The *Navajo Nation Health Survey (NNHS)*

Report of the Navajo Behavioral Risk Factor Surveillance Survey

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Chinle Health Improvement Council
Diné College
Navajo Department of Health - Programs
Navajo Health Education Program
Navajo Special Diabetes Project

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Participating Navajo Nation Agencies, Chapters, and State and Location

ARIZONA – Navajo Nation

Agency: CHINLE

Chapters: Chinle, AZ
Cottonwood/Tselani, AZ
Many Farms, AZ
Nazlini, AZ
Pinon, AZ
Round Rock, AZ
Tsaile/Wheatfields, AZ

Agency: FORT DEFIANCE

Chapters: Dilkon, AZ
Fort Defiance, AZ
Ganado, AZ
Greasewood, AZ
Indian Wells, AZ
Lupton, AZ
Nahata'Dzil (New Lands/Sanders), AZ
Oak Springs, AZ
Red Lake, AZ
Saint Michaels, AZ
Sawmill, AZ
Steamboat, AZ

Agency: WESTERN NAVAJO

Chapters: Cameron, AZ
Coalmine Mesa, AZ
Coppermine, AZ
Dennehotso, AZ
Inscription House, AZ
Kaibeto, AZ
Kayenta, AZ
Lechee, AZ
Navajo Mountain, AZ
Oljato, AZ
Tonalea, AZ
Tuba City, AZ

NEW MEXICO – Navajo Nation

Agency: EASTERN NAVAJO

Chapters: Baahaalii (Bread Springs), NM
Baca/Prewitt, NM
Casamero Lake, NM
Chichiltah, NM
Church Rock, NM
Crownpoint, NM
Lake Valley, NM
Manuelito, NM
Mariano Lake, NM
Nageezi, NM
Rock Springs, NM
Smith Lake, NM
Standing Rock, NM

Tsayatoh, NM
White Rock, NM

Agency: SHIPROCK

Chapters: Burnham, NM
Hogback, NM
Nenahnezad, NM
Red Valley, AZ
San Juan, NM
Sanostee, NM
Shiprock, NM
Teec Nos Pos, AZ
Upper Fruitland, NM

UTAH – Navajo Nation

Agency: SHIPROCK AGENCY

Chapters: Mexican Water, UT
Red Mesa, UT

Note: Navajo Chapter community locations are listed by Navajo Agency. However, most communities are geographically located within their respective states, of which Navajo Agencies overlap with more than one state in some instances. E.g., Shiprock Agency (UT, AZ, NM). See Figure 1.

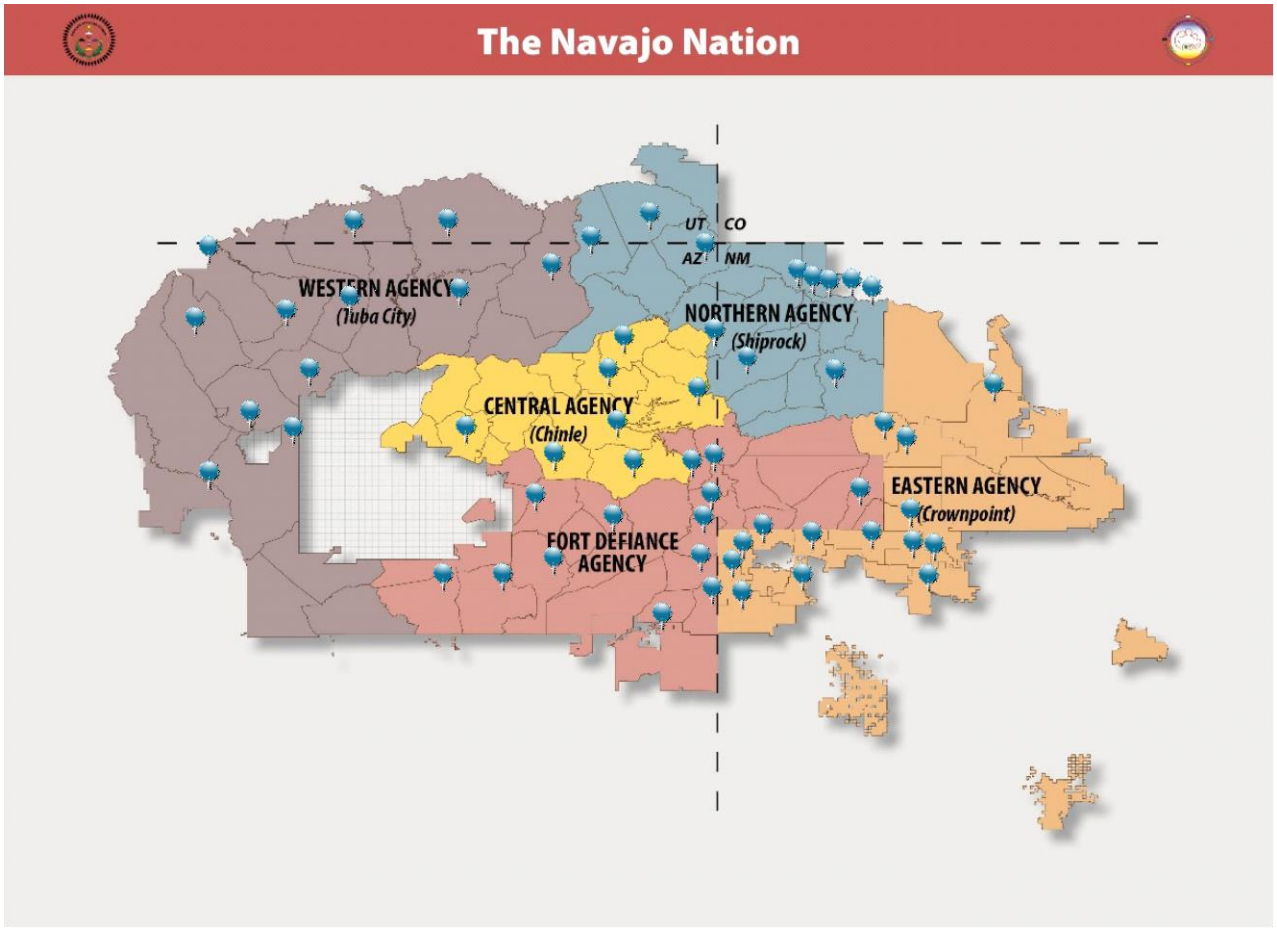

Figure 1. Map of Navajo Nation by Agency – Navajo Chapter participation in the NNHS.

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*** NEC recruited field staff from Navajo Department of Health's Navajo Health Education Program-Tuba City Office, and Kayenta Office of Navajo Special Diabetes Project, to assist with interviews, in-kind.*

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FOREWORD

Ya'a'teeh.

This report is intended as a Navajo-specific baseline of our health behaviors at one point in time. It is our hope that future public health professionals, researchers and leaders continue to collect information on the health behaviors of our Navajo members. Thereby, over time, we may have access to information about our own health trends and strive for health equity and move towards Hozhó Iína.

DEDICATION

The Navajo Epidemiology Center dedicates this report to all our relatives of the Navajo Nation. The People also known as the Diné, are a resilient and strong Nation with our language and clanship. We recognize and value our ancestors, who envisioned the success of future generations and teaching of Navajo cultural values and traditions. The project team extends their gratitude to all participants who completed the survey for their time and dedication. We express our gratitude to the project interviewers who traveled many miles to conduct the household interviews.

INTRODUCTON

The executive summary for the Navajo Nation Health Survey provides a glimpse of the health of the people who reside on the Navajo Nation. The Navajo Epidemiology Center led the survey administration and reporting of the project results. The study protocol was approved by the Navajo Nation Human Research Review Board. The dissemination of the results has also been approved by the Navajo Nation Human Research Review Board. The study had an advisory group who provided guidance and advice to the project team. The project team was led by Mr. Simental R. Francisco, Project Manager and Principal Investigator and the Navajo Epidemiology Center Director, Mrs. Ramona Antone Nez.

BACKGROUND

The Navajo Nation is one of the largest tribal nations in the U.S., with over 330,000 enrolled members. The Navajo Nation covers over 27,000 square miles of land that extends into New Mexico, Arizona, Utah and Colorado. Approximately 175,000 members reside on the Navajo Nation. In the context of studies reporting significant health disparities among indigenous populations, Navajo-specific health data is needed to drive public health practice. While state and national health surveys may oversample ethnic minority populations, limitations still exist. State based surveys may not align with cultural practices or address language barriers. Further, the Navajo Nation crosses multiple state boundaries and state surveys may focus on different priorities. Also, phone-based surveys may not reach rural locations with limited accessibility to reliable telecommunication services. As a result, state level data may have significant error when applied to the Navajo Nation. In response, the Navajo

Epidemiology Center with multiple partners developed the Navajo Nation Health Survey (NNHS), a Navajo-specific Behavioral Risk Factor Surveillance Survey (BRFSS). The data from the NNHS aims to characterize the health status, access to care, quality of life and risk behaviors among the Navajo in a culturally appropriate way and inform the health priorities and objectives of the Navajo people.

METHODS

The NNHS followed rigorous methods developed and refined by the Centers for Disease Control and prevention (CDC), with adaptations made to ensure alignment with the sociocultural context. For example, the survey was translated, conducted in a face-to-face format and certain answer options were removed or added to capture environmentally or culturally relevant topics (i.e. traditional care seeking). The final survey included 204 questions and was approved by the Navajo Nation Human Research Review Board and all 5 regional agencies prior to implementation. Surveys were conducted in three phases in 2013, 2015 and 2016. In each agency, half of all Census Block Groups (CBG) were selected using probability sampling. ArcGIS Explorer Desktop software was used to create grids composed of one square mile cells, superimposed on an aerial map of the selected CBG's. The number of housing structures were counted for each cell and 20 houses were randomly selected from each high-density cell and 4 houses from each low-density cell.

Selected households were approached by trained bilingual (Navajo and English) interviewers during regular business hours. Interviewers asked and recorded the number, age and gender of adults who permanently lived at the residence. A random number selection procedure was used to select one participant for the interview. If this person was not home, the interviewer would return up to 2 more times to complete the interview. If after 3 attempts the survey could not be completed, then that individual was considered a non-response. Analyses used weights to account for non-response and to adjust to each agency age and gender distribution. When making comparisons to U.S. and State level BRFSS data the NNHS results were age adjusted to the 2000 U.S. population.

RESULTS

Below are the key data findings from the NNHS. When comparisons are provided, the comparison groups are the United States, and the states of Arizona, New Mexico and Utah, hereafter called 'the 4 comparison groups.' All results are also summarized as data tables by each of the 5 regional agencies (Central, Ft. Defiance, Eastern, Northern, and Western) in an appendix to the report.

Demographics

A total of 12,998 survey interview attempts were made for 7,845 households, which resulted in 2,346 completed surveys. A total of 52% of participants were female. The average age of participants was 44.4 years old. Approximately 35.8% of people on the Navajo Nation reported being married. The average number of children younger than 18 years of age living in a Navajo Nation household was 1.38. About one quarter

(26%) of adults had less than a high school education. Almost half (45%) of households reported earning less than $15,000 per year. In nearly half of the homes on the Navajo Nation respondents reported “always” speaking the Navajo language at home, and more than 4 out of 5 spoke Navajo at least “sometimes.”

1. **Alcohol Consumption**
   - In the past 30 days, 1 in 5 adults reported drinking alcohol, which was significantly lower than all 4 comparison groups. Males (34.5%) were much more likely to report drinking alcohol than females (9.8%).
   - While 1 out of 7 adults reported binge drinking alcohol in the past 30 days, among those who drank alcohol, approximately 6 out of 7 reported binge drinking.
   - In the past 30 days, 0.9% of respondents reported drinking and driving, but a total of 27.9% of participants reported that they had been a passenger with a driver who had too much alcohol, which may be the best estimate of drinking and driving.

2. **Chronic Diseases**
   - The diabetes prevalence was 18.8%, significantly higher than state and national averages (10% U.S., 7% Utah, 10.1% Arizona and 11.5% New Mexico).
   - A total of 3.3% of participants reported they were told they had Chronic Obstructive Pulmonary Disease (COPD), which was significantly lower than all 4 comparison groups.
   - Reported prevalence for both heart attack (4.7%) and high blood pressure (29.4%) were similar to all 4 comparison groups.

3. **Cancer Screening**
   - A total of 84.3% of female participants self-reported having had a mammography screening; 85.4% reported a cervical cancer screening.
   - One third of participants age 50 and over reported ever having had a fecal occult blood test to screen for colorectal cancer; 25.0% used a home-based blood stool test in the past 2 years, which was significantly higher than all comparison groups (12.8% U.S. average).
   - Colorectal cancer screening with sigmoidoscopy or colonoscopy among the Navajo was significantly lower (estimate 38.6%) than all 4 comparison groups (68.8% U.S. average).
   - Prostate cancer screening among the Navajo in the past 2 years was significantly lower (20.6%) compared to all 4 comparison groups (42.8% U.S. average).

4. **Diet and Body Mass Index**
   - Based on self-reported height and weight, almost half of participants (47.4%) met the criteria for obesity, significantly higher than all 4 comparison groups (29.8% U.S. average).

- Self-reported daily fruit consumption (64.5%) was higher than all 4 comparison groups, which ranged from 56.9% to 62.4%. Daily vegetable consumption (70.5%) was lower than all 4 comparison groups (77.7% U.S. average).
- Daily soda consumption was high among males (45.6%) compared to females (32.0%). Consumption was higher among the younger age groups; 47% of adults under age 30 consumed soda daily. The lowest daily soda consumption was 23.1% for adults ages 60-69.

5. Disability

- Almost one quarter (23.3%) of the participants reported being limited because of a physical mental or emotional problem.
- About 1 in 8 participants reported having a physical, mental, or emotional problem that required the use of special equipment, which is significantly higher than all 4 comparison groups.

6. Health Care Access

- A total of 42.3% of participants reported having one person they think of as their doctor or health care provider, which was significantly lower than all 4 comparison groups (72% U.S. average).
- Respondents were more likely to report having more than one personal doctor or health care provider (22.3%) and significantly more likely to have reported not having a personal doctor or health care provider.
- Approximately 3 out of 5 Navajo Nation residents reported that they use a traditional healer or native medicine.

7. Health Status

- Navajo adults were significantly less likely to report “very good health” and significantly more likely to report “fair health” compared to residents of Arizona, New Mexico, Utah, and the U.S.

8. HIV Screening

- HIV screening among respondents was 45.7%, which was significantly higher than all 4 comparison groups.
- HIV screening was higher among younger age groups, with the highest proportion in the 18-29 age group.

9. Injury Prevention

- Unintentional injury is the leading cause of mortality on the Navajo Nation. Motor vehicle crashes are the most common type of unintentional injury resulting in death.
- Approximately 9 out of 10 participants reported always wearing their seat belt, similar to national and state averages.

10. Oral Health

- More than half (54.5%) of participants have had at least one permanent tooth removed, which was significantly higher than all 4 comparison groups.
- Almost 1 out of 6 (16.3%) participants aged 65+ have had all of their teeth extracted.

11. Tobacco

- Survey participants were significantly less likely to report smoking cigarettes every day and significantly more likely to have never smoked cigarettes compared to all 4 comparison groups.
- About 13.5% of participants reported chewing tobacco, significantly higher than all 4 comparison groups.

12. Sexual and Intimate Partner Violence

- Sexual violence includes any unwanted sexual contact (e.g. being groped or fondled), exposure to unwanted sexual situations (e.g. sexual harassment, someone exposing sexual parts of their body), and unwanted sex (i.e. rape).
- A total of 2.7% of female participants reported rape during their lifetime, 4.7% sexual violence and 12% physical violence. Among male participants, 0.3% reported sexual violence and 2.6% physical violence.
- These proportions are far lower than national averages, especially for Native American populations, suggesting likely underreporting.

CONCLUSION

Health status among the Navajo remains a substantial public health challenge on the Navajo Nation. Navajo adults were significantly less likely to report very good health and significantly more likely to report fair health compared to residents of Arizona, New Mexico, Utah, and the U.S. The most common health concerns are alcohol consumption, chronic diseases, health care access, obesity, oral health, intimate partner violence, commercial tobacco use and injury prevention. Colorectal cancer screening with sigmoidoscopy or colonoscopy was significantly lower (38.6%) than the U.S. (68.8%). Prostate cancer screening among the Navajo was significantly lower (20.6%) compared to the U.S. (42.8%). In addition, almost half of participants (47.4%) met the criteria for obesity, significantly higher than U.S. (29.8%). Unintentional injury is the leading cause of mortality on the Navajo Nation. Motor vehicle crash is the most common type of unintentional injury resulting in death.

Very few tribal nations have been able to implement a tribal-specific risk factor survey in a systematic and rigorous way. In response, the Navajo Epidemiology Center developed the NNHS. The data from the NNHS characterized the health status and behaviors of the Navajo people to inform health priorities and objectives. An ongoing health behavior surveillance is vital for identifying health priorities and concerns for a large population based tribe, such as Navajo Nation. The NNHS can strengthen and support continual tracking, measuring, monitoring, and evaluation of health status progress.

BACKGROUND

The Navajo Nation is a federally recognized tribe. It includes 27,425 square miles of land that extends into New Mexico, Arizona, and Utah, and Colorado. The geographical land base of the Navajo Nation is politically and geographically divided into "Navajo Chapters," across five tribal administrative Navajo Agencies. Navajo Chapters are local government entities within the Navajo Nation, delegated to address local issues pertaining to the land and health status of their respective Navajo Chapter population. According to the U.S. Census Bureau, each Navajo Chapter is designated as a Census Designated Place (CDP). Currently, there are 110 local Navajo Chapters, each with their own building, as the community center for local governance.

Figure 1 displays a map of the Navajo Nation, by Navajo Agency: Central Chinle Agency (yellow); Northern Shiprock Agency (grey blue); Eastern Crownpoint Agency (light orange); Fort Defiance Agency (color); and Western Tuba City Agency (purple grey).[a]

The 2010 U.S. Census enumerated 156,823 Navajo in combination (Navajo alone and Navajo mixed with other race) individuals living on the Navajo Nation[1]. From an epidemiologic perspective, and purposes of this study, the total Navajo in combination population on the Navajo Nation, is identified as the baseline population to determine prevalence and incidence rates for chronic diseases.

Results from the Navajo Nation Health Survey (NNHS) provide a baseline of data for the Navajo Nation. Health data on American Indians and Alaska Natives (AI/AN) indicate high risk of chronic disease, cancer, and injury[2], among health status disparities. The prevalence of diabetes and obesity is considerably higher in AI/AN youth and adults[3].

***Cancer Among the Navajo, 2005-2013[4]* Report**

Currently, cancer is the second leading cause of death among Navajo. According to this report, most recent data on cancer incidence (new cases), stage of diagnoses, mortality and cancer screening behaviors for the years 2005-2013 have been updated.

Cancer tumor registries from Arizona, New Mexico, and Utah provided data on AI/AN population-based cancer surveillance. Navajo residents in six counties: San Juan county, Utah; San Juan and McKinley counties in New Mexico; and, Coconino, Navajo, and Apache counties in Arizona represent about eighty percent of the total AI/AN population as a proxy for Navajo. Available data from the Navajo Area Indian Health Service's Government Performance and Results Act (GPRA) measures, and the NNHS data provided screening behavior for cancer report.

Incidence of Cancer

Breast, colorectal, prostate, kidney, uterine, stomach, non-Hodgkin lymphoma, pancreas, thyroid, liver, and lung are the most commonly diagnosed cancers among Navajos. Prostate cancer is the most commonly diagnosed cancer among Navajo males, followed by colorectal cancer

[a] The 3 satellite Navajo Chapters were not eligible for inclusion because they are served by the Albuquerque Area Southwest Tribal Epidemiology Center (AASTEC).

and kidney cancer. Breast cancer is the most commonly diagnosed cancer for Navajo females, followed by colorectal cancer and uterine cancer. Navajo had a low incidence of prostate, female breast, non-Hodgkin lymphoma, thyroid, and lung cancers, but had a higher incidence and mortality of liver, kidney, stomach, and gallbladder cancers when compared to the non-Hispanic white (NHW) population in Arizona and New Mexico.

Stage of Diagnosis

Navajos are diagnosed in later stages compared to NHW, with 8-9 percent fewer breast and colorectal cancer patients being diagnosed in the localized stages.

Cancer Screening

Based on the ***Cancer Among the Navajo, 2005-2013*** report, screening for cancer is low, particularly for colorectal cancer. GPRA measures also suggest a much lower rate in breast cancer screening for women. Self-reported BRFSS data for Navajo also suggest that NHW females receive mammography and pap test screenings at almost the same rate as AI/AN females in the six-county region of the Navajo Nation. The results of the Navajo BRFSS can provide further inference about cancer screening in the key data finding section of this report.

Cancer Mortality

The most common causes of cancer mortality among Navajo males were prostate, colorectal, and stomach cancers, and among Navajo females, breast, colorectal and ovarian cancers.

Substantial variability, especially, among breast cancer screening among Navajo females, suggest closer examination of all available data sources mentioned, cancer registry, clinical reports, and self-reported risk factors from the Navajo BRFSS.

Navajo Nation Mortality Report, 2006-2009 (AZ & NM Data)[5]

The leading cause of death for the Navajo Nation from 2006-2009 are unintentional injuries, accounting for 18.9% of all deaths. For the U.S., unintentional injuries are the 5th leading cause of death, and account for only 4.8% of deaths[6]. The age-adjusted mortality rate for unintentional injuries is 126.55 per 100,000 for the Navajo Nation and 37.3/100,000 for the U.S. in 2009. The five leading causes of unintentional injury death are motor vehicle crash (289 deaths), pedestrian (116 deaths), falls (75 deaths), unintentional alcohol poisoning (73 deaths), and exposure to cold (66 deaths). Key data finding from results of the NNHS on alcohol consumption, disability, and injury prevention provide further insight about unintentional injury.

Chronic Liver Disease and Cirrhosis is the fifth leading cause of death for the Navajo Nation, accounting for 5.6% of all deaths, whereas Chronic Liver Disease and Cirrhosis is the twelfth leading cause for the U.S., accounting for 1.3% of all deaths. The age-adjusted mortality rates for Chronic Liver Disease and Cirrhosis are 43.05 and 9.2 for the Navajo Nation and U.S., respectively.

The Navajo age-adjusted mortality rates are lower than the U.S. for Heart Disease, Stroke, and Chronic Lower Respiratory Disease.

The age-adjusted all-cause mortality rates for the Navajo Nation are 876.68/100,000 and 692.84/100,000 for men and women, respectively. The Navajo rate for male all-cause mortality is slightly lower than the 2009 U.S. male all-cause mortality rate of 888.4/100,000. The Navajo rate for women is higher than the 2009 U.S. female all-cause mortality rate of 625.5/100,000. There are some key health issues for which the Navajo male mortality rate is higher than the Navajo female mortality rate:

Table 1. Select Navajo Mortality Rates, by gender (Age-adjusted)

Cause of death	Male	Female	Male/Female Ratio
Suicide	31.41/100,000	5.30/100,000	5.93
Assault	21.14/100,000	4.44/100,000	4.76
Alcohol Dependence Syndrome	23.88/100,000	6.25/100,000	3.82
Unintentional Injury	193.14/100,000	53.02/100,000	3.64
Hypertensive Disease	15.82/100,000	5.86/100,000	2.70
Chronic Obstructive Pulmonary Disease	13.07/100,000	5.30/100,000	2.47
Diabetes	62.63/100,000	28.18/100,000	2.22

There are differences in mortality rates between the Arizona and New Mexico portions of the Navajo Nation. The age-adjusted mortality rates in Arizona for all causes, males and females are 744.94/100,000, 861.52/100,000 and 610.00/100,000, respectively. The age-adjusted mortality rate in New Mexico for all causes, males, and females are 841.88/100,000, 904.49/100,000, and 744.80/100,000, respectively.

Years of Potential Life Lost (YPLL) is another metric used to evaluate mortality data. It accounts for total deaths and age at death, simultaneously, to further quantify the impact each cause of death has on a population. Many causes of death occur primarily in an older population, and those who die from these causes may do so after they have reached their expected life span. When resources are limited, using YPLL may be helpful in directing resource allocation to have the greatest impact on improving the health and collective life span of a population. Unintentional injuries account for more than 4 times the number of YPLL than cancer although the age adjusted mortality rate is only 1.2 times greater.

The five leading causes of YPLL are:

1. Unintentional Injuries: 26,622.2 years
2. Cancers: 6,358.9
3. Diseases of Liver and Cirrhosis: 5, 753.4
4. Suicide: 5,526.1
5. Heart Disease: 4,783.9

Although difficult to quantify, due to varying reporting practices between Arizona and New Mexico, alcohol is a major cause of death or major contributor to death among the Navajo Nation. Among deaths reported in New Mexico, alcohol was a reported factor in 23.9% with an additional 2.8% reported as probably influenced by alcohol. After combining New Mexico's results with an estimation of alcohol contributions from Arizona's results, alcohol contributed to between 12.6% and 19.3% of all deaths.

INTRODUCTION

The purpose of this report is to provide behavioral risk factor data on Navajo adults (18 years old and older) residing on the Navajo Nation. Tribal nation-specific data among various AI/AN populations are not collected by the U.S. national CDC BRFSS. However, a summary by region using BRFSS data among AI/AN[7], a comparative study on cancer risk factors[8], and various ***Morbidity and Mortality Weekly Reports*** by the CDC as surveillance summaries[9,10], and chronic disease and health status[11], are additional resource publications available on AI/AN risk factor surveillance.

The Navajo Nation Human Research Review Board (NNHRRB) approved the study protocol on July 24, 2012. A survey questionnaire was developed with guidance from an advisory group – the NNHS Steering Committee – comprised of a health care practitioner, a population statistician, and two (2) health science professors in academia from Diné College and Northern Arizona University. A Project Manager was hired under the project budget to manage, coordinate project planning, scheduled activities throughout entire implementation of the study, i.e., data collection, data entry, and supervision of teams of Interviewers during data collection intervals, and reporting project status updates. Local governance authorized by Navajo Agency Council Resolutions from all five tribal agencies provided approval to conduct the Navajo BRFSS in selected chapter communities within each respective agency (Table 2).

Table 2. Navajo Nation Agency Council Approval to Conduct the *Navajo Nation Health Survey*

NN Agency Council	Support Resolution Number	Approval Date
Chinle Agency Council	--	October 9, 2010
Northern Navajo Agency	NNAC-50-1214113	December 14, 2013
Eastern Navajo Agency	ENAC-06-2014-14	June 7, 2014
Fort Defiance Agency	FDAC-15-10-002	October 10, 2015
Western Navajo Agency	WNA-262-103-#9	September 19, 2015

A total of 2,346 adults from sixty-one (61) Navajo Chapter communities participated in the NNHS. The data are presented as Figures and Tables. The Tables provide detailed data while the Figures graphically display the data. Comparisons are made with the AZ, NM, and UT state BRFSS data with all races combined.

The NNHS was initiated as an objective to the Five-Year Work Plan (September 15, 2011 – September 15, 2016) of the cooperative agreement between the I.H.S. and NEC for the development of a BRFSS project to evaluate Navajo Nation health risk behaviors. Results from the implementation of this study will provide further insight toward the study question: What is the Navajo Nation's highest priority health status objectives based on epidemiologic data among the adult population?

By asking the Navajo people directly the NNHS will provide an impressive amount of important health information which may be utilized for many purposes. These purposes include identifying relevant health needs, concerns, and issues. The goals of the NNHS project are:

- Implement a tribal nation-specific BRFSS to identify risk factors of adult living on the Navajo Nation;
- Collect data specific to Navajo Nation by in-person interview method via survey questionnaire;
- Continue to conduct the NNHS over time to measure Navajo Nation specific BRFSS data using epidemiology methods;
- Disseminate key data finding results from the NNHS to target audiences, primarily, members of participating Navajo Chapter communities, the Navajo Department of Health tribal programs, Navajo Area I.H.S. health care practitioners, and community health workers allied with community health organizations.

Aligned with the goal and objectives, the NEC will partner and collaborate with local community health organizations. NEC receives guidance from the Steering Committee to review the data results. Collectively, NEC, NDOH, and community health partnerships will assist Navajo Chapters with their interpretation and recommendation for action to prioritize community health, improve the health status of their community with identification of positive health trends and associated community strengths.

The sample design influenced the project time frame for the implementation stages of the project. The Navajo reservation is the largest land base of the five-hundred-and-sixty-seven (567) federally recognized AI/AN tribes in the U.S., therefore, an enormous amount of time and resources were required to conduct the NNHS under the 5-Year work plan activities according to the study protocol. The project timeline and milestones of the study implementation are highlighted in Table 3 below.

Training of the interviewers prior to mobilization of the teams to selected Navajo communities in the study sample during Phase I, II, and III, was the first stage. The second stage was data collection, followed by a third stage, closing out the data collection. A follow up meeting among the NEC staff, NNHS Steering Committee, and members of each team of Interviewers assigned to the five Navajo agencies, occurred to capture the Interviewer's experiences during the data collection period.

Table 3. Navajo BRFSS Project Timeline, Milestones

2012	2013	2015	2016	2017
✓Research Application to NNHRRB ✓Research Protocol Approval ✓Survey Questionnaire Development ✓*Completed*	✓Pilot Test Survey Questionnaire ✓NNHS Phase I Chinle Agency ✓Phase I Data Analyzed ✓*Completed*	✓ NNHS Phase II Northern Navajo ✓ Phase II Data Analyzed ✓ *Completed*	✓ NNHS Phase III Eastern Navajo Fort Defiance Western Navajo ✓ Phase III Data Analyzed ✓ *Completed*	✓ NNHS Data Results & Interpretation Session ✓ *Completed* Final Report ↓ Dissemination

A critical aspect of the survey administration was training and coordination of the Interviewer teams and oversight of field operations during the data collection process. The organization of the field assignments, training and the data collection is explained in more depth in the Methodology section of this report.

METHODOLOGY

The Navajo adult population was selected from all residents on the Navajo Nation. Individuals of all races from the 110 Navajo Chapters living within the reservation boundaries were eligible to participate in the NNHS. The project protocol and questionnaire were reviewed and approved by the NNHRRB.

Sample design

The NNHS Steering Committee determined the survey would be conducted as face-to-face interviews rather than telephone, cell phone, or other mixed methods because phone coverage on the Navajo Nation is still sparse. The survey included only adults 18 and older and included only 1 person, randomly selected, per household. All adults, regardless of race or tribal affiliation, were eligible for inclusion. This would allow the survey to make statements on the overall health of the Navajo Nation since persons of all races and tribes utilize services and influence the health of the community. The survey was designed as a multi-phase, multi-stage project.

Surveys were collected by Agency within the Navajo Nation with the goal to have generalizable results by Agency. An Agency is a collection of communities known as Chapters within specific geo-political boundaries; similar to a county. A much larger sample size, and much more expensive survey, would be required to have results at the Chapter level. The collection of surveys from these agencies was completed in 3 phases. Phase one consisted of the Chinle Agency, Phase two of the Northern Agency, and Phase 3 of the Eastern, Ft. Defiance and Western

agencies. The data collection portion of each phase was conducted in 2013, 2015 and 2016, respectively. Sample size calculations were conducted utilizing STATA software for each of the 5 agencies. The desired sample size was 1,220 adults age 18 and older. Each of the five agencies were oversampled because we predicted limitations such as non-responses and/or unoccupied housing structures. The stages of the survey consisted of Census Block Group (CBG) selection, division of CBG into high and low density areas, selection of high and low density areas within CBG's, selection of homes, and selection of an adult household member (each stage will be discussed further below).

Half of the total number of CBG's from each agency were selected utilizing SAS software and probability proportional to size with replacement (PPS/WR). Using ArcGIS Explorer Desktop software, grids composed of one square mile cells were superimposed on an aerial map of the selected CBG's. During Phase 1 (Chinle Agency only) each cell was then stratified into a high density or low density category, with high density defined as being part of a U.S. Census defined Census Designated Place (CDP)[12]. For the remaining 4 agencies, cells were no longer stratified into CDP's as this seemed arbitrary in some cases, and results did not differ by high and low density in Phase 1. The removal of the high/low density designation made data collection more efficient with respect to reduced travel costs and time. The proportion of the Chinle Agency population living in a CDP was calculated to help identify how many people from high and low density cells should be included.

The number of structures were counted for each cell created within the selected CBG's. Four high density cells were selected PPS/WR from each selected CBG. Twenty-seven low density cells were selected PPS/WR. Cells that did not contain any structure were not eligible for inclusion. Each housing structure was given a number, pinned, and had its GPS coordinates recorded for future reference. Within each selected high density cell 20 houses were randomly selected, using the number assigned and a random number table. From each low density cell 4 houses were randomly selected. If a CBG's high density cells contained fewer than 80 houses then all houses were included. If a low density cell contained fewer than 4 houses then an adjacent low density cell was selected to provide the additional house or houses required.

During Phase 2 and Phase 3 cells for each CBG were created exactly as during Phase 1. Cells were no longer divided by high or low density, however. Housing structures within each cell were counted as during Phase 1. Enough cells were selected PPS/WR to achieve the desired sample size by sampling 10 houses from each cell. If a cell could not provide enough houses either because there were fewer than 10 houses, or because a cell was selected a number of times that exceeded the total houses contained within the cell, then additional cells and houses from the CBG were randomly selected for inclusion.

Weighting procedure

A base sampling rate was created from the SAS output generated when randomly selecting CBG's. The purpose of this weight was to ensure that the CBG's properly reflected the Agency's total population. A cell probability weight was created from the SAS output generated when cells were randomly selected. The purpose of this weight was to ensure that the cells properly reflected the total persons found in each CBG. A house probability was created by dividing the total houses found within a cell by the number of houses randomly selected from the cell. The purpose of this weight was to ensure that the houses included properly reflected the total houses in each cell. A person probability weight was created by dividing 1 (the person interviewed) by the total number of adults in the household. The purpose of this weight was to ensure that the total number of persons 18+ in each house was properly reflected. The product of each of these 4 weights created the base sampling rate.

Once all the surveys were returned, an additional weight was created to adjust for non-response. This was created after removing housing structures identified on aerial maps that were unoccupied, not actually housing units, or lost to follow-up (house did not participate either because of a verbal refusal, or interviewers could not interview any adult after 3 attempts). The base sampling rate was then multiplied by the non-response adjustment rate to create a final weight.

The returned surveys were then analyzed, after applying the final weight, to determine how well the total Agency population was reflected by age and gender. A post stratification weight was created, and multiplied by the final weight, to properly reflect the underlying age and gender population structure. Finally, when making comparisons to U.S. and State level BRFSS data the NNHS results were age adjusted to the 2000 U.S. population.

Training of the Interviewer Teams

The NEC recruited, hired, and trained teams of interviewers during each data collection interval of the NNHS to conduct in-person interviews. Prospective team members were recruited from each Navajo agency where the NNHS was to be conducted. Interview teams were assigned to a Navajo agency during all phases of the project. Six interviewers typically formed a team. The Project Manager, intermittently, assisted the team with interviews, when appropriate. Interviewers received training on the following from the NEC team:

- introduction to epidemiology
- human subjects research
- interview techniques
- survey questionnaire template and accompanying response sheet
- Geographic Positioning System (GPS) use
- random selection procedure of one adult person to interview
- voluntary acknowledgement by informed consent to participate
- documentation on outcome of household visits.

Printed materials were provided to each member in their interviewer binder to carry with them at all times. An interviewer guidance manual was developed for reference.

A week long *Interviewer's Training and Orientation* was followed by the team deploying to the first community. The Project Manager assisted with survey interviews, monitored interview procedure, and manual (hand) recorded the information exchanged during an interview for quality assurance. Supervision of the Interviewers required constant communication with the NEC staff.

Team leads were assigned when the Project Manager was not assisting the team. A team leader was responsible for coordinating the team schedule of home visits per interview, receiving all documentation, including daily interview log sheets, informed consent forms, and the respondent response sheet at the end of each day. It was encouraged that Interviewers rotate as a team leader for leadership development in this type of group dynamic. All documents were submitted to the Project Manager during weekly debrief meetings.

The survey instrument was paper based and included approximately 200 questions. Interviewers were given a packet of maps for all homes included in the sample. The maps included an overview of the U.S. Census designated CBG, a snapshot of the cells selected, and enlarged images of the homes included. Route designation of exiting road systems (state and tribal) were provided on the maps. Frequently, homes were found on unnamed dirt roads. Interviewers wrote detailed descriptions with directions to each of the homes selected. GPS coordinates were recorded for each house, and each team was given a GPS device to help locate and confirm the house location.

Survey Administration Procedure (once inside the house)

Upon arrival of the selected home, the Interviewer asked and recorded the number of adults eighteen (18) and older who permanently lived at the residence, along with their age, and gender. The random number selection procedure was used to select one participant for the interview. Each week, a table of random integers with values ranging between 18 and 99 were provided to the team to provide consistency with randomization. The tables were generated and provided to the team every week. The list of ages were matched to the random integers and used to select the first adult. The interviewer referred to the first line of the random number table and moving from left to right looked for the first combination of numbers that corresponded to one of the household member's age. If the person randomly selected for inclusion was not home at the initial contact then the interviewer would return up to two more times to complete the interview. If after 3 attempts the survey could not be completed then that individual was lost to follow-up. Table 4 provides a breakdown of the number of houses selected by agency. Response and refusal rates are provided in the Results section, as Table 7 and Table 8.

The survey instrument for Phase I consisted of 199 questions which included some skip patterns. The survey was translated into Diné Bizaad (Navajo language). Teams of interviewers were sent into the field between 8:00 a.m. and 5:00 p.m. Monday through Friday beginning in March of each survey year and ending in September. Navajo Nation personnel policies prohibited the survey team from conducting surveys later than normal business hours on Monday through Friday, and from conducting surveys during the weekend. The questionnaire used to conduct the NNHS in the Chinle Agency was updated. Five (5) questions were added (explained in more detail in the following section).

Survey Instrument Modification

Following the conclusion of Phase I data collection for the Chinle agency in 2013, the survey instrument was reexamined and revised by NEC staff, and members of the NNHS Steering Committee, and advisory group composed of a health practitioner, health information statistician, and health science faculty from Northern Arizona University and Diné College, to recommend inclusion of five (5) additional questions on the survey questionnaire.

A question about how often the Navajo language was spoken in the home was added to the Demographic section of the questionnaire. The NEC agreed to add this question based upon interviewer experiences with Navajo speakers in the household.

Four questions were added from the CDC 2013 BRFSS Prostate Cancer Screening module questions. Three leading questions ask survey respondents of the Prostate Specific Antigen (PSA) test, if a doctor, nurse, or other health professional has ever talked, ever recommended, and ever had the PSA test. The final question added is a follow-up question to those who have had a PSA test of what the main reason was for having the PSA test. A recommendation by the United States Preventive Services Task Force[13] recommends against Prostate-Specific Antigen (PSA)-based screening for prostate cancer.

With the additions of the Navajo language and prostate cancer screening questions, the questionnaire was updated to 204 questions prior to conducting the survey in the Northern, Eastern, Western, and the Fort Defiance agency. Responses to these additional questions will not be available for the Chinle Agency.

During the survey administration of Phase I, II, and III, extensive time and energy were devoted to developing training manuals, conducting trainings, and developing reference documentation. Community maps were created by an NEC staff epidemiologist and Project Manager for Interviewers to use as a visual aid when locating households. In total, the NNHS project collaborated and trained 26 Interviewers, 4 NEC epidemiologists, the NEC director, 5 Health Educators from the Navajo Health Education Program.

Data Collection

Data collection of Phase I, II, and III, of the project took over 20 months to complete, per intervals described below. The Navajo Nation agency councils' approval was received at different times, resulting in staggered interviewer training and data collection periods, as outlined below.

Phase I data collection in the Chinle Agency began in May and concluded in October of 2013; **6 months**.

Phase II data collection in Northern Agency began in March and concluded in September 2015; **7 months**.

Phase III data collection includes conducting the NNHS in 3 Navajo agencies (Eastern, Fort Defiance, and Western) consecutively, and simultaneously, beginning in March and concluding September 2016; **7 months**.

Teams of interviewers for each Navajo agency initiated first contact visits to over 7,800 homes throughout 57 communities in each respective agency. Total counts are listed in table below.

Table 4. Number of completed survey questionnaires collected and analyzed, by Agency

Navajo Nation Agency	Number of Selected Households	Completed Questionnaires	Attempts
Chinle (7 Chapters)	1,836	713	2,764
Shiprock (11 Chapters)	1,428	519	2,748
Crownpoint (15 Chapters)	1,391	478	2,178
Fort Defiance (12 Chapters)	1,597	353	3,129
Tuba City (12 Chapters)	1,593	283	2,179
TOTAL	**7,845**	**2,346**	**12,998**

Validity Checks

As mentioned in the Survey Instrument Modification, the sampling design was altered after Phase 1 with respect to high and low density areas of the Navajo Nation. Occupied housing units were counted by Chapter from the 2010 U.S. Census and by CDP's found within the Navajo Nation. The percent of houses in the Navajo Nation found within a CDP is 43.9%. The percent of houses within a CDP among Chapters included in the sample was 46.5%. The percent of houses in our survey within a CDP was 48.3% (95% Confidence Interval: 46.3%, 50.3%). While not significantly different, we had slightly more houses in our sample from CDP areas. The most rural areas of the Navajo Nation may be underestimated, but this is working under the assumption that the 2010 U.S. Census is an accurate reflection of CDP and non-CDP areas. CDP distribution by Agency can be seen in Table 5 below.

High density areas were selected more often than expected for the Eastern, Northern, and Western Agencies. The 3 agencies with higher than expected high density (CDP) surveys completed compared to high density CBG's sampled, were all completed during Phase 3. RA's may not have been as diligent in reaching low density household, or may not have returned for all 3 attempts.

Table 5. High Density (defined by CDP) distribution by Agency

Agency	Survey Sampled	CBG's included	All CBG's
Chinle	39.6% (36.0%, 43.1%)	42.9% (41.7%, 44.1%)	41.9%
Eastern	38.5% (34.1%, 42.9%	27.2% (26.2%, 28.3%)	23.1%
Ft. Defiance	60.3% (55.2%, 65.4%)	47.9% (46.8%, 48.9%)	47.0%
Northern	48.0% (43.7%, 52.3%)	51.4% (50.2%, 52.6%)	44.8%
Western	72.1% (66.9%, 77.3%)	59.0% (57.9%, 60.1%)	57.2%
All	48.3%	46.5%	43.9%

Because the surveys were completed during common business hours there was some concern that the survey results would not accurately represent the population based on employment status. Employment for the Navajo Nation can be found in Table S2301 of the 2015 American Community Survey (5 year estimate). Comparisons between the American Community Survey (ACS) and the NNHS for 3 key labor statistics can be found in Table 6. A higher percentage than expected were in the labor force and unemployed in the NNHS, while the percentage who were employed was on target in the NNHS compared to the ACS.

Table 6. Employment status comparison between 2015 ACS and NNHS, Ages 20-64

Survey	Labor Force	Employment	Unemployment
ACS	54.8% (54.0%, 55.6%)	43.9% (43.2%, 44.6%)	19.8% (19.0%, 20.6%)
NNHS	68.1% (63.8%, 72.1%)	40.6% (35.3%, 46.1%)	27.5% (22.7%, 32.9%)

RESULTS

Number of Interviews

In total, 2,346 completed surveys were collected from one adult per household. All interviews were conducted in person.

Response Rates

The response rates are tabulated in Tables by agency as shown below.

Table 7. Response rate by Agency, Counts

	Chinle	Eastern	Ft. Defiance	Northern	Western
Completed Interviews	713	478	353	519	283
Verbal Refusal	136	110	432	123	735
3rd Attempt Refusal	386	524	468	462	307
Occupied Houses	1,235	1,112	1,253	1,105	1,325
Unoccupied*	601	279	344	180	268
Not a House	NA	NA	NA	142	NA
Unsafe	0	0	0	1	0
Total Structures	1,836	1,391	1,597	1,428	1,593

*Chinle unoccupied and not a house combined

Table 8. Response rate by Agency, Percentage

	Chinle	Eastern	Ft. Defiance	Northern	Western
Completed Interviews	57.7%	43.0%	28.2%	47.0%	21.4%
Verbal Refusal	11.0%	9.9%	34.5%	11.1%	55.5%
3rd Attempt Refusal	31.3%	47.1%	37.4%	41.8%	23.2%
Occupied Houses	67.3%	79.9%	78.5%	77.4%	83.2%
Unoccupied	32.7%	20.1%	21.5%	12.6%	16.8%
Not a House	NA	NA	NA	9.9%	NA
Unsafe	0%	0%	0%	0.07%	0%

Demographics

One of the primary purposes of the NNHS is to provide a basic description of health throughout the Navajo Nation for all residents, including those who are not Navajo. The demographic results should reflect, or be similar to, what is already known about the general population. The NNHS results can be compared to U.S. Census data to confirm the demographics. The NNHS included slightly more Navajo participants than expected based on the U.S. Census (94.4% versus 90.3%). An additional 3.1% were "Other Native" bringing the total Native American population in the NNHS to 97.5%. This is only 1.4% higher than the U.S. Census. A full self-reported race breakdown can be seen in Table 9. The average age (weighted) of participants was 44.35 years, and 51.5% were female.

Table 9. Demographics - Which one or more of the following would you say is your race? (N=2,346)

Race	Point Estimate	Lower Estimate	Upper Estimate
Navajo	94.4%	91.8%	96.2%
Other Native	3.1%	2.0%	4.8%
White	0.9%	0.4%	1.9%
Other Race	1.7%	0.6%	4.6%
Native Hawaiian & Other Pacific Islander	0.5%	0.1%	1.6%
Black	0.3%	0.05%	1.4%
Asian	0.05%	0.01%	0.2%

The Navajo Nation demographics differ from the U.S. in several key areas. Significantly fewer people on the Navajo Nation are married (Table 10).

Table 10. Demographics - Are you... ? (N=2,330)

Status	Percent	Lower Estimate	Upper Estimate
Married	35.8%	31.6%	40.2%
Divorced	5.5%	3.8%	7.9%
Widowed	7.8%	6.2%	9.9%
Separated	3.2%	2.2%	4.7%
Never Married	39.4%	35.6%	43.4%
A member of an Unmarried Couple	8.3%	6.2%	11.1%

The average number of children (under the age of 18) living in a Navajo Nation household was 1.38 (95% Confidence Interval: 1.23-1.54, N = 2,295). Significantly fewer Navajo homes do not have children. One out of 25 (4.4%, 95% Confidence Interval: 1.8%-10.1%) women of child bearing years were pregnant with 10.1% between ages 20 and 29 reporting pregnancy.

The education level of Navajo residents differs from the U.S. Far more Navajo adults have less than a high school education and a high school diploma or GED than the U.S. population. Far fewer Navajo adults have a college degree than the U.S. population (Table 11).

Table 11. Demographics - What is the highest grade or year of school you completed? (N=2,335)

Grade Completed	Percent	Lower Estimate	Upper Estimate
Never attended school or only attended kindergarten	3.1%	2.1%	4.4%
Elementary (Grades 1-8)	6.9%	5.2%	9.1%
Some High School (Grades 9-11)	16.2%	13.2%	19.7%
High School Graduate (Grade 12 or GED)	39.7%	34.7%	45.0%
Some college or technical school (1-3 years)	29.7%	26.0%	33.6%
College Graduate (College 4 or more years)	4.6%	3.2%	6.5%

A similar pattern can be seen in household income where more Navajo homes earn less than $15,000 per year, and fewer homes earn $50,000 or more per year (Table 12). Approximately 1 in 7 households earn less than $5,000 per year.

Table12. Demographics - Is your annual household income from all sources...? (N=1, 927)

Income	Percent	Lower Estimate	Upper Estimate
<$5,000	13.6%	10.3%	17.7%
$5,000-$9,999	17.8%	13.6%	22.8%
$10,000-$14,999	13.9%	10.5%	18.2%
$15,000-$19,999	8.7%	6.5%	11.7%
$20,000-$24,999	8.7%	6.1%	12.3%
$25,000-$29,999	5.7%	3.7%	8.5%
$30,000-$34,999	6.2%	3.8%	9.9%
$35,000-$39,999	3.8%	2.5%	5.7%
$40,000-$44,999	3.8%	2.2%	6.6%
$45,000-$49,999	3.7%	2.4%	5.8%
$50,000-$54,999	2.1%	1.2%	3.8%

$55,000-$59,999	2.4%	1.3%	4.4%
$60,000-$64,999	1.6%	0.8%	3.2%
$65,000-$69,999	0.8%	0.4%	1.4%
$70,000-$74,999	0.8%	0.4%	1.5%
≥$75,000	6.4%	3.5%	11.4%

One quarter of adults surveyed were employed for wages which is approximately half of what is reported in the U.S. and the percent of Navajos out of work for more than a year is about 6 times greater than the U.S (Table 13).

Table 13. Demographics - Are you currently...? (N=2,207)

Employment Category	Percent	Lower Estimate	Upper Estimate
Employed for wages	25.0%	21.5%	28.8%
Self-employed	11.0%	7.9%	15.2%
Out of work >1 year	16.4%	12.4%	21.3%
Out of work<1 year	7.5%	5.4%	10.3%
A homemaker	13.3%	10.3%	16.9%
A student	6.9%	4.9%	9.5%
Retired	13.4%	11.1%	16.0%
Unable to work	6.6%	4.9%	9.0%

Nearly half of homes on the Navajo Nation speak the Navajo language “Always”, more than 4 of 5 speak at least sometimes (Table 14).

Table 14. Demographics - How often is the Navajo language spoken in the home? (N=1,622)

	Percent	Lower Estimate	Upper Estimate
Always	45.1%	39.4%	50.9%
Usually	16.0%	12.5%	20.3%
Sometimes	22.3%	18.3%	26.9%
Rarely	12.4%	8.5%	17.7%
Never	4.2%	1.9%	9.4%

Approximately one in 20 adults (5.4%, 95% Confidence Interval: 3.9%-7.5%) have ever served in the United States Armed Forces, and almost two thirds of these have served in a combat or war zone.

This survey reinforced the notion that a telephone-based survey would be problematic. Only 22% of households have a landline. Almost 90% of persons interviewed indicated that they have a cell phone for personal use, but only 77.7% have good cell reception at their house and 29.7% indicated that minutes would be an issue if a phone-based survey was used.

Survey participants were asked to identify their Chapter. Often, tribally enrolled Navajos will identify with their home Chapter, which is not always the Chapter in which they live geographically. Additionally, in some areas of the Navajo Nation, the Chapter boundaries may be unclear to Chapter members. Table 15 displays the 61 self-identified Chapters for participants, and Table 16 displays the 66 geographic Chapters in which the house was found.

Table 15. Demographics - Is this the place where you usually live? Chapter Code (N=2,230)

Community	Percent	Agency	Community	Percent	Agency
Baca	1.8%	Eastern	**Navajo Mountain**	2.6%	Western
Becenti	0.02%	Eastern	**Nazlini**	1.4%	Chinle
Black Mesa	0.02%	Chinle	**Nenahnezad**	1.0%	Northern
Bread Springs	2.4%	Eastern	**Oak Springs**	1.8%	Ft. Defiance
Burnham	1.3%	Northern	**Oljato**	0.01%	Western
Casamero Lake	0.7%	Eastern	**Other**	0.1%	NA
Chichiltah	0.8%	Eastern	**Pinon**	3.5%	Chinle
Chinle	2.8%	Chinle	**Red Lake**	1.3%	Ft. Defiance
Churchrock	2.5%	Eastern	**Red Mesa**	1.1%	Northern
Coalmine Mesa	0.2%	Western	**Red Valley**	1.2%	Northern
Coppermine	0.6%	Western	**Rock Point**	0.2%	Northern
Crownpoint	1.0%	Eastern	**Rock Springs**	2.1%	Eastern
Dennehotso	1.0%	Western	**Rough Rock**	0.06%	Chinle
Dilkon	1.9%	Ft. Defiance	**Round Rock**	2.6%	Chinle
Fruitland	0.4%	Northern	**San Juan**	1.2%	Northern
Ft. Defiance	4.1%	Ft. Defiance	**Sanostee**	5.9%	Northern
Ganado	1.5%	Ft. Defiance	**Sawmill**	1.2%	Ft. Defiance
Greasewood	0.8%	Ft. Defiance	**Shiprock**	0.6%	Northern
Hardrock	0.2%	Chinle	**Shonto**	0.7%	Western
Hogback	0.9%	Northern	**Smith Lake**	2.1%	Eastern
Indian Wells	1.1%	Ft. Defiance	**St. Michael's**	6.2%	Ft. Defiance

Inscription House	2.0%	Western	**Standing Rock**	1.9%	Eastern
Kayenta	6.1%	Western	**Steamboat**	1.1%	Ft. Defiance
Lechee	0.9%	Western	**Tachee**	1.1%	Chinle
Leupp	1.0%	Western	**Teec Nos Pos**	1.9%	Northern
Lupton	2.1%	Ft. Defiance	**Tonalea**	2.8%	Western
Manuelito	0.5%	Eastern	**Tsaile/Wheatfields**	1.0%	Chinle
Many Farms	1.9%	Chinle	**Tsayatoh**	1.5%	Eastern
Mariano Lake	0.8%	Eastern	**Tselani/Cottonwood**	2.2%	Chinle
Mexican Water	0.4%	Northern	**Tuba City**	3.8%	Western
Nageezi	1.9%	Eastern	**Whippoorwill**	0.4%	Chinle
Nahata'dziil	2.4%	Ft. Defiance	**White Rock**	0.8%	Eastern

Table 16. Geographic Chapter of house included in survey (N=2, 346), Respondents who reported as a family member outside (in-law) of their voter enrolled community

Community	Percent	Agency	Community	Percent	Agency
Baca	1.2%	Eastern	**Nazlini**	1.7%	Chinle
Bread Springs	1.2%	Eastern	**Nenahnezad**	1.0%	Northern
Burnham	1.3%	Northern	**Oak Springs**	1.5%	Ft. Defiance
Casamero Lake	0.6%	Eastern	**Oljato**	0.8%	Western
Chichiltah	0.8%	Eastern	**Pinedale**	0.02%	Eastern
Chinle	2.5%	Chinle	**Pinon**	3.2%	Chinle
Churchrock	2.2%	Eastern	**Red Lake**	1.2%	Ft. Defiance
Coalmine Mesa	0.9%	Western	**Red Mesa**	1.1%	Northern
Coppermine	0.6%	Western	**Red Rock**	1.6%	Eastern
Crownpoint	1.0%	Eastern	**Red Valley**	1.7%	Northern
Dennehotso	1.0%	Western	**Rock Point**	0.2%	Northern
Dilkon	1.6%	Ft. Defiance	**Rock Springs**	2.0%	Eastern
Ft. Defiance	4.3%	Ft. Defiance	**Rough Rock**	0.1%	Chinle
Ganado	1.4%	Ft. Defiance	**Round Rock**	2.4%	Chinle
Greasewood	1.2%	Ft. Defiance	**Saint Michael's**	5.4%	Ft. Defiance
Hardrock	0.2%	Chinle	**San Juan**	1.1%	Northern
Hogback	0.9%	Northern	**Sanostee**	5.9%	Northern

Huerfano	0.1%	Northern	**Sawmill**	1.2%	Ft. Defiance
Indian Wells	1.3%	Ft. Defiance	**Shiprock**	0.5%	Northern
Inscription House	2.0%	Ft. Defiance	**Smith Lake**	1.7%	Eastern
Jeddito	0.4%	Ft. Defiance	**Standing Rock**	1.7%	Eastern
Kayenta	5.6%	Western	**Steamboat**	0.7%	Ft. Defiance
Kinlichee	0.1%	Ft. Defiance	**Sweet Water**	1.0%	Northern
Lake Valley	0.8%	Eastern	**Teec Nos Pos**	2.7%	Northern
Lechee	1.1%	Western	**Thoreau**	0.4%	Eastern
Lupton	1.9%	Ft. Defiance	**Tonalea**	2.8%	Western
Manueito	0.5%	Eastern	**Tsaile**	0.9%	Chinle
Many Farms	1.8%	Chinle	**Tsayatoh**	0.8%	Eastern
Mariano Lake	0.7%	Eastern	**Tselani**	2.1%	Chinle
Mexican Water	0.4%	Northern	**Tuba City**	3.8%	Western
Nageezi	2.5%	Eastern	**Upper Fruitland**	0.5%	Northern
Nahat'a'dziil	2.9%	Ft. Defiance	**Whippoorwill**	0.4%	Chinle
Navajo Mountain	2.5%	Western	**Whiterock**	0.6%	Eastern

There was agreement between self-reported Chapter and Chapter by GPS coordinates for 96.2% of participants. Among the self-reported Chapters, 15 accounted for over half of all surveys (Figure 2). Fifteen Chapters accounted for half of the surveys by GPS location, as well, but there were 4 differences between the two methods (Figure 3).

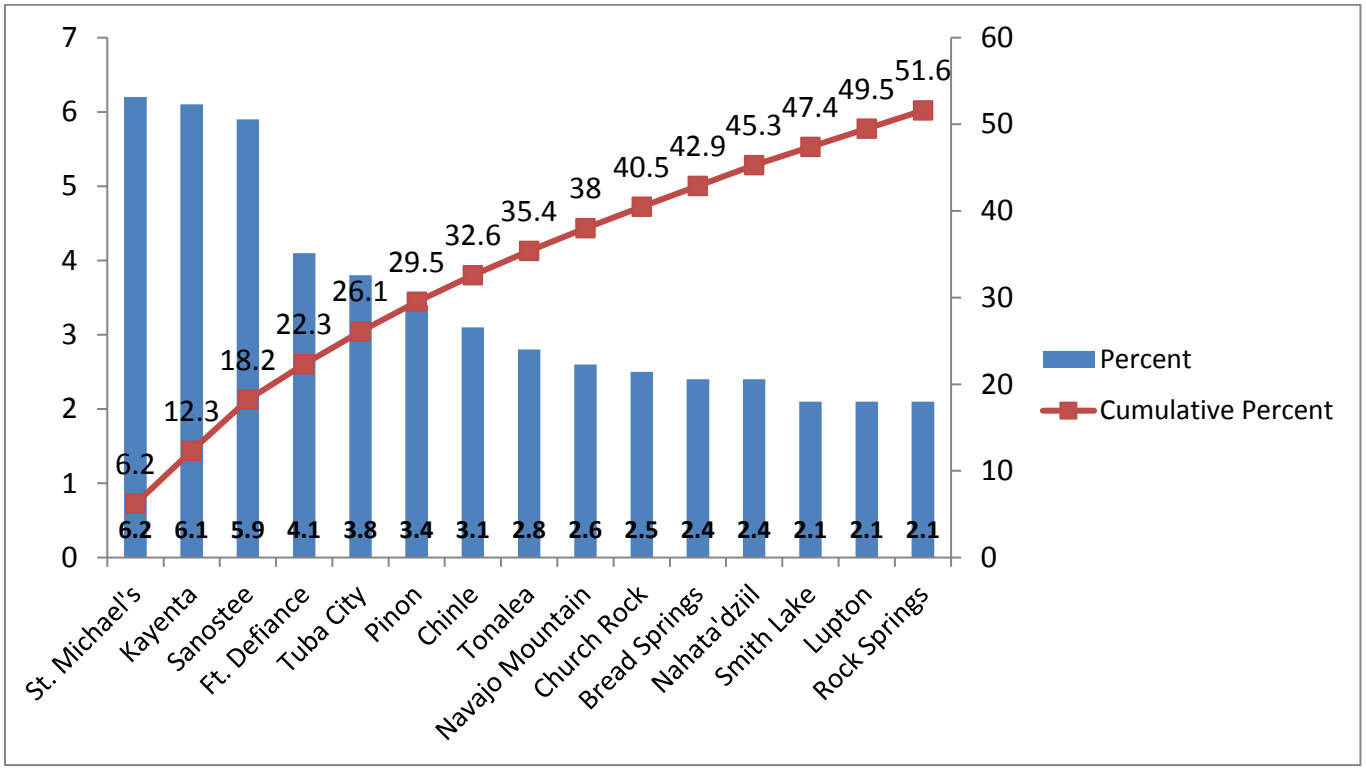


Figure 2. Self-Reported Community of Residence

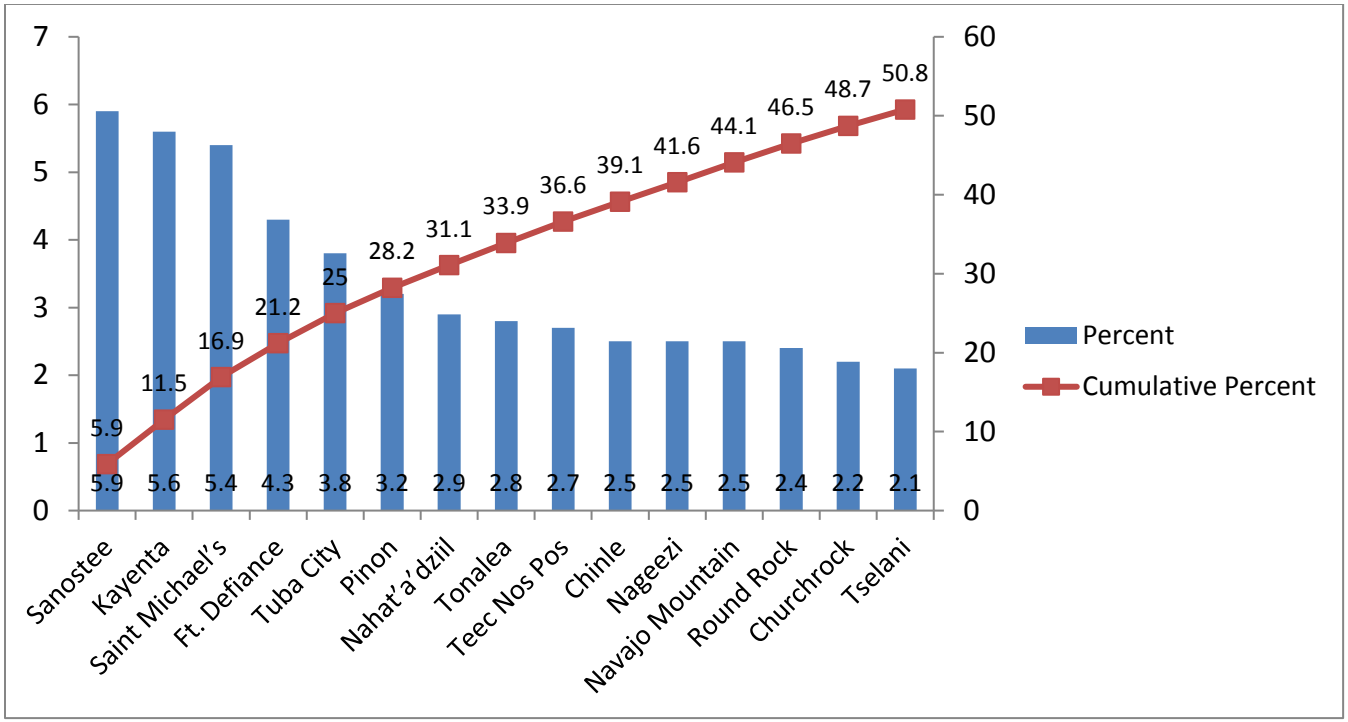


Figure 3. Chapter of Residence by GPS location

Key Findings

Comparisons were made between results found in the NNHS and results from the U.S. BRFSS and Navajo Nation border state BRFSS (i.e. Arizona, New Mexico, and Utah). Results for the U.S. BRFSS represent the median State response. The NNHS was age adjusted to the 2000 U.S. population, so the results wouldn't be affected by differing age structures of the underlying populations. Significant findings are reported here.

Alcohol Consumption

Alcohol is a key contributor to mortality on the Navajo Nation[14]; however, self-reported alcohol consumption is lower than expected and significantly lower than all 4 comparison groups (Figure 4). Alcohol consumption in the previous month was 60%, 55.7%, 54.3%, and 28.6% lower than the median State in the U.S., Arizona, New Mexico, and Utah respectively.

Binge drinking, which is 5 or more drinks of alcohol at one time for a male and 4 or more drinks for a female, in the Navajo Nation was not significantly different than the comparison groups.

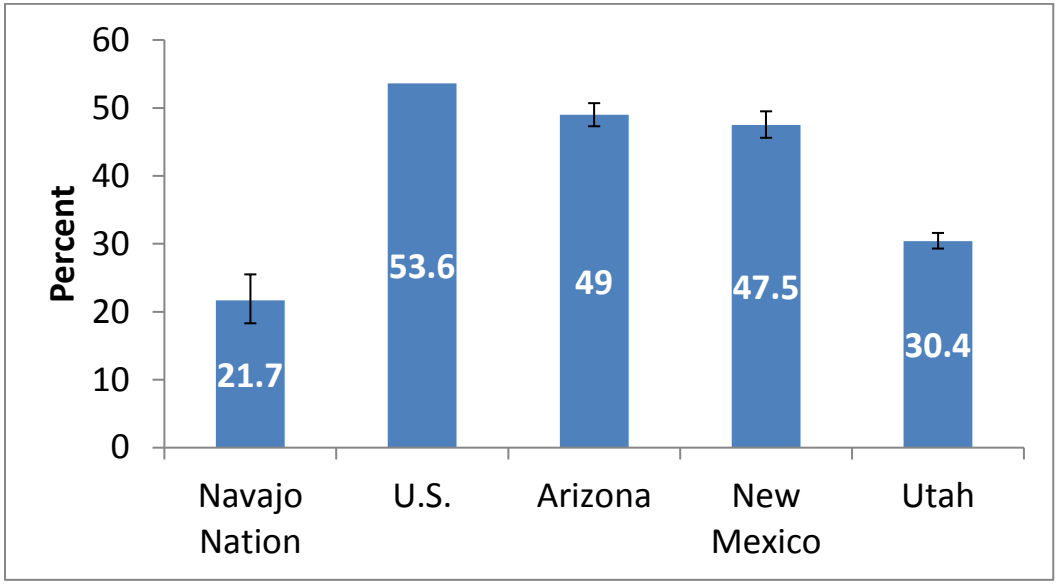


Figure 4. Percent of adults who reported consuming alcohol in the previous 30 days

- Among Navajo Nation adults who reported drinking alcohol in the previous 30 days, 84.3% reported binge drinking.
- Less than 1% of Navajo adults reported driving a motor vehicle after having too much to drink. This low percentage may be due to the negative social stigma associated with drinking and driving, and an unwillingness of the respondents to provide an honest response.
- Although the sample size was small (N=344), 27.9% of participants reported that they had been a passenger with a driver who had too much alcohol. This number may better represent the true drinking and driving percent.

Chronic Diseases

One of the primary purposes of the NNHS was to assess the burden of chronic diseases on the Navajo Nation. Understanding the magnitude of the problem can help the Navajo Nation in program planning and resource allocation.

While it is important to understand and properly address the needs of those with chronic diseases, not all of the findings are negative and there are some areas in which the Navajo Nation's level of disease burden is lower than the comparison groups. The Navajo Nation has significantly fewer adults with arthritis than New Mexico (Figure 5).

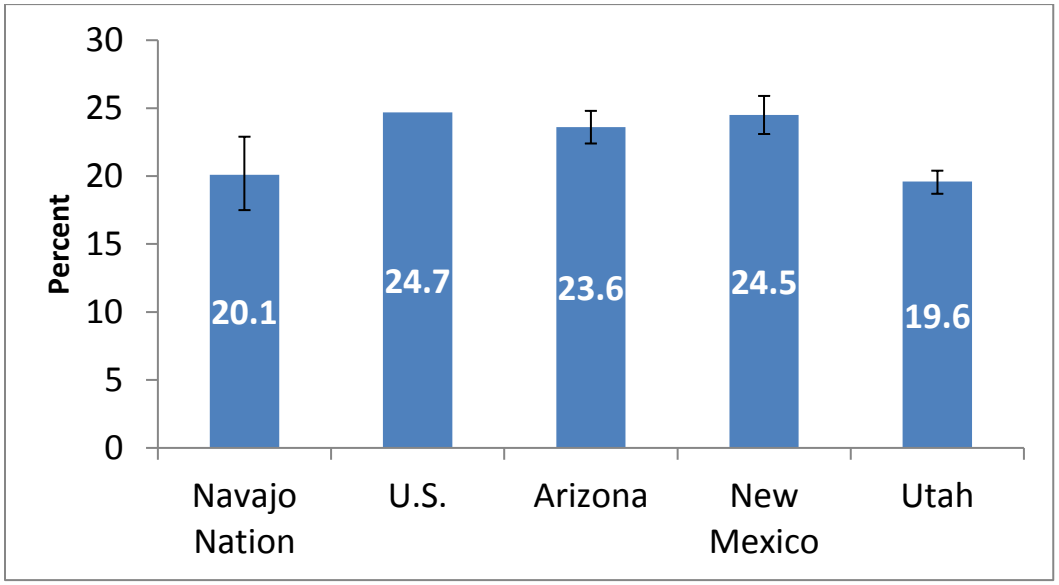


Figure 5. Chronic Health Conditions - Has a doctor, nurse, or other health professional EVER told you have some form of arthritis?

20.1 percent of Navajo adults reported having some form of arthritis.

The Navajo Nation has significantly fewer adults with Chronic Obstructive Pulmonary Disease (COPD) than the U.S., Arizona and New Mexico (Figure 6).

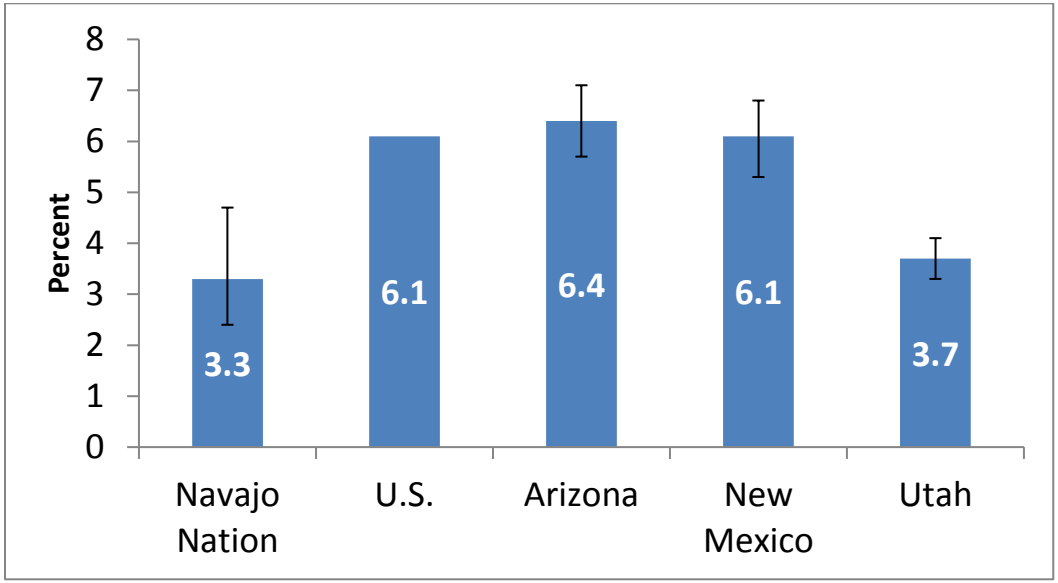


Figure 6. Chronic Health Conditions – Has a doctor, nurse, or other health professional EVER told you have Chronic Obstructive Pulmonary Disease or COPD?

3.3 percent of Navajo adults reported having Chronic Obstructive Pulmonary Disease (COPD).

The Navajo Nation has approximately half the number of adults who have ever been told they have cancer (not including skin cancer) than all 4 comparison groups (Figure 7).

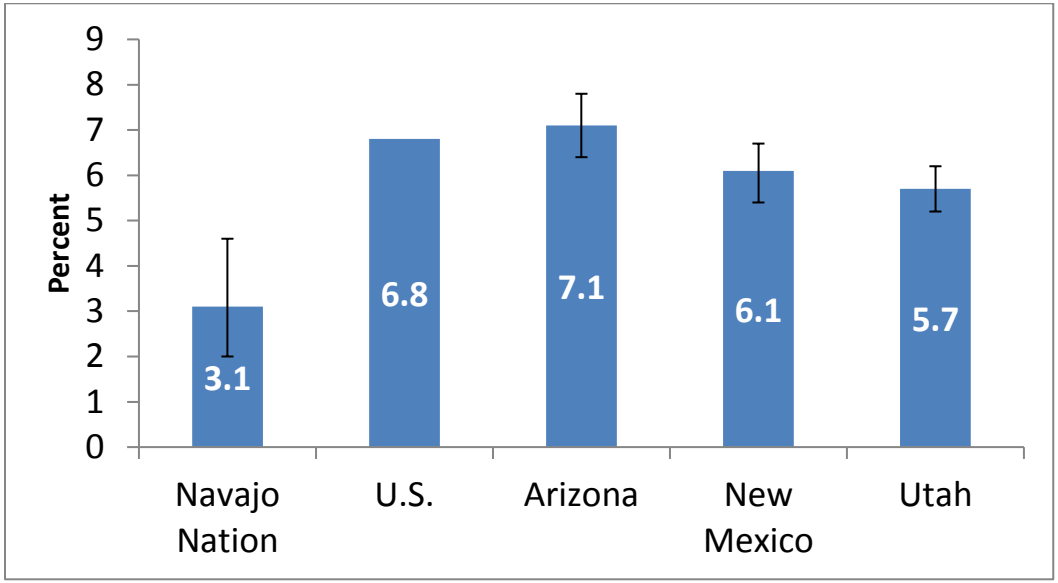


Figure 7. Chronic Health Conditions - Has a doctor, nurse, or other health professional EVER told you have any other types of cancer?

3.1 percent of Navajo adults reported having other types of cancer.

The Navajo Nation was similar to the comparison groups for both heart attack and high blood pressure, although it was significantly higher than Utah on both accounts (Figure 8, Figure 9).

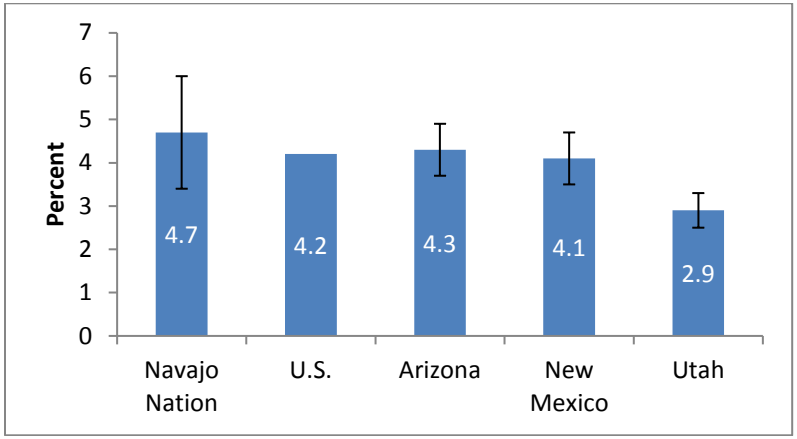


Figure 8. Chronic Health Conditions - Has a doctor, nurse, or other health professional EVER told you have had a heart attack?

4.7 percent of Navajo adults reported having a heart attack.

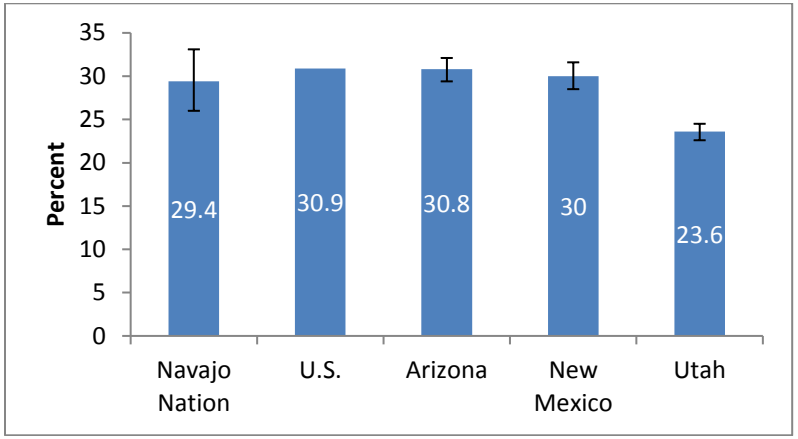


Figure 9. Chronic Health Conditions - Has a doctor, nurse, or other health professional EVER told you have high blood pressure?

29.4 percent of Navajo adults reported having high blood pressure

The chronic disease that is most concerning with respect to the comparison groups is diabetes.

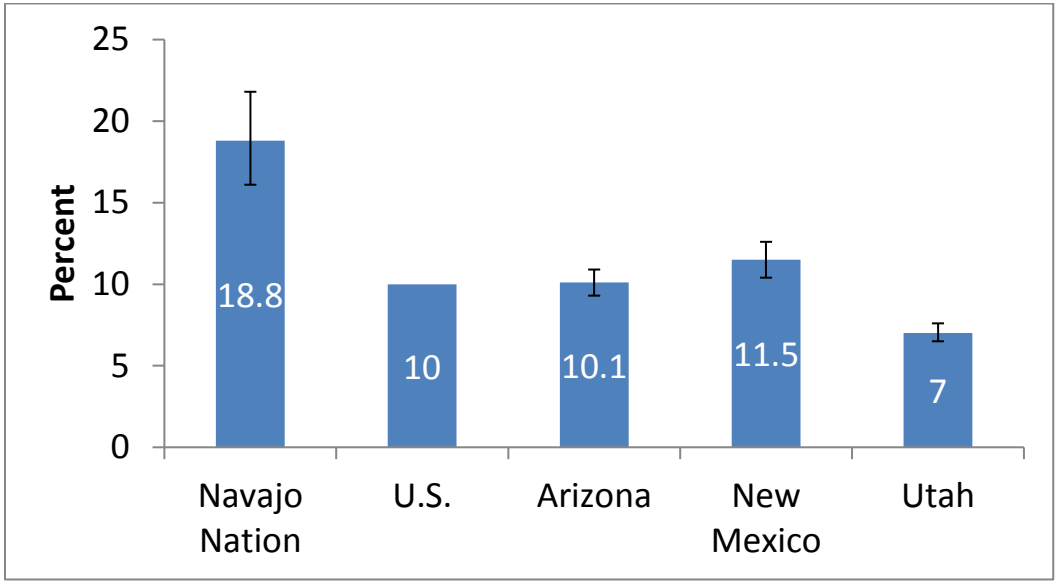


Figure 10. Chronic Health Conditions - Has a doctor, nurse, or other health professional EVER told you have diabetes?

- Almost 1 out of 5 adults have been diagnosed with diabetes, which is almost double the U.S. and Border States.
- An additional 11.3% reported being told by a doctor or health care professional that they have pre-diabetes or borderline diabetes.

Diabetes is the fourth leading cause of death on the Navajo Nation. Key findings from the National Diabetes Statistics Report among U.S. adults aged 18 years and older, American Indian/Alaska Natives had the highest prevalence of diagnosed diabetes for both men (14.9%) and women (15.3%). Overall, prevalence was higher among AI/AN (15.1 percent).[15] Complications of having diabetes include cardiovascular diseases, blindness, kidney failure, and amputation of extremities.

Cancer Screening

Participants were asked about various cancer screenings including colorectal cancer screening, prostate screening (for men), and breast and cervical cancer screening for women. Female cancer screening prevalence was very similar to the comparison groups.

Navajo adults age 50+ were significantly more likely to report having had a blood stool test (home kit) and significantly less likely to have ever had a sigmoidoscopy or colonoscopy (Figure 11 & 12). Sigmoidoscopy and colonoscopy are out-patient procedures done in a clinic and are more invasive than the blood stool kit, which may explain why the Navajo Nation lags behind the U.S.

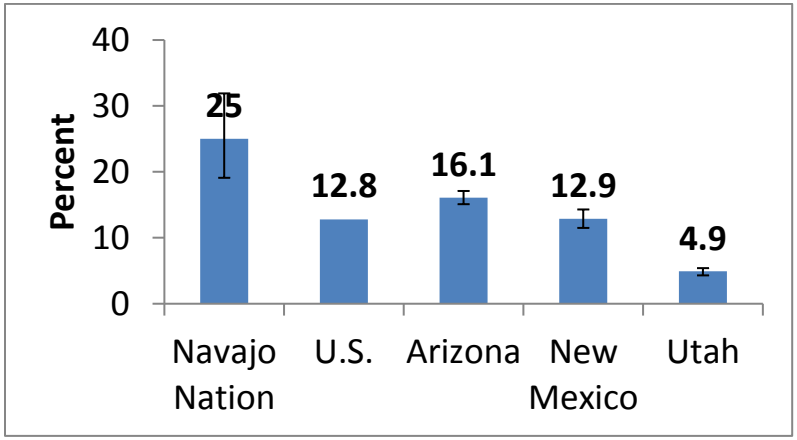


Figure 11. Colorectal Cancer Screening - Adults aged 50+ who have had a blood stool test in the past 2 years?

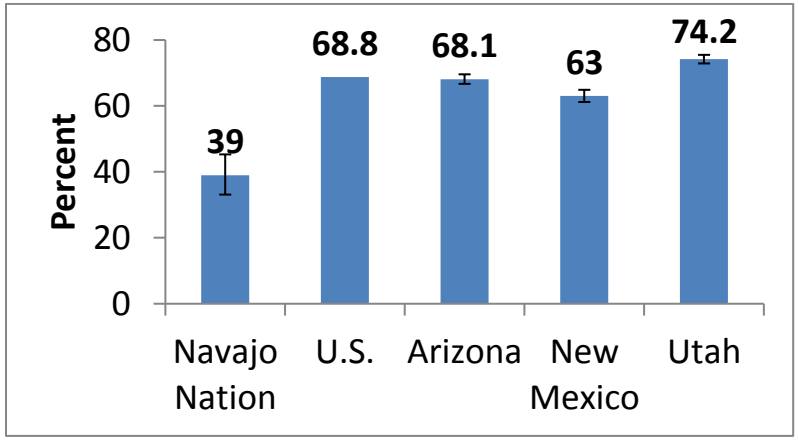


Figure 12. Colorectal Cancer Screening - Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy?

The prostate screening question was not asked during Phase 1 (Chinle Agency), so the results do not reflect the entire Navajo Nation.

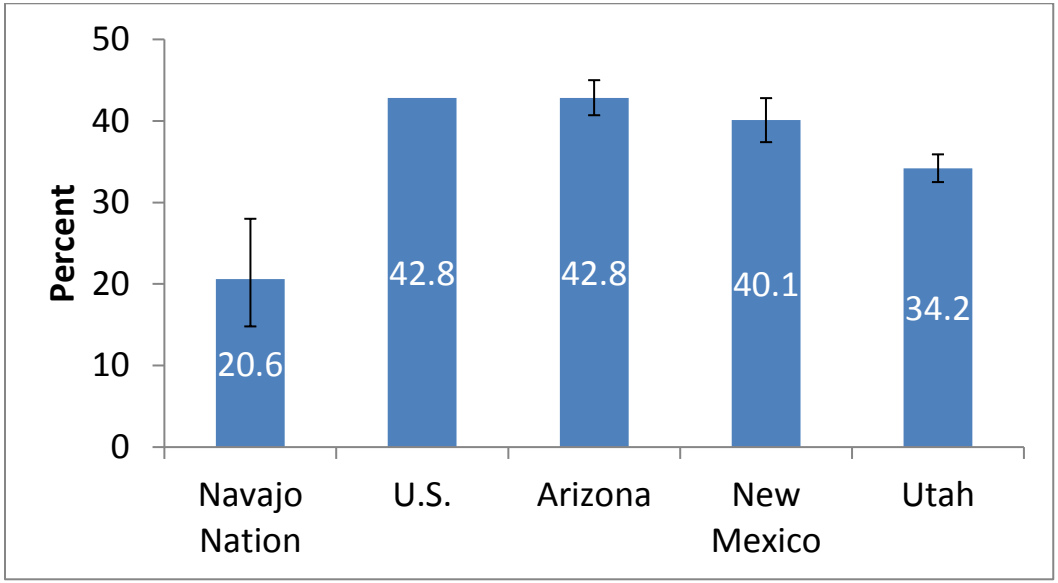


Figure 13. Prostate Screening - Men Aged 40+ who have had a PSA test within the past 2 years (Chinle Agency, not included)

Navajo men aged 40+ were approximately half as likely to have had a prostate screening test as the comparison groups.

Diet & BMI

One possible explanation for poor health outcomes, including diabetes, is poor diet.[16] [17] A series of questions were asked about fruit and vegetable consumption. From these questions a dichotomous variable could be created to answer if participants consumed fruits at least once per day (Figure 14), and if they consumed vegetables at least once per day (Figure 15).

Among the different vegetable categories (green leafy, orange, other) none were consumed more than once per day on average.

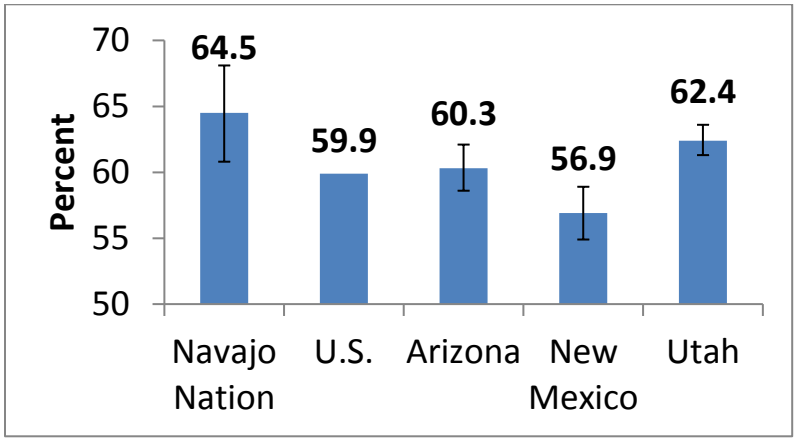


Figure 14. Fruits and Vegetables - Consumed fruit at least once per day

The Navajo Nation had higher fruit consumption at least once per day than New Mexico.

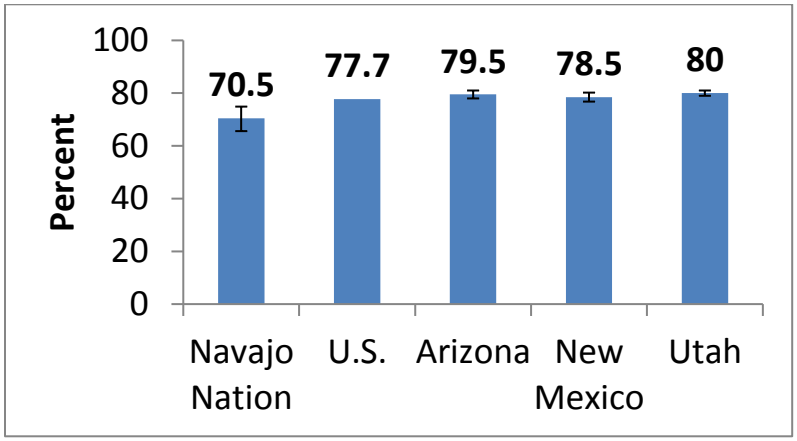


Figure 15. Fruits and Vegetables - Consumed vegetables at least once per day

Vegetable consumption was significantly lower than all 4 comparison groups although the absolute percent difference was not very great.

Participants were asked about their height and weight from which their body mass index (BMI) could be calculated. Body Mass Index is an index based on height and weight used to categorize an adult as underweight, normal, overweight, or obese. Figure 16 displays the 4 level weight categories for the Navajo Nation and its comparison groups based on BMI. A person with a BMI greater than or equal to 30 is considered obese. More research should be done to help determine what factors are driving the high BMI among Navajo adults.

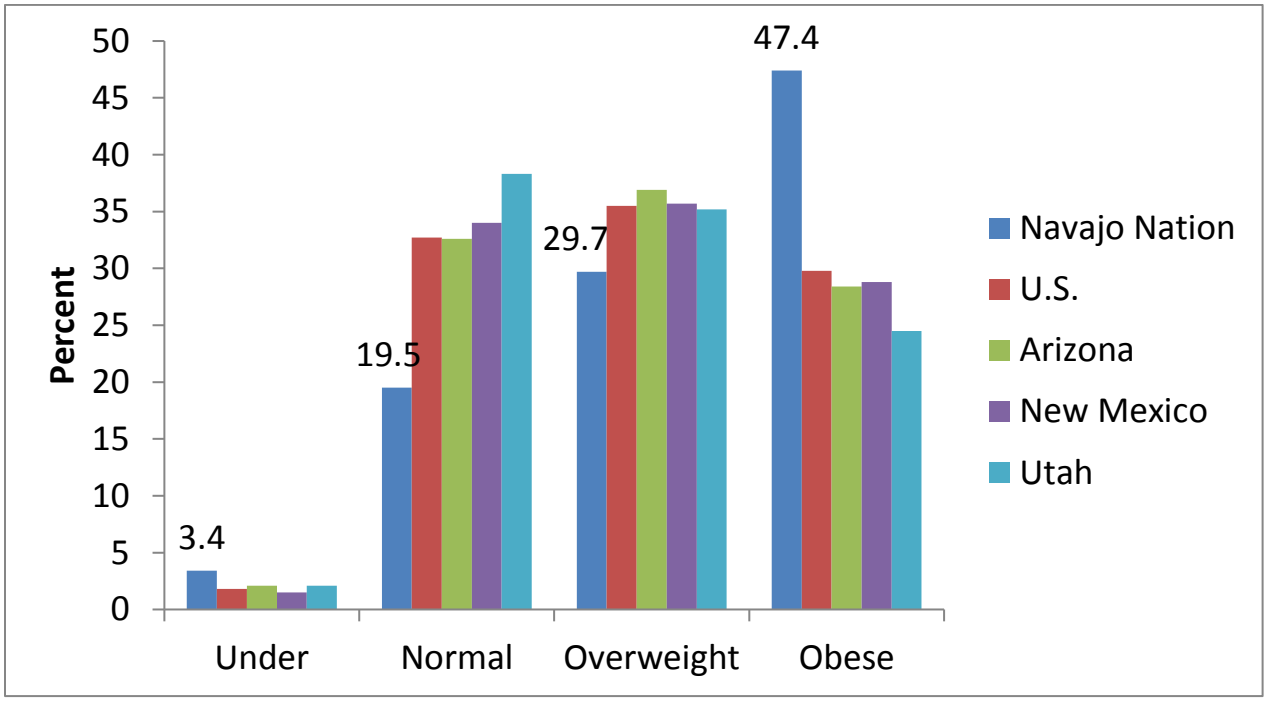


Figure 16. Body Mass Index (BMI) Category

- Almost half of Navajo adults (47.4%) were obese, and almost a third more (30.1%) were overweight.
- Navajo adult females (52.2%) were more likely to be obese than males (42.4%)
- The average BMI was 30.11.
- Sixty-seven (67.5%) percent of Navajo adults (N=2,257) reported that they participated in any exercise in the past month.
- About 3 out of 4 (73.7%) Navajo adults (N=2,319) were physically active in the past month.
- Walking (52.8%), Running (10.6%), and other (8.4%) physical activity are the most reported (N=1,640).

Disability

Almost one quarter (23.3%) of the adult Navajo Nation population was limited because of a physical mental or emotional problem. Almost 1 in 8 adult Navajo Nation residents have a physical, mental, or emotional problem that requires the use of special equipment, which is significantly higher than all 4 comparison groups.

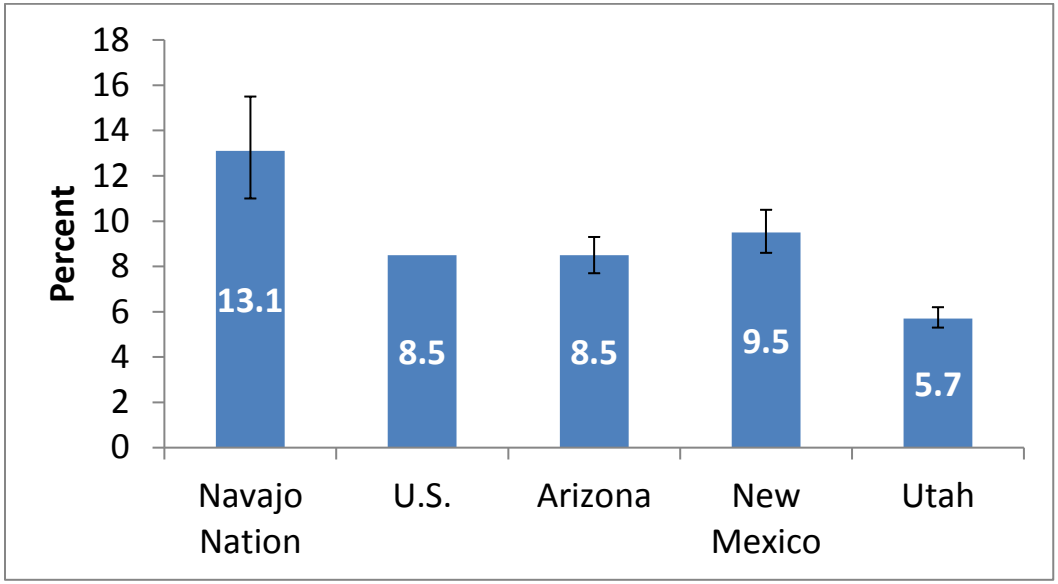


Figure 17. Disability - Have health problems that require the use of special equipment

Health Care Access

Nearly all (94.8%) Navajo Nation residents reported having some type of health care coverage, which is in large part driven by the presence of the Indian Health Service (IHS). Median U.S. coverage was 89.2%. The reported level of personal care within the health care system varies slightly among Navajo adults compared to the U.S. and Border States.

More than 60% of BRFSS respondents in the comparison groups reported having one person they think of as their personal doctor, whereas only 42.3% of Navajo adults reported one personal doctor. Navajo adults were more likely to report having more than one personal doctor (22.3%), and significantly more likely to have reported not having a personal doctor or health care provider (35.5%, see Figure 18).

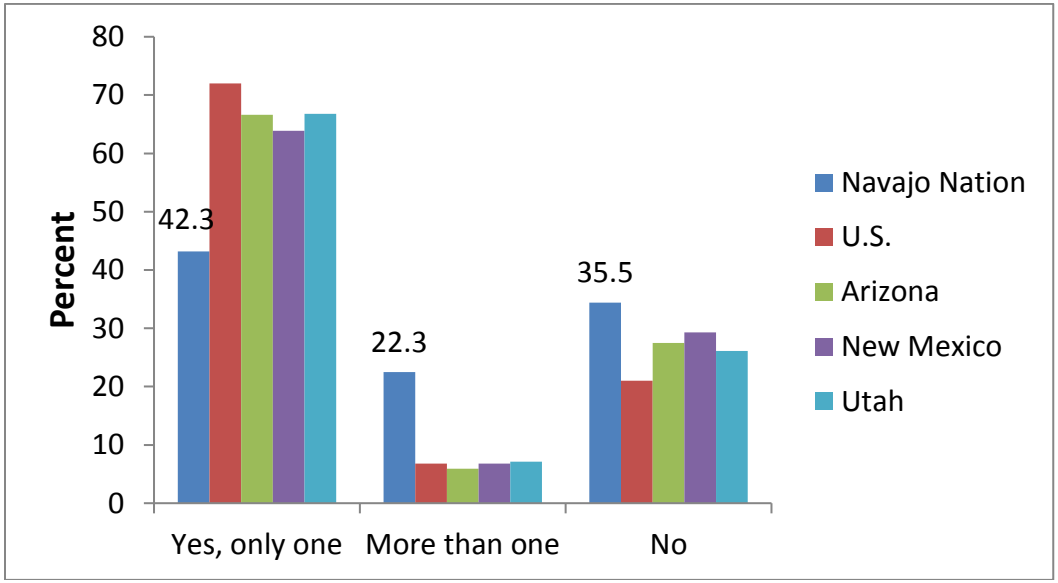


Figure 18. Health Care Access - Do you have one person you think of as your personal doctor or health care provider?

Almost two thirds (65.4%) reported visiting a doctor within the past year and 85.8% reported visiting a doctor for a routine check-up within the past 2 years. Approximately 3 out of 5 (58.8%) Navajo Nation residents reported that they use traditional or native medicine.

Health Status

Participants were asked to rate their overall health using 5 options: Excellent, Very Good, Good, Fair or Poor. This question, although very subjective, has proven to be an effective assessment of overall population health[18,19,20]. Navajo adults were significantly less likely to report very good health and significantly more likely to report fair health than the comparison groups (Figure 19).

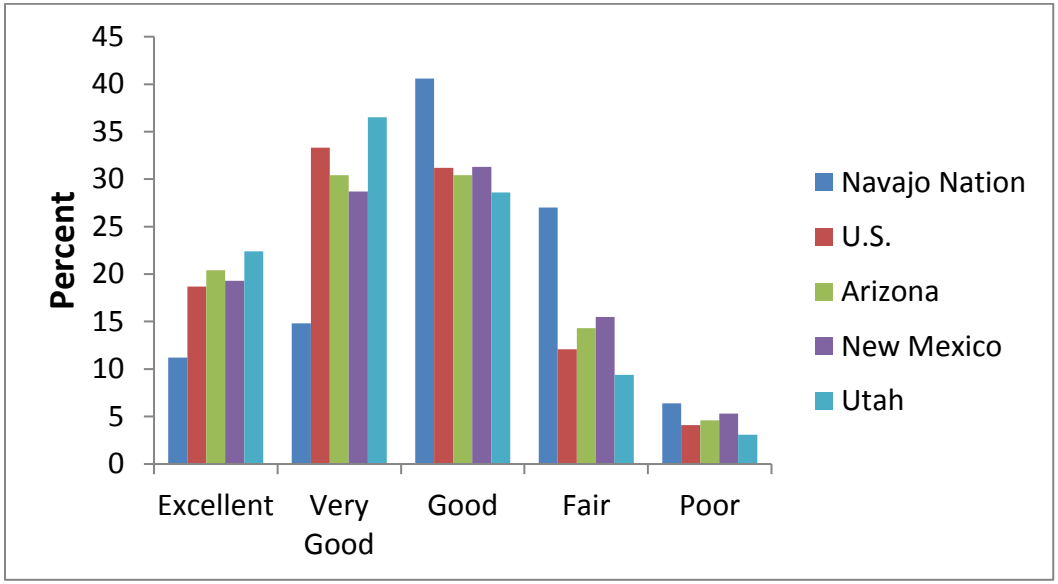


Figure 19. Health Status - 5 Level Categories

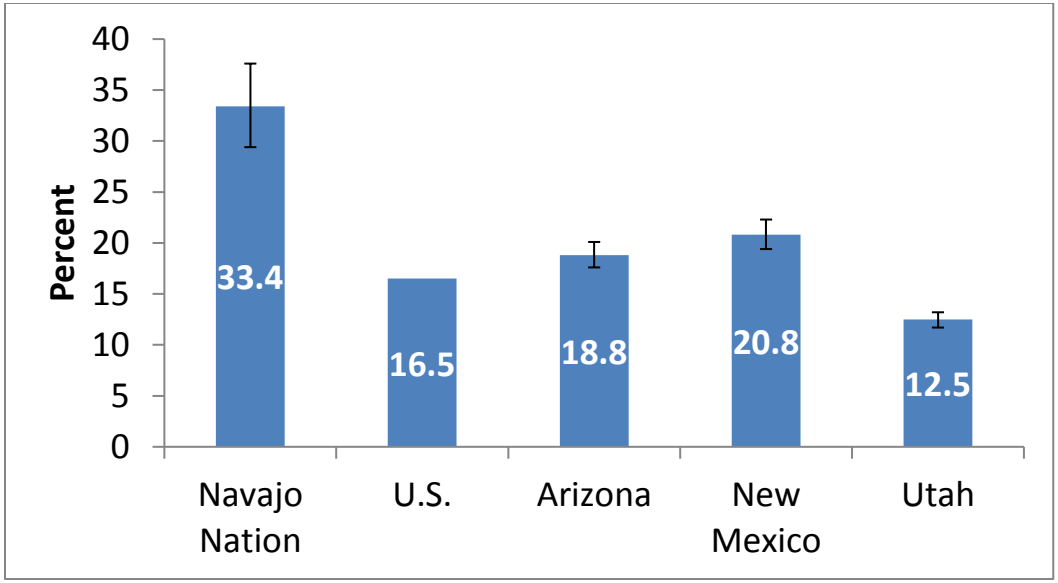


Figure 20. Health Status - Fair or Poor Health

The 5 options on the General Health questions were condensed into two discreet groups, Fair & Poor health and Excellent, Very Good, & Good Health. One in three Navajo adults reported fair or poor he0alth, which is about 1.6 to 2.6 times higher than the comparison groups (Figure 20). Additional analysis on this data set and other data sets should be done to learn what is driving the reporting of fair or poor health.

HIV Screening

Almost half of Navajo adults have ever been tested for HIV. This is significantly higher than all 4 comparison groups (Figure 21).

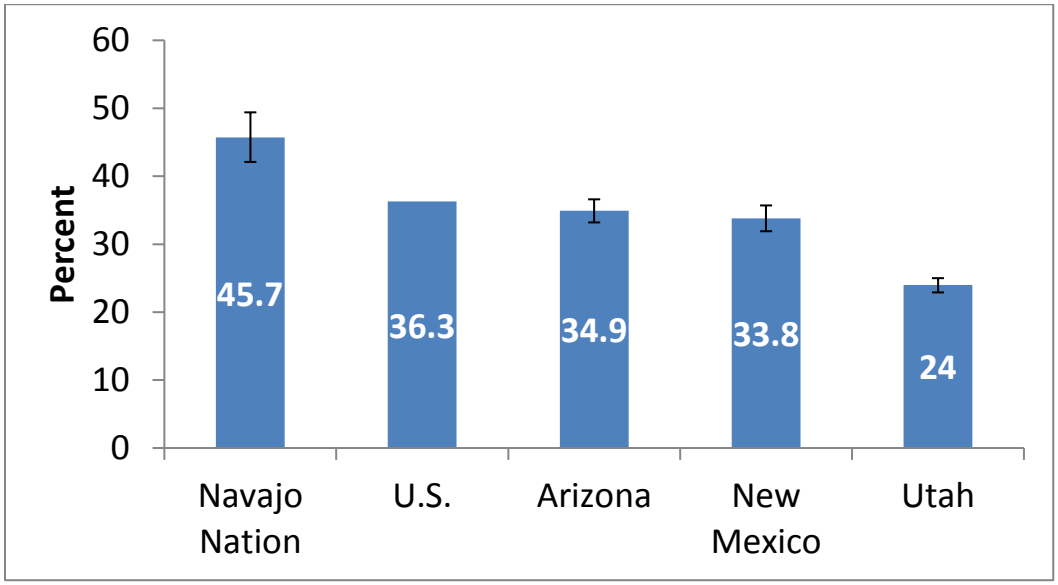


Figure 21. HIV/AIDS - Have you ever been tested for HIV?

Further study into why HIV screening is high may shed some light on how other sensitive screening efforts might be improved in health care settings. A follow-up question may be worthwhile to learn if the HIV tests happened in community or clinical settings.

Injury Prevention

Unintentional injury contributes significantly to mortality on the Navajo Nation[21]. It is the leading cause of death on the Navajo Nation, and motor vehicle injury is the leading type of injury death. 9 out of 10 adults reported always wearing their seat belt. This is in line with what is reported in New Mexico, and significantly higher than Utah (Figure 22).

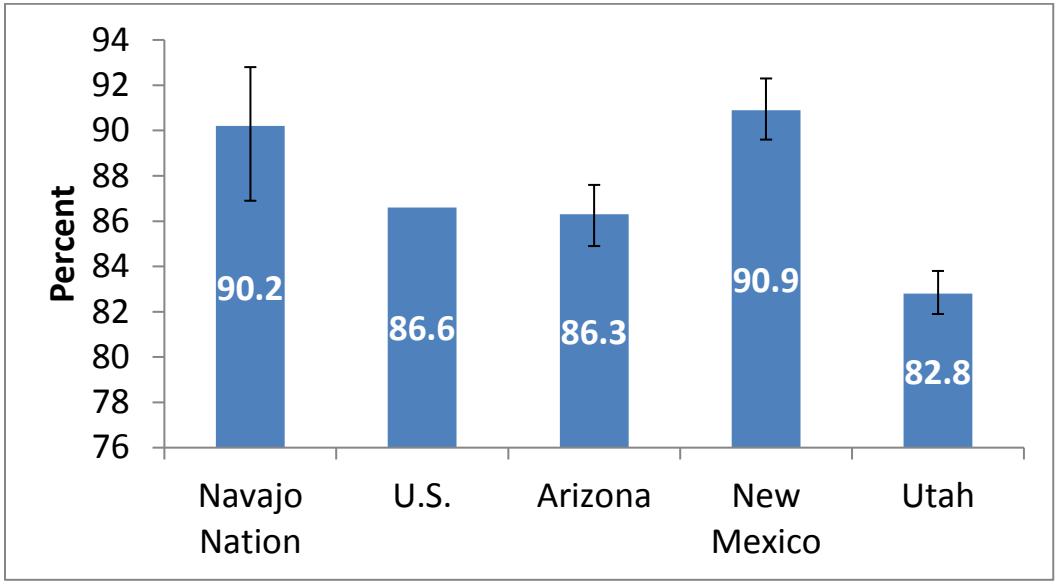
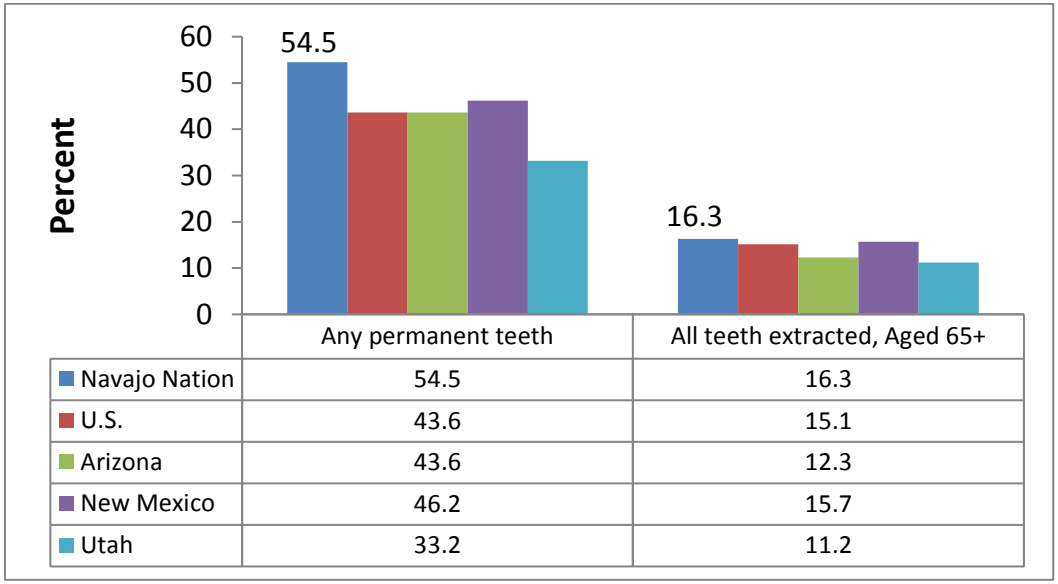


Figure 22. Seatbelt Use - Reported always wearing their seat belt

Oral Health

Oral health is associated with cardiovascular disease[22]. More than half (54.5%) of Navajo Nation adults have had at least one permanent tooth removed which is significantly higher than all 4 comparison groups (Figure 23). Almost 1 out of 6 (16.3%) Navajo Nation adults aged 65+ have had all of their teeth extracted, which is significantly higher than Utah.



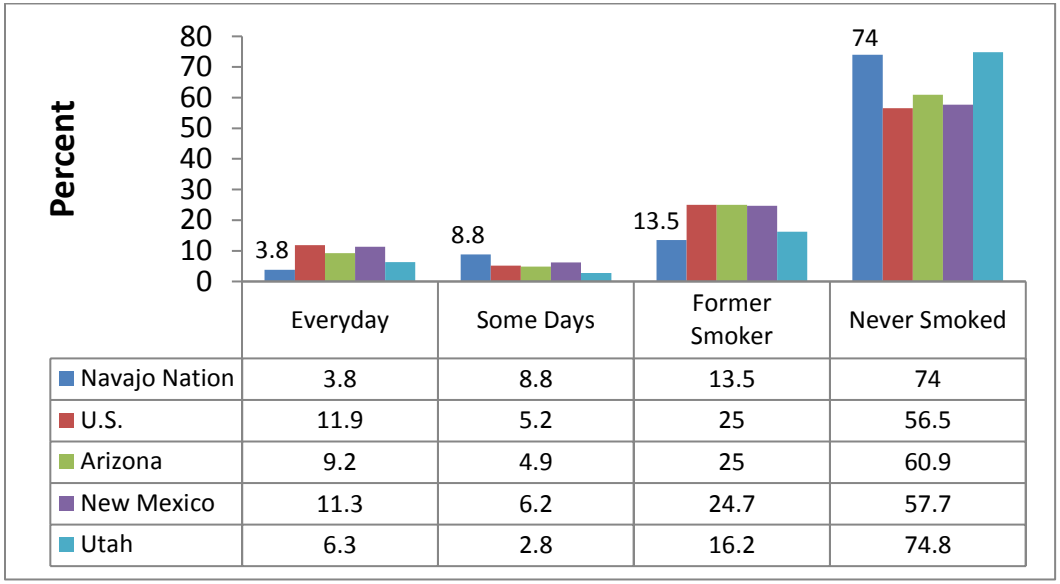
	Any permanent teeth	All teeth extracted, Aged 65+
Navajo Nation	54.5	16.3
U.S.	43.6	15.1
Arizona	43.6	12.3
New Mexico	46.2	15.7
Utah	33.2	11.2

Figure 23. Oral Health - Teeth Removal

Tobacco

Tobacco is a major contributor to morbidity and mortality.

Navajo Nation tobacco use varies significantly from its comparison groups. Navajo Nation adults are significantly less likely to smoke every day and significantly more likely to have never smoked. Four level smoking status can be seen in Figure 24.

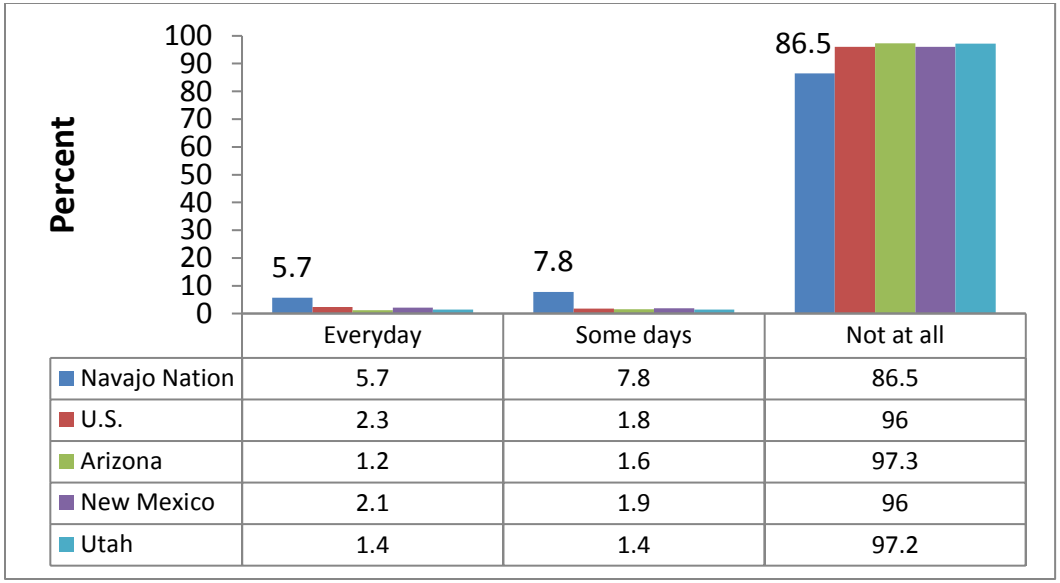


	Everyday	Some Days	Former Smoker	Never Smoked
Navajo Nation	3.8	8.8	13.5	74
U.S.	11.9	5.2	25	56.5
Arizona	9.2	4.9	25	60.9
New Mexico	11.3	6.2	24.7	57.7
Utah	6.3	2.8	16.2	74.8

Figure 24. Tobacco Use - Four Level Smoking Status

This may help explain the Navajo Nation's lower cancer rates, particularly for lung cancer. Only 1 in 8 (12.6%) Navajo Nation adults are current smokers (respondents who smoked every day and some days), which is significantly lower than the U.S. and New Mexico median (both at 17.5%).

One area that can be improved is chewing or smokeless tobacco use. There are more Navajo Nation adults who currently use chewing tobacco than who smoke tobacco. The Navajo Nation has significantly more chewing tobacco users than all 4 comparison groups (Figure 25).



	Everyday	Some days	Not at all
Navajo Nation	5.7	7.8	86.5
U.S.	2.3	1.8	96
Arizona	1.2	1.6	97.3
New Mexico	2.1	1.9	96
Utah	1.4	1.4	97.2

Figure 25. Tobacco Use - Three Level Chewing Tobacco

Sexual & Intimate Partner Violence

The BRFSS does not ask questions relating to Sexual and Intimate Partner Violence. The CDC funds The *National Intimate Partner and Sexual Violence Survey (NISVS)* which we can compare to the NNHS. The NISVS is a national phone-based survey, and the most recent data comes from the 2010-2012 survey. There was insufficient data to make comparison to Border States, but comparisons are possible at the National level and in some instances by race/ethnicity.

Sexual violence includes any unwanted sexual contact (e.g. being groped or fondled), exposure to unwanted sexual situations (e.g. sexual harassment, someone exposing sexual parts of their body), and unwanted sex (i.e. rape). Among women, the NNHS reports much lower sexual violence than National race/ethnicity groups (Figure 26). Lifetime rape among Navajo Nation women was reported about a tenth as often as U.S. AI/AN women.

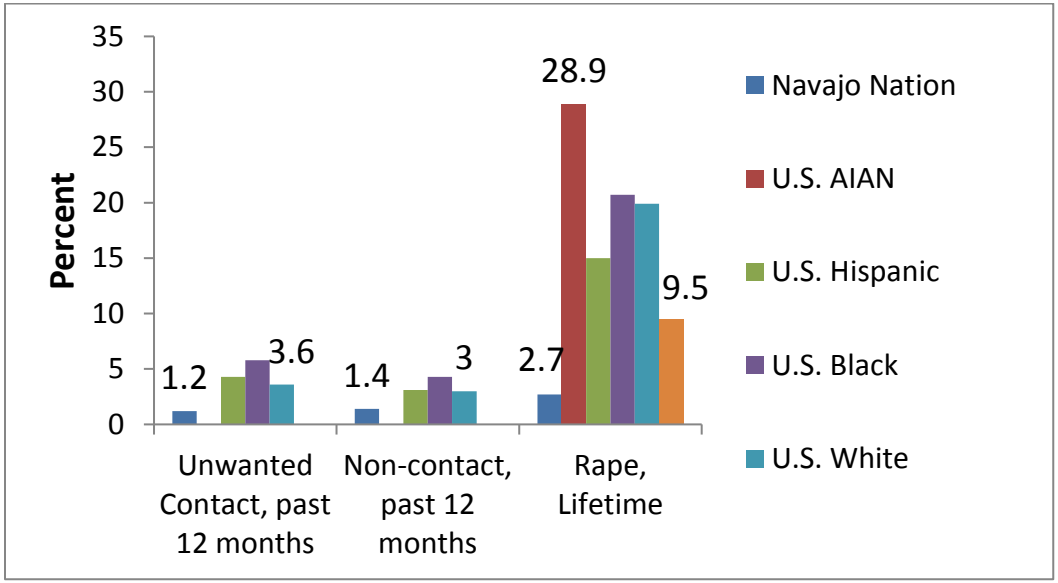


Figure 26. Sexual Violence among Women

A similar pattern was seen among men (Figure 27), although the difference for the NNHS was not as pronounced as among women. There was insufficient data in the National survey to report by race/ethnicity for men.

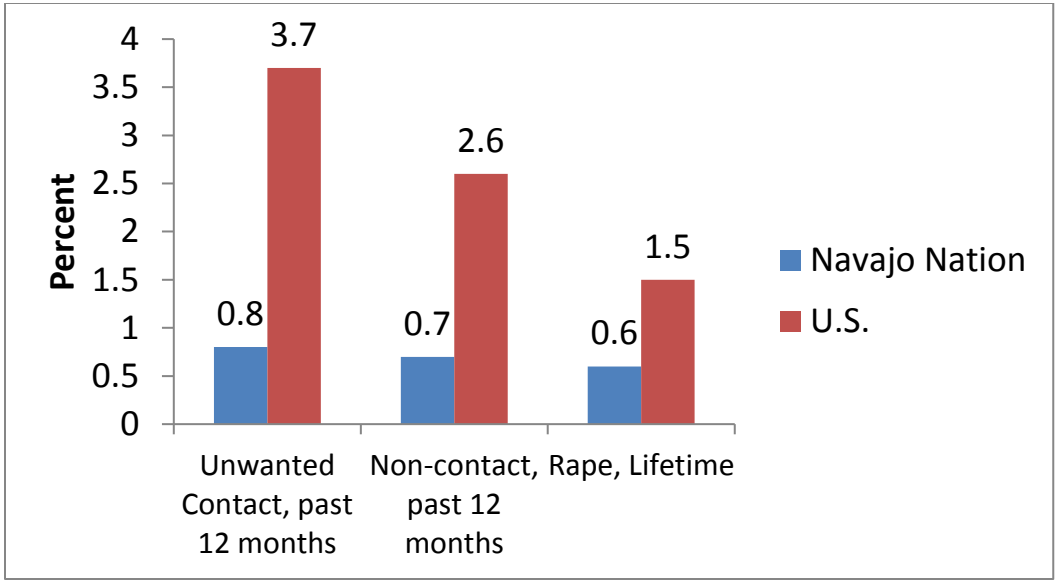


Figure 27. Sexual Violence among Men

Intimate Partner Violence was separated into two broad categories: Sexual and Physical. Comparisons could only be made at the National level by gender. Sexual violence among U.S. women was reported about 3 ½ times as often as Navajo Nation women, and physical violence was reported about 2.7 times as often among U.S. women as Navajo Nation women. Sexual violence among U.S. men was reported about 23 times as often as Navajo Nation men, and physical violence was reported more than 10 times as often among U.S. men as Navajo Nation men (Figure 28).

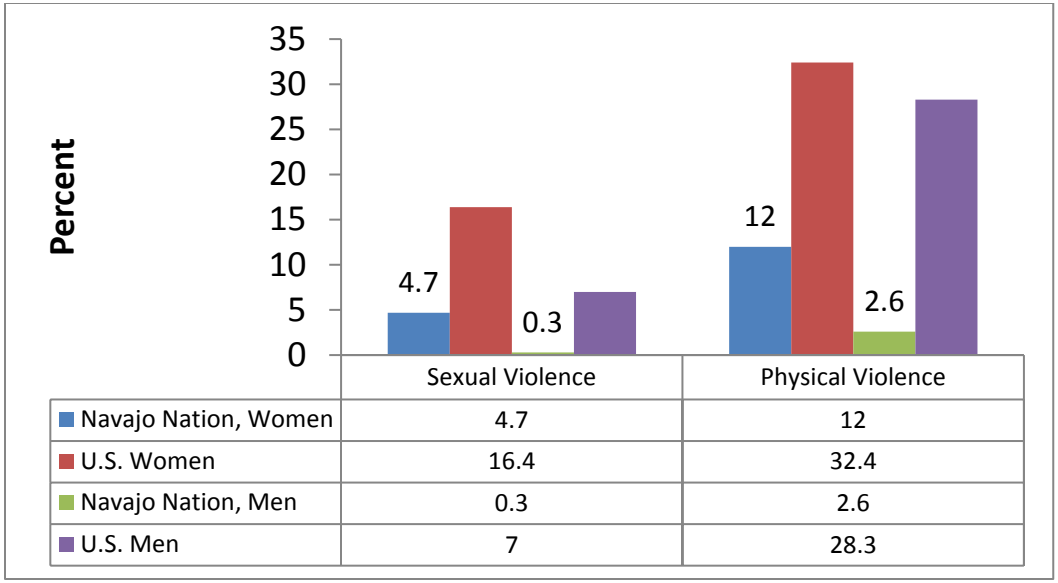


Figure 28. Lifetime Intimate Partner Violence

Results from the Sexual & Intimate Partner Violence modules were much lower than expected. Possible reasons for these low numbers are discussed in the limitations section of this report. Data not included in this results section are tabulated in the Sexual and Intimate Partner Violence questions tables. The data results were not sufficient to make comparisons to Border States, therefore, some results are not conclusive by inference.

LIMITATIONS

Collection and working with surveillance data experienced some limitations.

1. In some instances, interviewers did not follow the study protocol. Some people were selected out of convenience because they were at home during the initial contact rather than through the use of a random number table. This could be due to time constraints, interviewers returning to sample the houses at the same time of day on each contact attempt, not returning to the home a third time, or some other reason. During the next iteration, the NNHS may need to employ more interviewers, hire permanent interviewers to ensure higher quality employees, or focus on 1 or 2 agencies at a time.
2. About a third of surveys were completed in the Navajo language. Although the survey was translated into Navajo by a native speaker and experienced translator, there were still some disagreements based on regional Navajo language dialect variations on the translation. Some highly technical health terms (e.g. colonoscopy and sigmoidoscopy) were difficult to translate and not readily understood by NNHS participants. Use of visualizations, e.g., diagrams, illustrations, especially, of screening procedures would help with verbal explanation of the colorectal cancer screening questions.
3. At the time of the NNHS study, maps of the Chapter boundaries were not available, therefore, CBG boundaries were used. The CBG boundaries do not have practical meaning among Navajo Nation communities, projects, and programs. As a result, the data cannot be generalized at the Chapter level and community members have difficulty relating to the CBG's. Future iterations of the NNHS should use Navajo Chapter boundaries rather than CBG's for sampling.
4. Aerial maps were used to generate community maps to assist with finding house locations as displayed by a map service. Up-to-date digital aerial mapping is available, i.e., google maps, but limited to trial-and-error learning. Identified man-made structures, such as houses, does not guarantee that identified structure on a map actually exists on the ground. Use of digital mapping technology, e.g., geographic information system (GIS) software, provides storage, organization, visualization and display of location-based data for analysis and presentation, may be a viable mapping solution.
5. Response bias may have influenced self-reporting on the topic of sexual and intimate partner violence. Sexual behavior is often not talked about among the Navajo people. This is potentially due to the invasiveness of the questions and fear of judgment, embarrassment, or reprisal by a perpetrator if questions were answered honestly. Audio computer assisted self-interview (ACASI) survey technology may provide more accurate results because it would allow the participants to read and listen to the questions and respond confidentially.

CONCLUSION

The results presented from the Navajo Nation Health Survey provide survey data on individual behavioral risk factors for the Navajo adult population residing within reservation boundaries, including demographic information, health status, access to health care and screenings, chronic health conditions. Analysis of the data can be used to inform tribal programs of the Navajo Department of Health and future American Indian and Alaska Native population research studies. This study implemented by the Navajo Epidemiology Center is the beginning of a tribal behavioral risk factor surveillance system (BRFSS) for the Navajo Nation. An established baseline study of tribal specific BRFSS data on the adult Navajo population is now readily available. For the information to become a living document, it is very useful to assess adult health behaviors as a surveillance tool to continuously monitor and evaluate health promotion and disease prevention through the BRFSS process: annual questionnaire construction, data collection, analysis and reporting.

The Navajo Epidemiology Center (NEC) strongly recommends strengthening collaboration with sister Navajo Department of Health (NDOH) programs to establish epidemiologic surveillance systems for behavioral health, cancer, infectious diseases, and chronic disease within NDOH. With the key data finding, the NEC intends to begin the process of identifying health indicators of concern for the Navajo Nation. Fulfillment of the original premise to provide tribal nation specific BRFSS data with establishment of a foundation for a tribal BRFSS surveillance system, ongoing health behavior surveillance is vital for the Navajo Nation to set in motion health priorities. A Navajo BRFSS surveillance system can strengthen and support continual tracking, measuring, monitoring, and evaluation of health status progress. Much like the Healthy People framework for public health priorities and actions, the Navajo Epidemiology Center can strategize an evolving initiative of its own that is BRFSS data specific of the Navajo adult population residing on the reservation, to address disease prevention and health promotion of significance to Navajo Nation.

There are other Tribal Epidemiology Centers and Area Indian Health Boards that have conducted and reported findings using the BRFSS process modified to meet their tribal nation's public health surveillance: Alaska TEC[23]; Northwest Portland Area Indian Health Board[24]; and, California Tribal Epidemiology Center[25]. The Center for Health Promotion and Prevention Research (CHPPR) at the University of North Dakota School of Medicine and Health Sciences conducted a "Native American specific survey using the BRFSS face-to-face interview" methodology in four northern plains tribal communities statewide in North Dakota[26 27]. Successes learned from piloting and testing, conception of a sampling design, study methodology, and procedural survey protocol allow further investigation to determine an surveillance system representative and exclusive to American Indian and Alaska Native (AI/AN) populations, i.e., Navajo.

It is uncertain if a stand-alone, single, research methodology is appropriate for tribal nations using the BRFSS process. However, in the case of the Navajo BRFSS study, the sample design as mentioned in the methodology section of this report is one approach for a large population based tribe, such as, Navajo Nation. Other tribal BRFSS surveys conducted utilized a sample methodology very different and inclusive of more than one tribal nation. Modification of the national BRFSS questionnaire to include culturally sensitive and culturally appropriate questions may be a possible solution for a tribal nation to fully understand its own tribal perspective on public health surveillance via a descriptive study, such as, a community health profile. The importance of systematic collection, analysis, and interpretation of health data infusing the information as

knowledge toward taking actions of communicating to partners, setting and/or re-prioritizing health priorities, establish program needs or creating new programs, policy development, and, formulating new hypotheses in epidemiologic studies.

Enhancing a tribal specific behavioral risk factor surveillance system come with challenges. The current experience with conducting a BRFSS health survey among a single AI/AN population requires piloting and testing new modes, or a mixed method, of data collection, especially, in a digital age where computer applications in mobile data collection technology are now available. Integrated workflows for efficient field operations with planning; coordinating project tasks and assignments to boost efficiency reduce downtime and cut operational expenses; navigating the most efficient transportation route to and within project locations via global positioning systems (GPS); capture of geographic information, community maps with aerial imagery, form-based data collection in real time, all specialized to display survey results, and monitor, track, and report data captured, in real time data feeds. Reduction or replace reliance on a paper questionnaire by creating a computerized template for data input directly on a laptop, tablet, of even a mobile device, such as, a smart phone.

With technology of today, the CDC now has the capability to use geographic information systems (GIS) mapping technology and BRFSS data, together in a computer user interface, as a visualization tool to compare prevalence data for states, territories and local areas. Two dimensional mapping integrated together with analytics can create visualizations of data in a geographic context. With GIS technology software, the ability to visualize vulnerable populations, identify community resources, enable disease surveillance, and connect stakeholder collaboration to make data-driven decisions.

The NEC recommends the Navajo Nation explore the identified twelve results as health priority areas. Further research for new insight toward innovative solutions and establishment of epidemiologic surveillance systems toward data finding is encouraged by the Navajo Department of Health programs. Strengthening a public health system for the Navajo Nation rests on the capacity to effectively deliver evidence-based programs. Essential programs, social services, public safety, transportation, education, environmental, play an integral part for the function and health of the Navajo Nation. For the benefit of our people we can inform, educate and empower our Diné to achieve Hozhó.

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