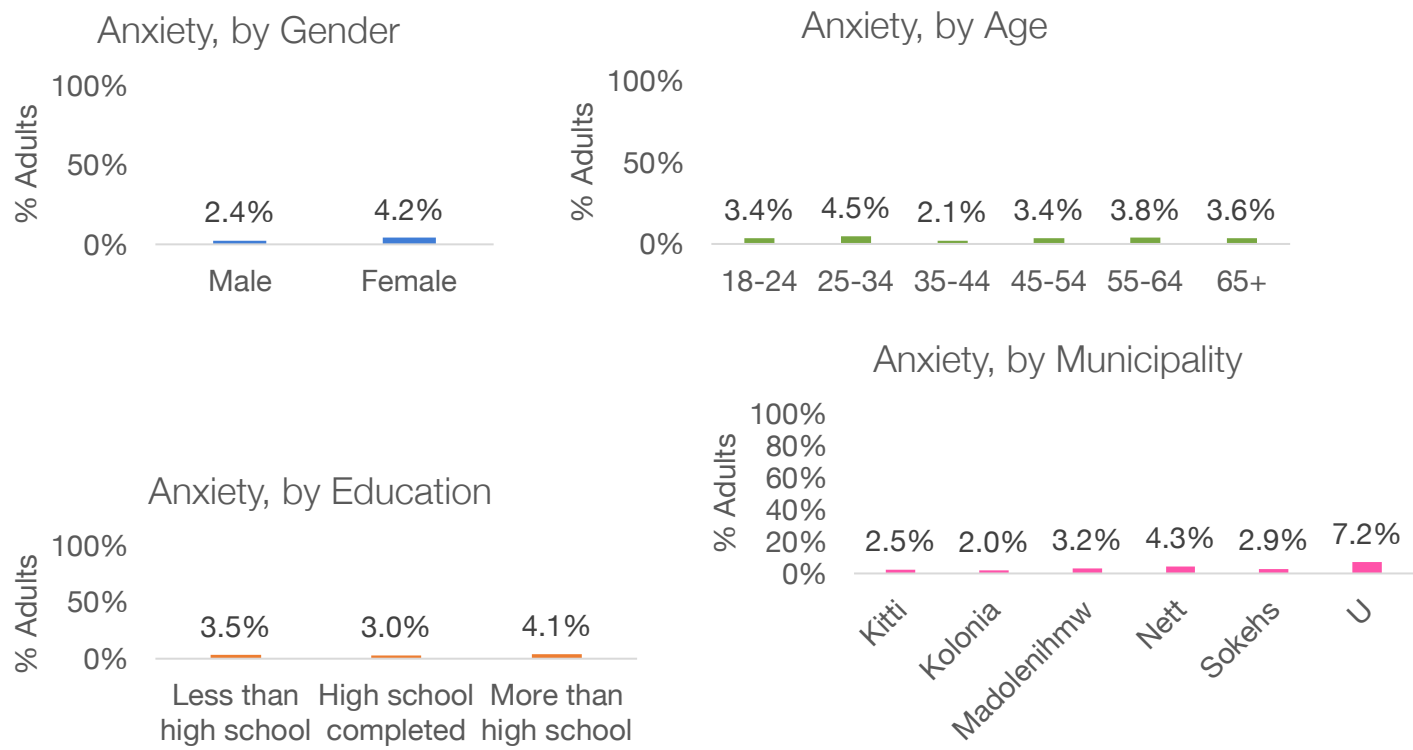
Participants were asked questions regarding their mental health status.

3.4% of adults in Pohnpei reported signs of anxiety.*

*(3.4%; 95%CI: 2.4% - 4.7%)

Anxiety was screened using the GAD-12.

There were no statistically significant differences in the prevalence of anxiety in Pohnpei by selected demographic characteristics.

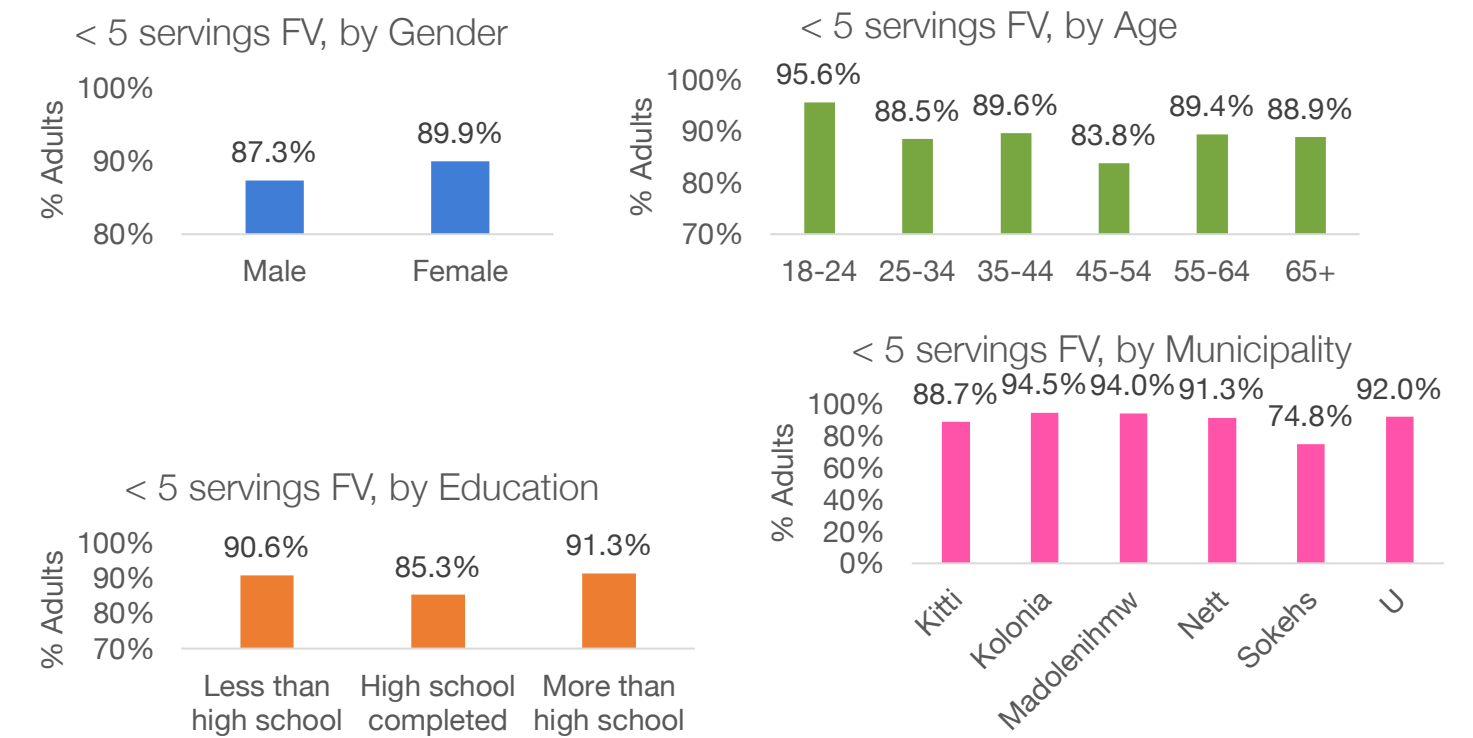


Fruit and Vegetable Consumption

Nearly 9 out of 10 adults (88.8%) in Pohnpei reported that they consumed less than the recommended daily servings of fruits and vegetables (at least 5 per day).*

*(88.8%; 95%CI: 86.7% - 90.5%)

Low fruit and vegetable consumption (<5 servings per day) is significantly higher among those with less than and more than a high school education and those living in Kolonia and Madolenihmw.

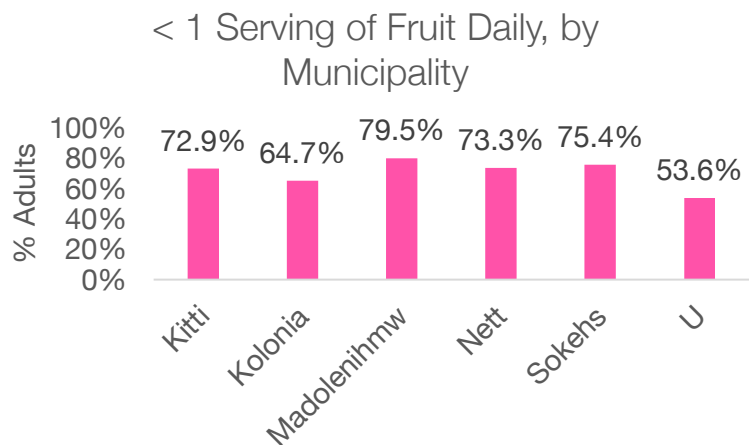
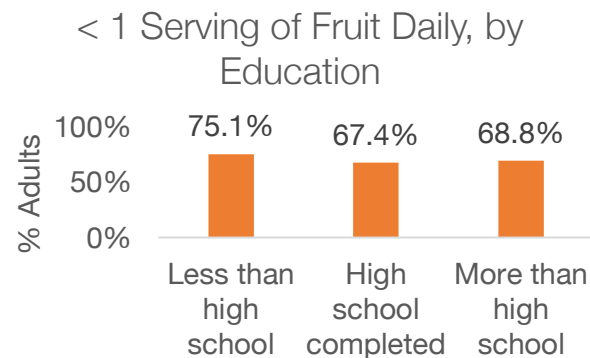
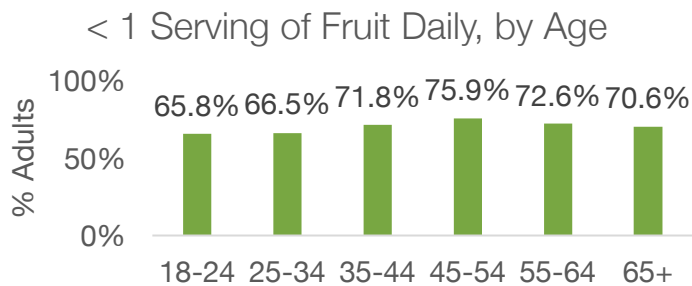
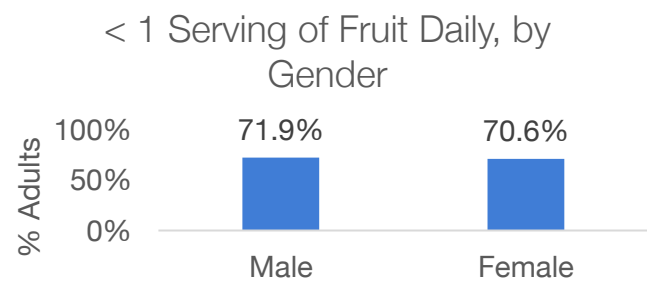


Fruit Consumption

Nearly 3 out of 4 adults (71.2%) in Pohnpei reported that they consumed less than one serving of fruit per day.*

*(71.2%; 95%CI: 68.4% - 73.8%)

Low fruit consumption was significantly higher among those with less than a high school education and those living in Madolenihmw.

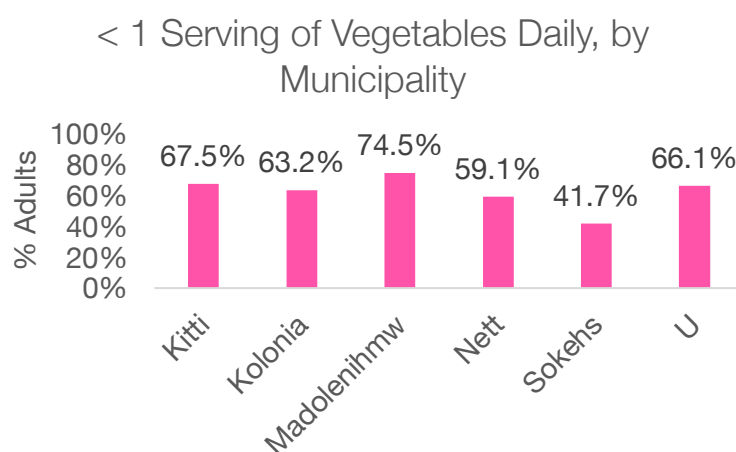
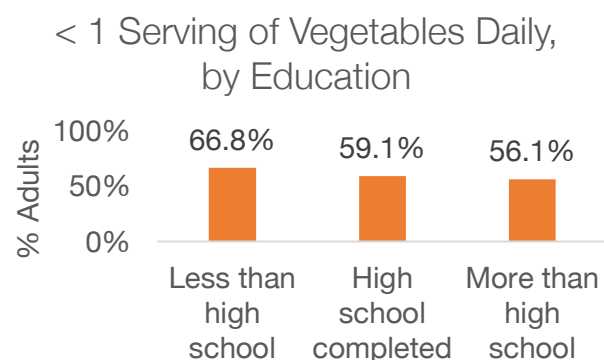
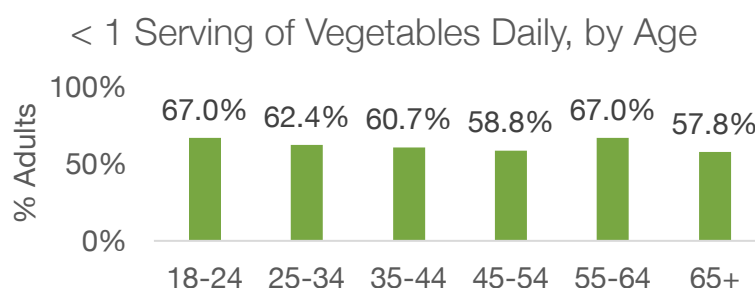
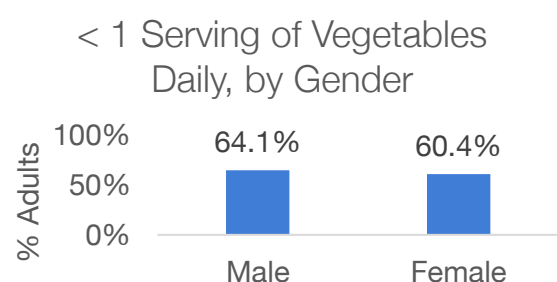


Vegetable Consumption

Nearly 2 out of 3 adults (62.0%) in Pohnpei reported that they consumed less than one serving of vegetables per day.*

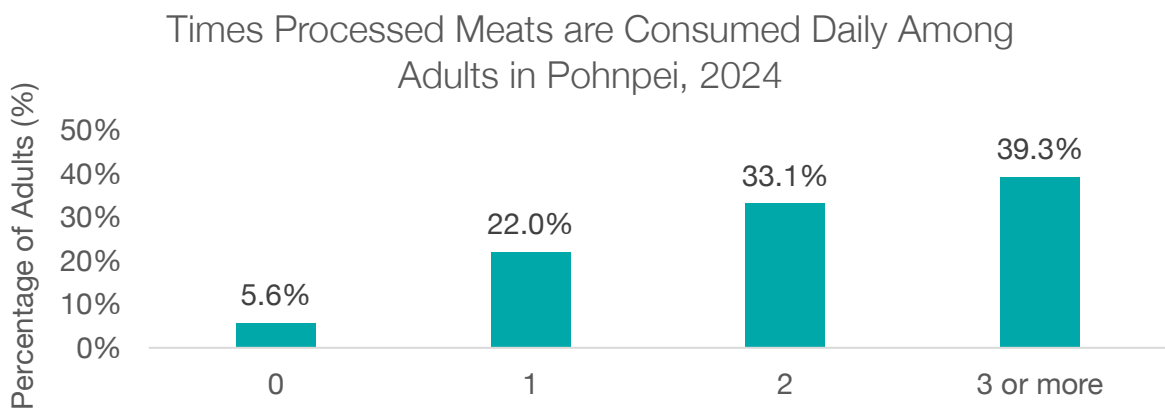
*(62.0%; 95%CI: 59.0% - 64.9%)

Low vegetable consumption was significantly higher among those with less than a high school education and those living in Madolenihmw.

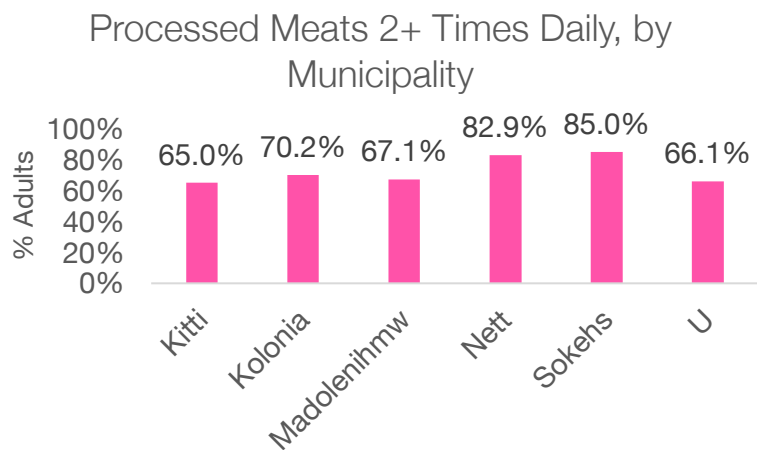
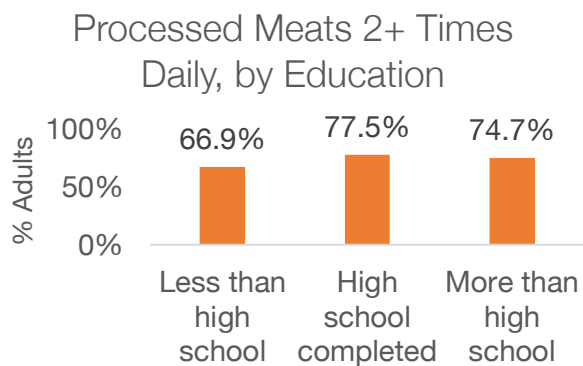
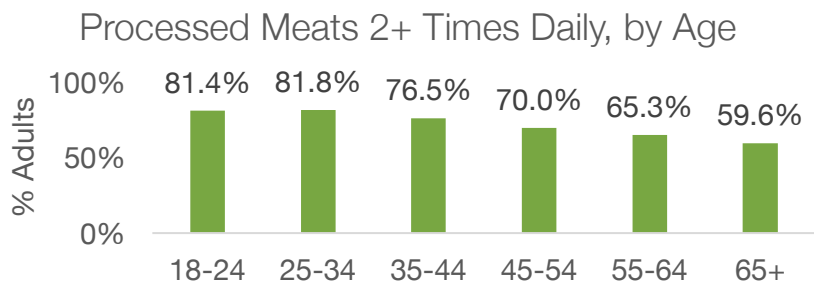
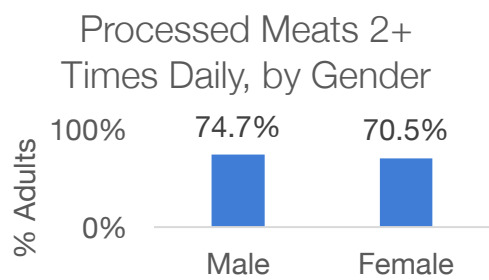


Processed Meat Consumption

Over 9 out of 10 adults (94.4%) in Pohnpei reported that they consumed processed meats at least once per day. Nearly 3 out of 4 adults (72.4%) in Pohnpei reported that they consumed processed meats 2 or more times per day.* *(72.4%; 95%CI: 69.6% - 75.0%)



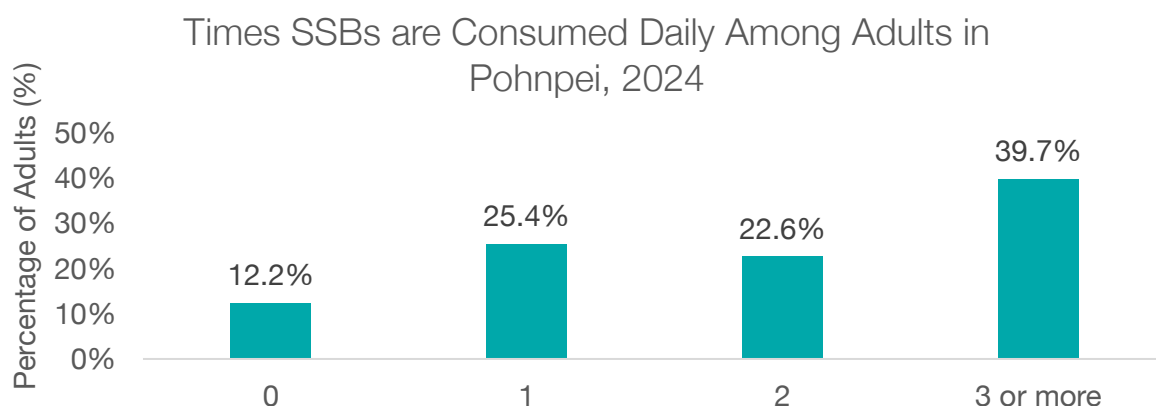
Heavy consumption of processed meats (2+ times per day) was significantly more prevalent among younger adults, those with high school education, and those living in Sokehs.



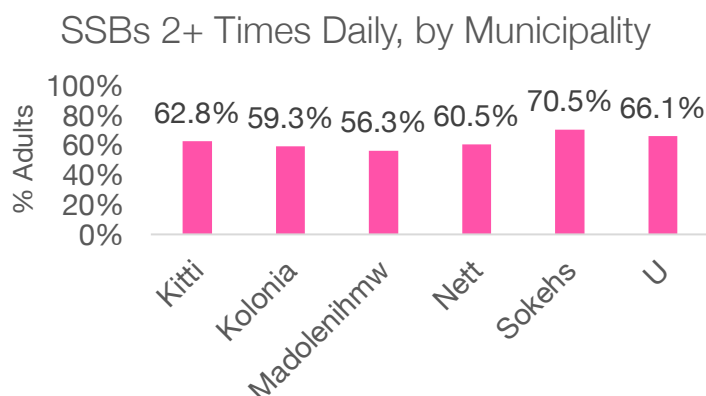
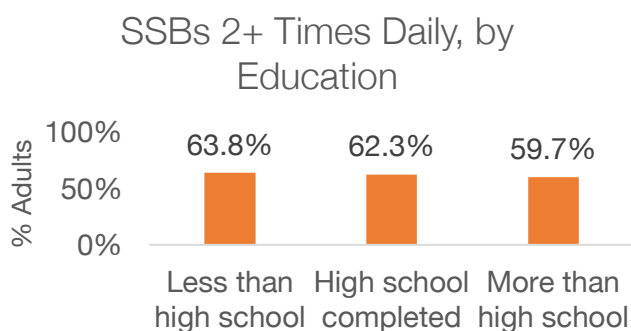
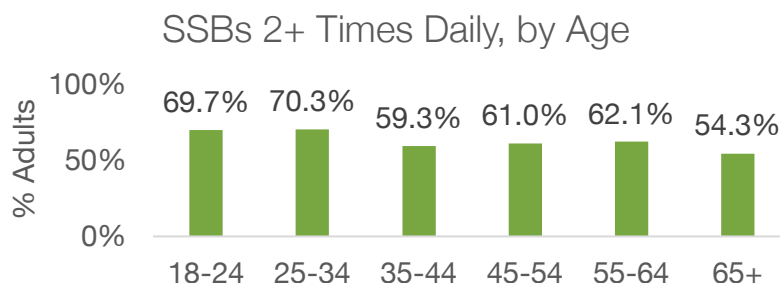
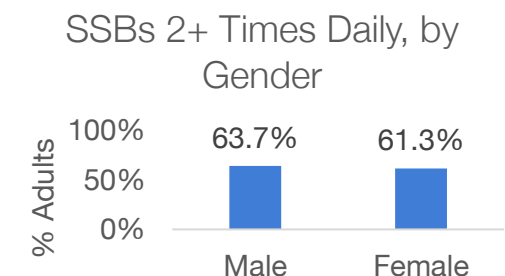
Sugar-Sweetened Beverages

Nearly 9 out of 10 adults (87.8%) in Pohnpei reported that they consumed sugar-sweetened beverages at least once per day. Over half of adults (62.3%) in Pohnpei reported that they consumed sugar-sweetened beverages 2 or more times per day.*

*(62.3%; 95%CI: 59.4% - 65.2%)



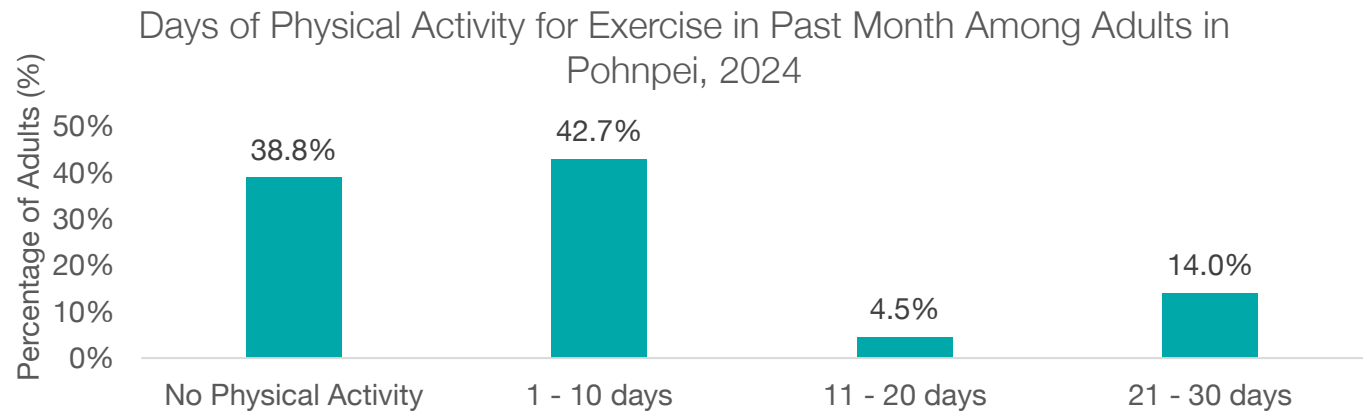
Heavy consumption of SSBs (2+ times per day) was significantly more prevalent among those living in Sokehs.



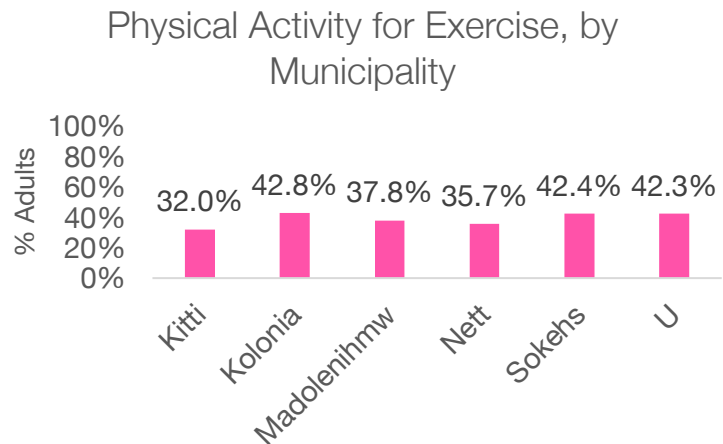
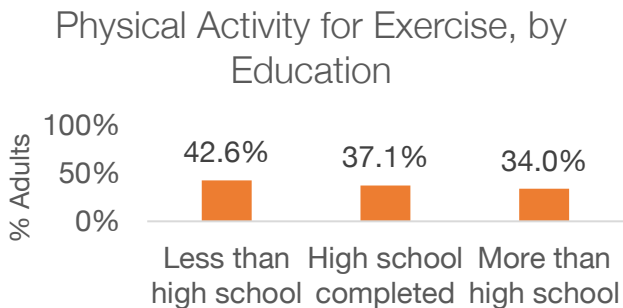
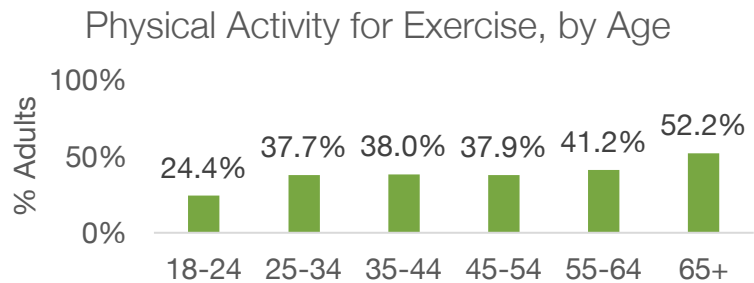
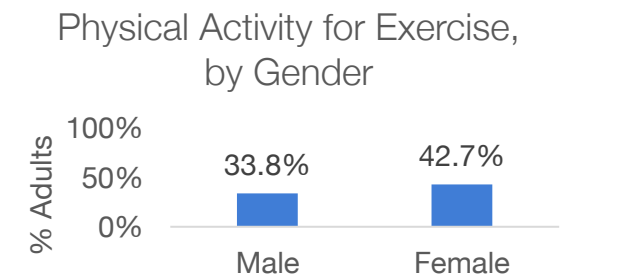
Physical Activity

Nearly two out of three adults (61.2%) reported participating in any physical activity specifically for exercise in the past 30 days.*

*(61.2%; 95%CI: 58.2% - 64.1)



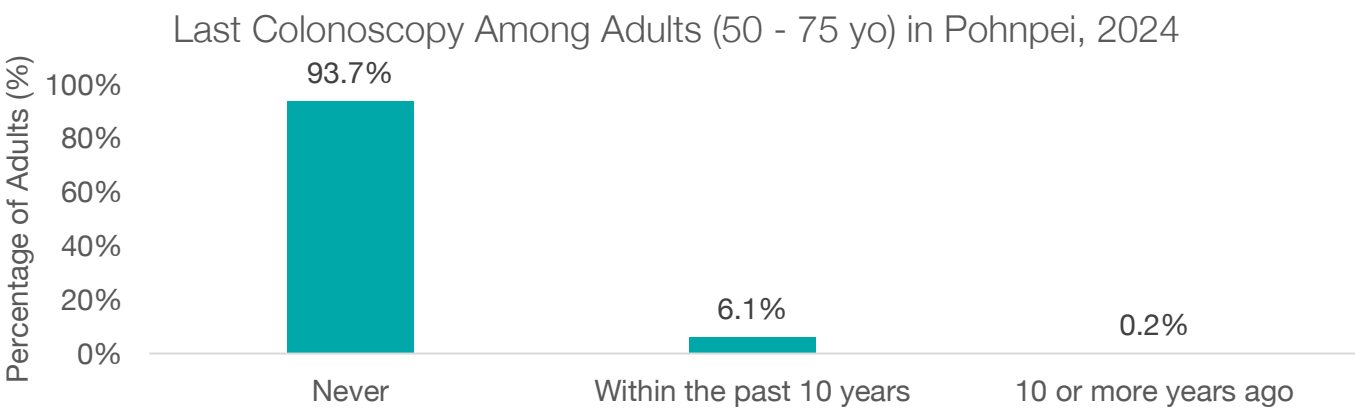
No physical activity was significantly higher among females and older adults.



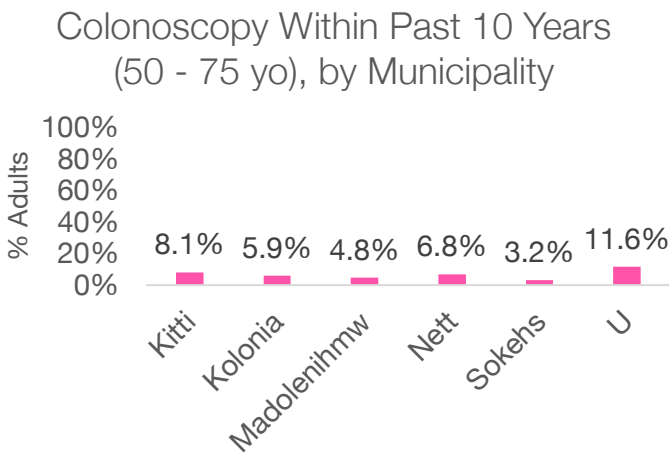
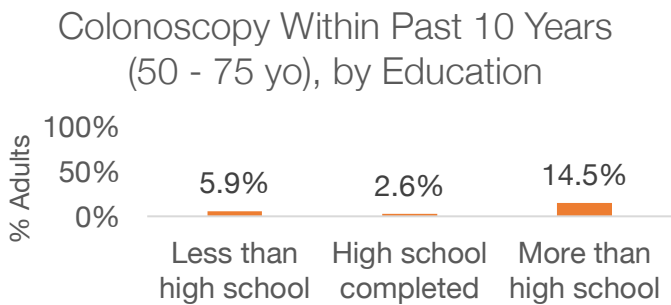
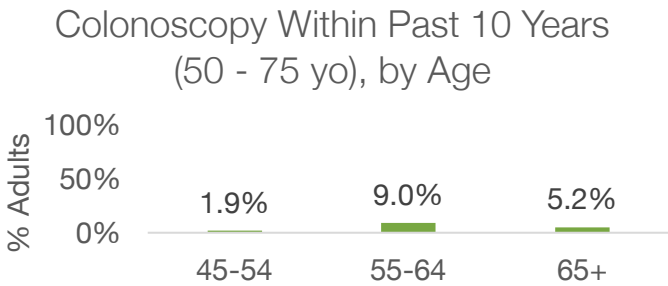
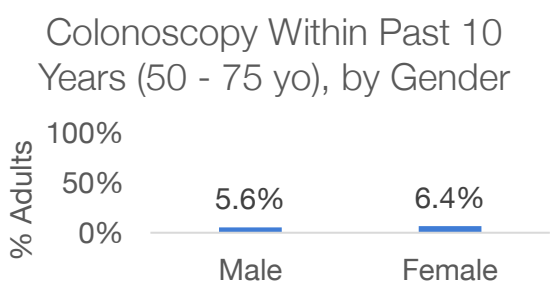
Colon Cancer Screening: Colonoscopy

Less than 1 out of 10 adults aged 50 to 75 years (6.1%) in Pohnpei meet the American Cancer Society recommendation for receiving a colonoscopy in the past 10 years.*

*(6.1%; 95% CI: 4.1% - 8.8%)



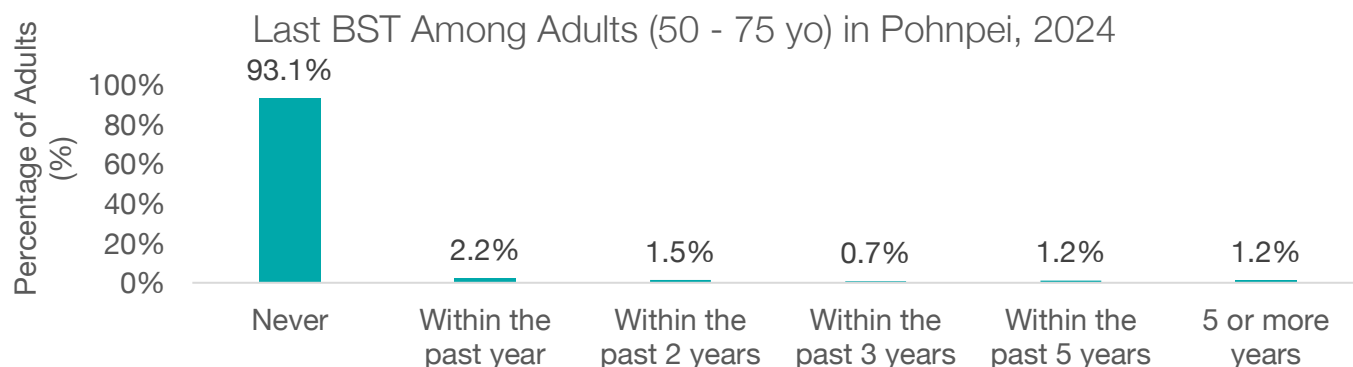
Up-to-date colonoscopy was higher among 55 to 64 year olds and those with more than a high school education.



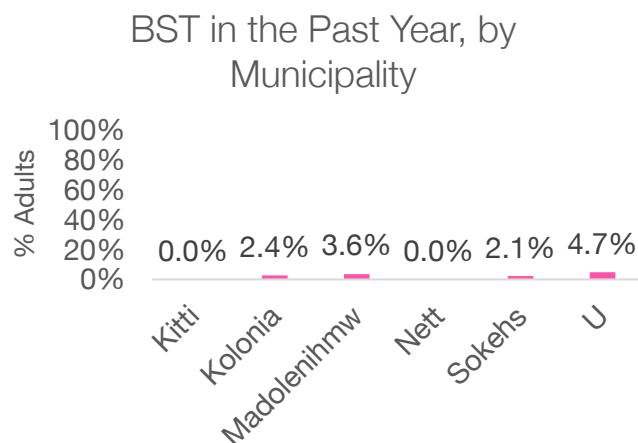
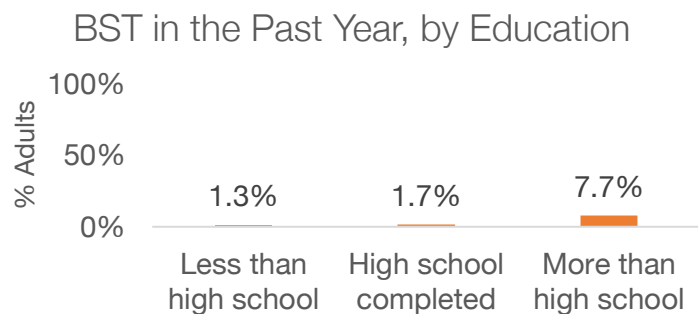
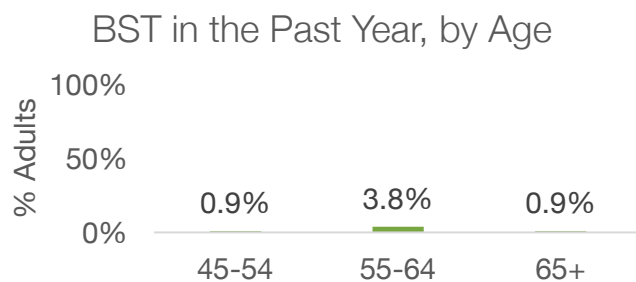
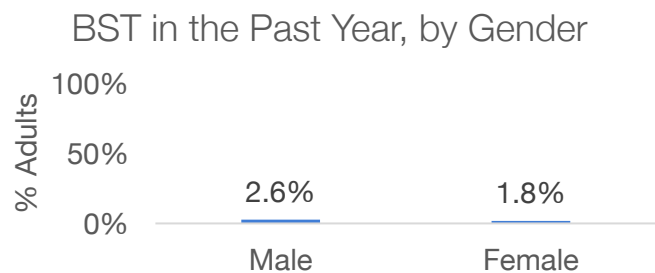
Colon Cancer Screening: Blood Stool Test

Among adults aged 50 to 75 years in Pohnpei, less than 1 out of 10 adults (2.2%) met the American Cancer Society recommendation of receiving a Blood Stool Test (BST) once in the past year.*

*(2.2%; 95%CI: 1.2% - 4.1%)



Receiving a BST in the past year was significantly higher among adults with more than high school education.



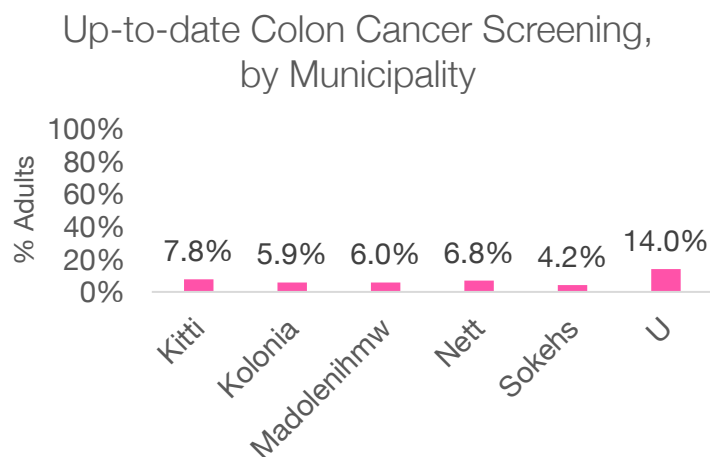
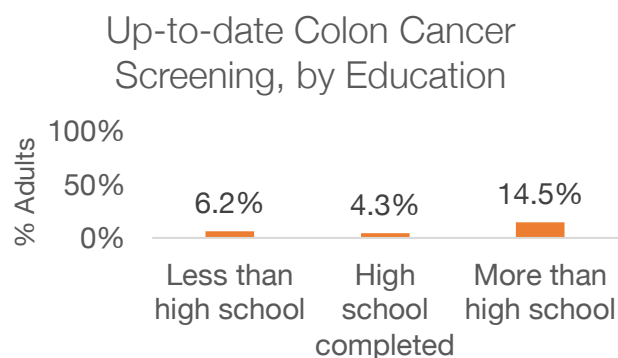
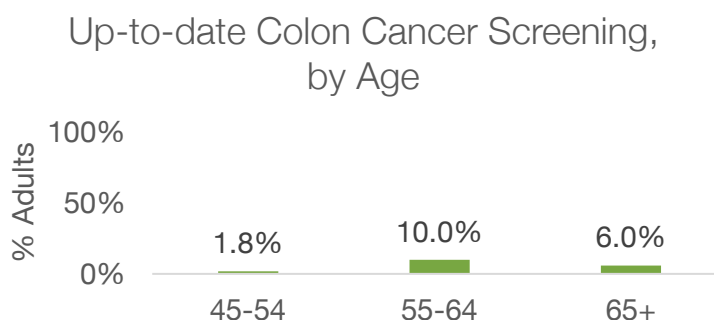
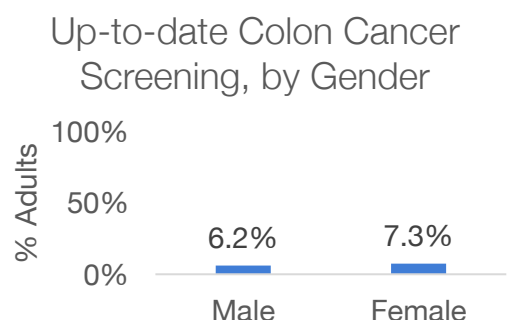
Any Colon Cancer Screening

Among adults 50 to 75 years in Pohnpei, 6.7% have had any up-to-date colon cancer screening.*

*(6.7%; 95% CI: 4.7% - 9.6%)

Any colon cancer screening is defined as someone who has had a blood stool test in the past year and/or a colonoscopy in the past 10 years.

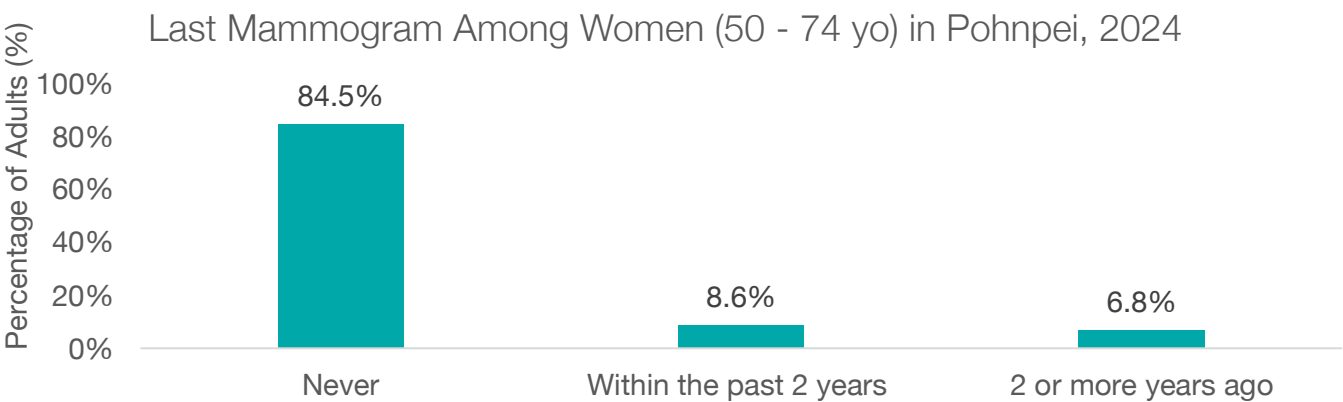
Having an up-to-date colon cancer screening was significantly higher among adults aged 55 – 64 years and with more than a high school education.



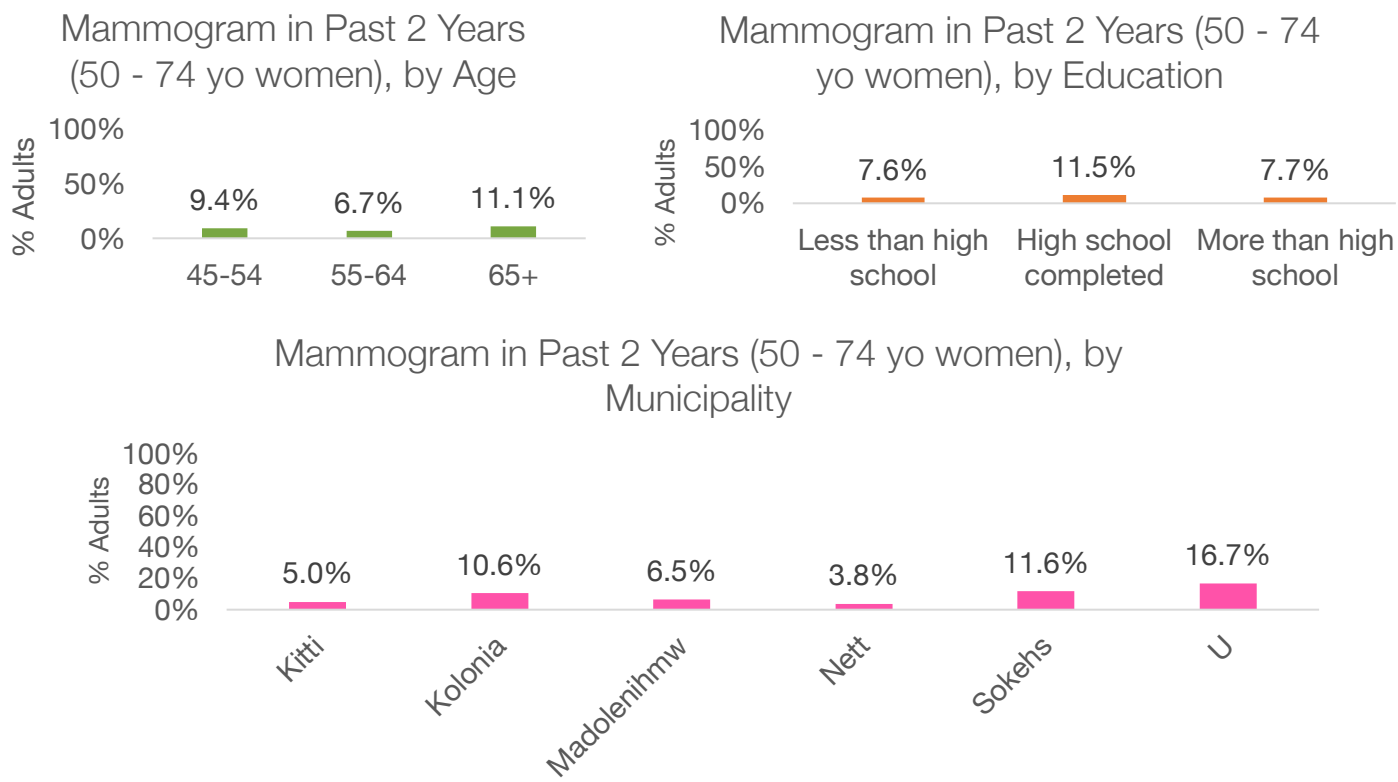
Female Cancer Screening: Mammogram

Less than 1 out of 10 women (8.6%) aged 50 to 74 years in Pohnpei have received a mammogram in the past two years per US Preventative Task Force (USPTF) recommendation.

*(8.6%; 95% CI: 5.6% - 13.1%)



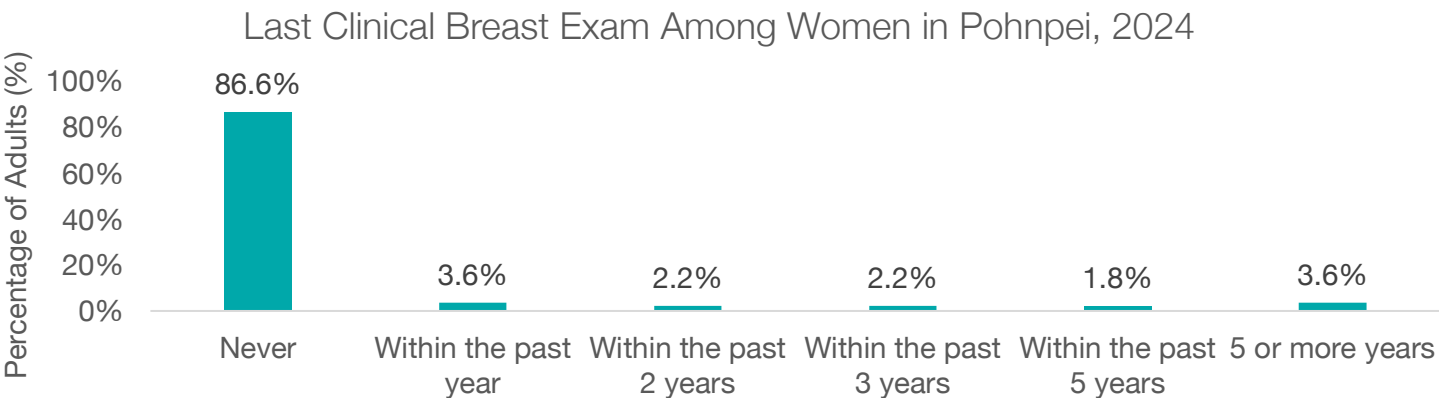
There were no statistically significant differences by selected demographic characteristics for having an up-to-date mammogram.



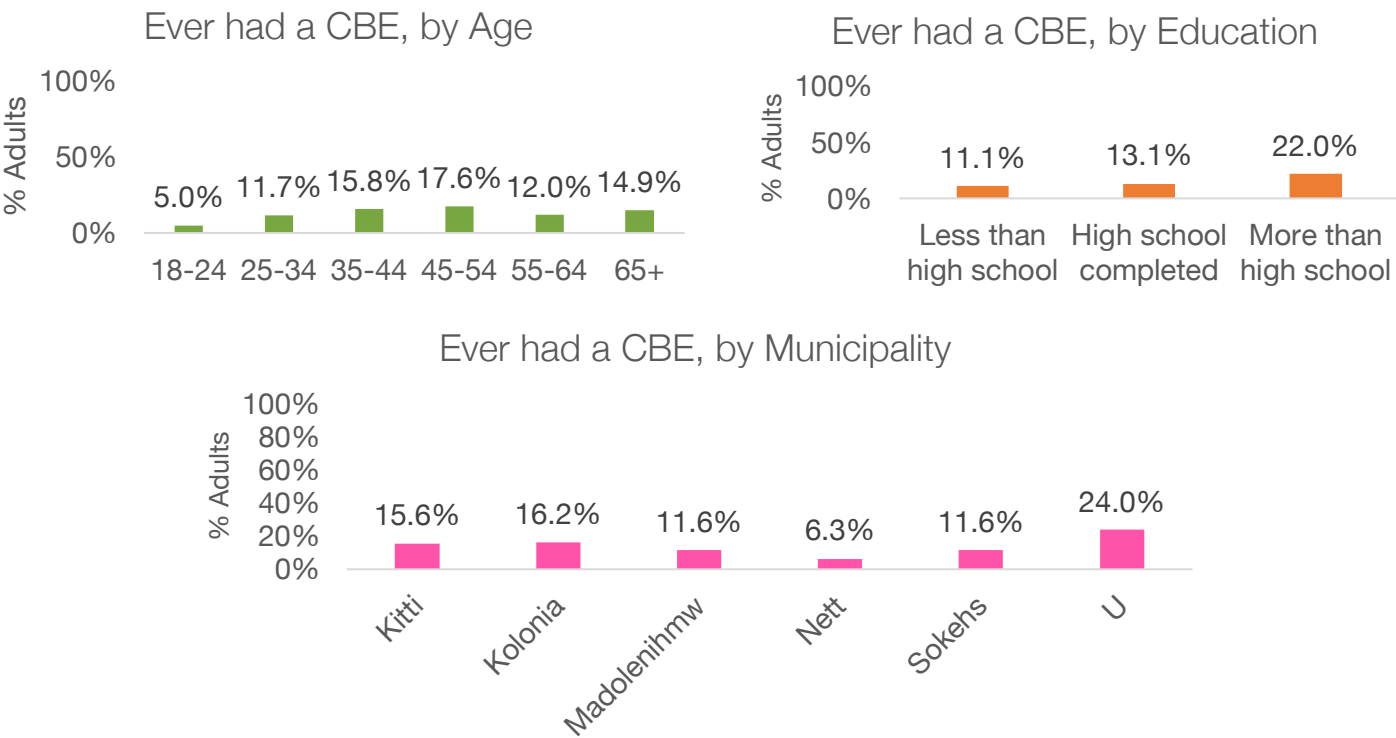
Female Cancer Screening: Clinical Breast Exam

13.7% of women in Pohnpei have ever had a clinical breast exam.*

*(13.7%; 95% CI: 11.2% - 16.7%)



There were no statistically significant differences by selected demographic characteristics for having a clinical breast exam.

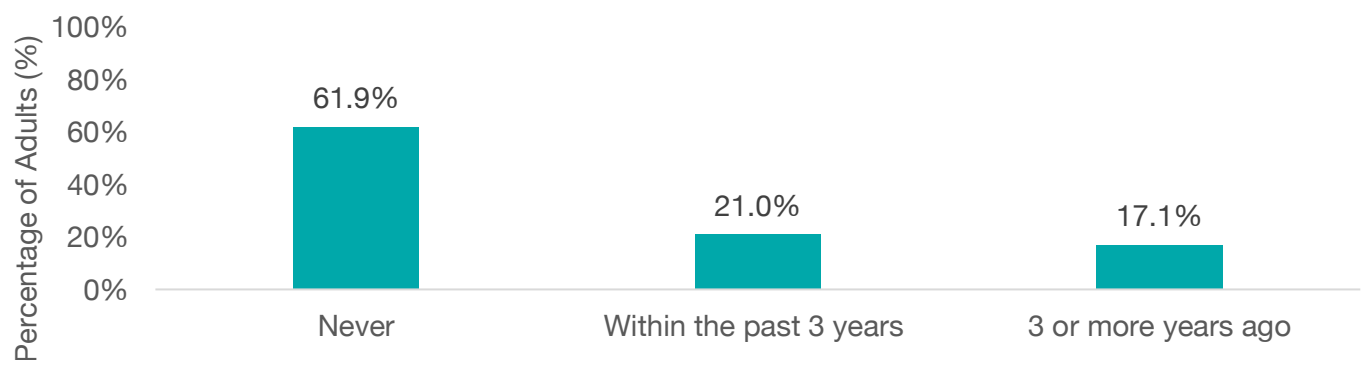


Female Cancer Screening: Pap Smear

1 out of 5 women (21.0%) aged 21 - 65 years in Pohnpei had a pap smear in the past 3 years (per USPTF recommendation).*

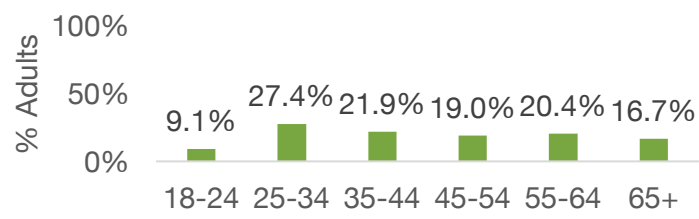
*(21.0%; 95%CI: 17.7% - 24.8%)

Last Pap Smear/VIA Among Women (21 - 65 yo) in Pohnpei, 2024

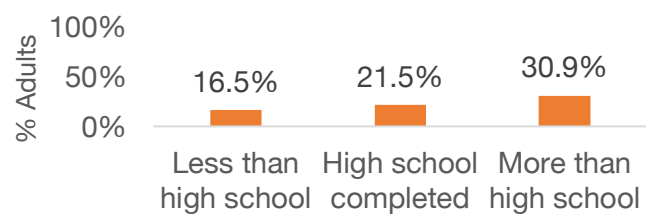


Having an up-to-date pap smear was significantly higher among women with more than a high school education.

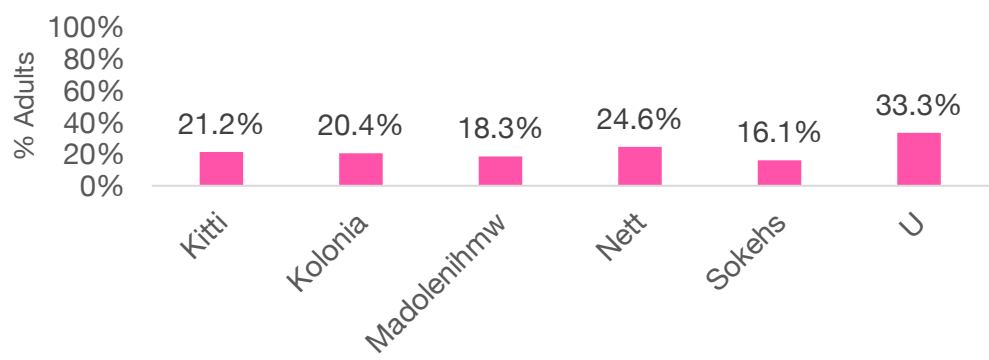
Pap Smear/VIA in Past 3 Years (21 - 65 yo women), by Age



Pap Smear/VIA in Past 3 Years (21 - 65 yo women), by Education



Pap Smear/VIA in Past 3 Years (21 - 65 yo women), by Municipality



Notes About the Survey Screening

Strengths

- Physical and biochemical measurements were conducted for NCD prevalence estimation rather than just self-reporting.
- Quality and thorough training was provided for all surveyors over the course of three days.
- The use of tablets ensured data collection was clean, efficient, and timely.
- There were successful partnerships and collaboration between internal and external stakeholders.
- There was substantial support from local leadership.

Challenges & Limitations

- A good portion of the data collected are self-reported, thus bias may exist, specifically regarding the more sensitive questions about substance use and mental health. Therefore, certain indicators may be under-reported.
- The sample was slightly older than the last Census population estimates. However, the data were not weighted because the most recent Census data were several years old, and there were many population changes during the COVID-19 pandemic.
- As the most recently available Census is from 2010, there was a challenge in up-to-date household information. Specifically, in navigating unidentifiable, vacant, or demolished households.

Discussion

This adult Hybrid Survey provides much-needed information about the status of NCDs and risk factors in Pohnpei, which complements data from youth school surveys (that provide a picture of how well we are protecting youth from the development of habits that will make them sick in the future) and death rates (that give a picture of the final impact of NCDs).

Comparing the results of the present survey with data from the US helps to paint a picture of health disparities that exist between Pohnpei and the US. Based on these comparisons, it is evident that nearly all health indicators are worse in Pohnpei compared to the US. Moreover, trend data comparing 2019 to 2024 indicated no observed improvements among several NCDs and selected risk factors within Pohnpei. Specifically, there was no improvement in the prevalence of overweight/obesity and diabetes. Trends in up-to-date female cancer screening rates have varied, with improvements in women receiving an up-to-date mammogram but worsening in up-to-date pap smears. Prevalence of betel nut use and e-cigarettes have remained constant. However, cigarette smoking prevalence has improved. The prevalence of alcohol use and binge drinking has remained stable over the years. The prevalence of consuming less than the recommended daily fruits and vegetables has been consistent, though this statistic remains very high. The lack of improvement to many of the NCDs and risk factors considered in the hybrid survey over the years indicates an urgent need for more aggressive strategies to tackle these issues.

The Monitoring Alliance for NCD Action (MANA) Dashboard for FSM shows the status of the adoption of critical, evidence-based policies and programs that are known to be effective in controlling NCDs. This dashboard shows that there is much “unfinished business” in adopting policies that protect the community, especially youth, from the risk factors that cause NCDs.

From the MANA Dashboard, the list of policies that need adoption or strengthening for tobacco control includes, raising excise taxes, strengthening smoke-free environments, banning advertising, strengthening sales and licensing, working on tobacco industry interference, and improving tobacco health warnings. To combat obesity, diabetes, and hypertension, measures that need to be done include excise taxes on unhealthy foods (especially sugar-sweetened beverages and processed meats), banning of trans fats, restrictions on marketing of unhealthy foods to children, healthy food policies in schools, compulsory physical education in school curriculum, and stronger enforcement of NCD policies.

In addition to a need for more aggressive policies to control NCD risk factors, the results of this survey indicate that there is a large “protection gap” in the delivery of health services designed to screen for and control the damage done by NCDs. The findings of this survey indicate that only 25.8% of adults with diabetes and 52.5% of hypertensives in Pohnpei have their disease under control. Findings also indicate that many adults in Pohnpei do not have up-to-date cancer screening (93.3% for colon cancer, 91.4% for breast cancer, and 79.0% for cervical cancer without up-to-date screening). More aggressive efforts are needed to ensure that most adults receive the screening services they need for cancer prevention and to provide the follow-up and care that those with diabetes and hypertension need to protect them from complications and death.

Recommendations

Recommendations

1. Assure that a Hybrid Adult Survey will be conducted every 5 years, in accordance with the NCD Monitoring & Surveillance Plan (next due in 2029).
2. Use the MANA Dashboard as the basis for developing a policy agenda and tracking progress to more effectively address NCD risk factors, especially overweight/obesity and tobacco use in Pohnpei.
3. Develop a strategy across health service agencies to monitor care delivery, expand outreach, tracking, and accessible services for the care of patients with NCDs.
4. Provide appropriate services and support for substance use and mental health.

Priority Areas for Health Improvement in Pohnpei

1. Reducing obesity, diabetes, and hypertension by improving diet/nutrition education and healthy food access and increasing physical activity using evidence-based programs and policies.
2. Strengthening NCD clinical screening and management programs among adults in Pohnpei.
3. Providing appropriate cessation services for substance use, specifically tobacco and alcohol.
4. Strengthening mental health services, especially to young adults.
5. Consider policy approaches to reduce certain risk factors, especially those in the Monitoring Alliance for NCD Action (MANA) framework.
6. Support chronic disease self-management programs to help individuals with NCDs control their disease.

Acknowledgements

We wish to express our heartfelt appreciation to everyone who played a part in making the Pohnpei State NCD Hybrid Survey (2024/2025) a success.

Thank you to the FSM Department of Health and Social Affairs at the national level, the Pohnpei State Department of Health and Social Services, and the Division of Primary Health Care, with special recognition to the Non-Communicable Disease Program. We are equally grateful to all municipal governments, our traditional and faith-based leaders, and above all, the People of Pohnpei for their cooperation and support. Kalahngan.

Our heartfelt thanks go to Mr. Stuard H. Penias, Director of the Pohnpei State Department of Health and Social Services, for endorsing the survey and providing unwavering support, encouragement, and leadership. We also gratefully acknowledge the Chief of the Primary Health Care Division for hosting this initiative and offering consistent support throughout the process.

We offer a very special Kalahngan to the Pohnpei NCD Hybrid Surveyors (Public Health Staff). Your commitment, stamina, and willingness to push through long days and heavy workloads made this survey possible. Despite the many demands on your time, you carried this project to completion, and the results reflect the teamwork and dedication displayed across the national, state, and community levels. Congratulations to all of you for an exceptional job.

We also extend our gratitude to the Pohnpei Women's Council (PWC) and Lien Kempahn Roson Mwahu (LKRM) for their fiscal management support, which helped ensure smooth implementation of the survey.

Our acknowledgment would not be complete without recognizing our colleagues at the Pacific Island Health Officers' Association (PIHOA) for their ongoing partnership. Your technical expertise, encouragement, and contributions throughout the planning stages, fieldwork, and dissemination of findings have been greatly valued. We deeply appreciate your dedication and assistance.

As we move forward, let us continue working together to strengthen the health and well-being of our people, our communities, our island, and to advance efforts that prevent and reduce the impact of NCDs.

Kalahngan to all who contributed, and a special appreciation to the surveyors for their patience and commitment!



References

1. Pacific Islands Health Officers Association, Declaring a Regional State of Health Emergency Due to the Epidemic of Non-Communicable Diseases in the United States-Affiliated Pacific Islands- Board Resolution #48-01. 2010.
2. World Health Organisation, Global action plan for the prevention and control of noncommunicable diseases 2013-2020. 2014, WHO: Geneva.
3. World Health Organisation, Social determinants of health: the solid facts (2nd edition), R.Wilkinson and M. Marmot, Editors. 2003, World Health Organisation: Copenhagen.
4. World Health Organisation, Review of Areca (Betel) Nut and Tobacco Use in the Pacific: A Technical Report. 2012: WHO Western Pacific Region.
5. (2010 Census) Summary Analysis of Key Indicators from the FSM 2010 Census of Population and Housing [Internet]. Palikir, Pohnpei: FSM Office of Statistics, Budget, Overseas Development Assistance and Compact Management; Available from: http://prism.spc.int/images/census_reports/FSM_2010_Census_Indicators_Final.pdf