Inter Tribal Council of Arizona, Inc.

Behavioral Health and Substance Abuse Surveillance among American Indians in Arizona, Nevada, and Utah

Tribal Epidemiology Center

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TO: Tribal Leaders and Tribal Health Directors

FROM: Inter Tribal Council of Arizona, Inc.
             Tribal Epidemiology Center
             Maria Dadgar, MBA, Executive Director

RE: *Behavioral Health and Substance Abuse Surveillance among American Indians in Arizona,
Nevada, and Utah*

The Inter Tribal Council of Arizona, Inc. (ITCA) Tribal Epidemiology Center (TEC) is pleased to present the *Behavioral Health and Substance Abuse Surveillance among American Indians in Arizona, Nevada, and Utah* report.

This surveillance report was prepared in response to behavioral health and substance abuse-related concerns among Tribal communities within the Phoenix and Tucson Indian Health Service (IHS) Areas. The TEC utilized data from the IHS, Arizona Department of Health Services; Nevada Division of Public and Behavioral Health; and Utah Department of Health to construct the report.

This surveillance report highlights indicators of community behavioral health and substance abuse among American Indian populations in Arizona, Nevada, and Utah. For some indicators, results should be interpreted with caution due to missing data and small sample sizes. These data provide only a snapshot into the behavioral health status of a community and may not fully reflect ongoing trends in behavioral health and substance use disorders.

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PURPOSE

The purpose of the *Behavioral Health and Substance Abuse Surveillance among American Indians in Arizona, Nevada, and Utah* report is to provide information about behavioral health and substance use disorders affecting American Indians and Alaska Natives (AI/AN) in Arizona, Nevada, and Utah. The target audience for this report includes the following: Tribal Health Directors and public health professionals, tribal leadership, and health researchers. This report focuses on indicators of behavioral health and substance abuse in AI/AN communities. This surveillance report presents the current trends in behavioral health and substance abuse using data requested from state surveillance systems and national surveys, including hospital discharge, vital statistics, Behavioral Risk Factor Surveillance System (BRFSS), and Youth Risk Behavior Surveillance (YRBSS) data.

INTRODUCTION

This is the first publication of the report, *Behavioral Health and Substance Abuse Surveillance among American Indians in Arizona, Nevada, and Utah,* by the Inter Tribal Council of Arizona, Inc. (ITCA) Tribal Epidemiology Center (TEC). Using data obtained from state surveillance systems and national surveys, this surveillance report demonstrates the current trends in indicators of behavioral health and substance abuse among AI/AN in Arizona, Nevada, and Utah.

The surveillance data analyzed in this report was extracted from the vital statistics, hospital discharge, and emergency department surveillance systems of Arizona, Nevada, Utah; the Epi Data Mart of the Indian Health Service (IHS); and publicly available BRFSS and YRBSS survey results. The collation of information allows for the monitoring of trends for behavioral health and substance abuse. This information may be used to inform the development and implementation of interventions and programs to enhance behavioral health in AI/AN communities.

Behavioral health and substance abuse surveillance data for AI/AN can be used by Tribal Leaders, Tribal Health Directors, community health representatives (CHRs), health care providers (e.g., IHS, other clinicians and nurses), and researchers to identify emerging and ongoing trends, focus prevention efforts, plan programs, allocate resources, and develop public health policies.

This is particularly important, as data suggest that AI/AN are disproportionately affected by substance use disorders relative to other populations in the United States (US). AI/AN populations have been reported to be significantly more likely to self-report past-year alcohol and substance use disorders than other racial/ethnic groups. Among AI/AN, the drug-related mortality rate for 2007-2009 was 1.8 times higher than the rate for all groups in the US.[1]

The rates of behavioral health disorders and suicide have also been found to be high, substantially impacting the health of individuals, families, and communities.[2] Data suggest that suicide mortality rates for AI/AN may be 6.6 times greater than the national average.[1] A number of factors may contribute to suicide risk in this population, including: prior suicide attempts, alcohol and other substance use disorders, mood and anxiety disorders, historical trauma, alienation, acculturation, discrimination, community violence, lack of access to care, and exposure to suicide.[3]

Due to the importance of behavioral health and substance use disorders, both on and off Tribal lands, the Council of State and Territorial Epidemiologists (CSTE) established a list of recommended indicators for substance abuse and behavioral health surveillance.[4] While the CSTE has developed indicators for use on a population basis, the utility of these indicators for the assessment of substance abuse and behavioral health in Indian Country remains largely untested. To remedy this knowledge gap, ITCA conducted an evaluation to establish expert consensus using a 2-round Delphi survey and to rate the importance of these indicators in substance abuse and behavioral health assessment. A multidisciplinary group of 43 epidemiology and behavioral health experts rated the importance of 18 indicators. While overall group agreement was low, consensus was reached on 13 indicators, suggesting that this methodology may be useful in determining the feasibility and applicability of evaluating indicators in Indian Country, as effective indicators may differ between American Indian and other populations.[5]

This report is, to our knowledge, among the first to utilize the CSTE behavioral health and substance abuse indicators to assess health in Indian Country. It includes age-adjusted and crude mortality rates for AI/AN in Arizona, Nevada, and Utah. Although it was not possible to calculate rates based upon state-level hospital discharge data, state-level mortality rates were available.

Results should be interpreted with caution. Some of the CSTE indicators could not be examined among AI/AN due to data limitations. The source of each of several indicators was the National Survey on Drug Use and Health

(NSDUH), but, unfortunately, race/ethnicity data could not be obtained at the state-level from this source. Additionally, insufficient sample sizes were available for some state-level indicators obtained using data from the BRFSS and YRBSS. Not all data sources provided high enough counts to report accurate results for each indicator, and data for said indicators were therefore left unreported. Even though these indicators were identified as important in participating communities, the surveillance data described herein may not accurately represent their prevalence, potentially introducing some error.

This report is organized into eight main sections:

- Purpose
- Introduction
- Executive Summary
- Analysis Highlights
- Action Items
- Technical Notes
- Glossary
- Statistical Notes Table

The Analysis Highlights section includes summary data for selected behavioral health and substance abuse indicators in Arizona, Nevada, and Utah. This report focuses solely on the behavioral health and substance abuse indicators rated to be of greatest importance among American Indians. Additional analyses of other indicators may be provided to ITCA TEC Tribal partners upon request by contacting us directly at: TECinfo@itcaonline.com.

EXECUTIVE SUMMARY

The purpose of the *Behavioral Health and Substance Abuse Surveillance among American Indians in Arizona, Nevada, and Utah* report is to provide information for the tribes we serve. This report focuses on trends in substance abuse and behavioral health among AI/AN.   Due to confidentiality reasons, it was decided that if a sample size of less than six individuals was available per indicator per state, data would not be presented in this report. Results should be interpreted with caution, since the availability of race/ethnicity data varied by indicator. For instance, data on the *drug abuse or dependence, drug use, depressive episode, and serious mental illness* indicators were not included in the report due to insufficient data, even though these were rated as important indicators in the states of Arizona, Nevada, and Utah.

In IHS facilities and the three states under study, the *any mental illness* indicator comprised the greatest proportion of the overall hospitalizations, followed by the *any mental illness except drug- and alcohol-related disorders, mood and depressive disorders, schizophrenic disorders,* and *post-traumatic stress disorder (PTSD)* indicators*.* In the IHS, Arizona, Nevada, and Utah facilities, the *any substance use disorder* indicator comprised the greatest proportion of the overall hospitalizations. This indicator was followed by the *drug use during pregnancy and associated conditions, opioid dependence,* and *cocaine dependence* indicators in the IHS facilities. In Arizona, the *any substance use disorder* indicator was followed by the *other (prescription) opioid poisoning, drug use during pregnancy and associated conditions, benzodiazepine poisoning,* and *amphetamine poisoning* indicators. Liver disease and cirrhosis was the top cause of death in all three states, followed by suicide in Arizona and Utah and drug overdose in Nevada. Due to low sample sizes, BRFSS and YRBSS data were predominantly only available in Arizona.

Several action items can be initiated by individuals, tribal communities, tribal health care providers, tribal leaders, and researchers to prevent and detect behavioral health and substance use disorders. Individuals can see a healthcare practitioner if they exhibit symptoms of a behavioral health disorder or are concerned about their substance use and can regularly take their medication and stay in contact with their healthcare provider if they have been diagnosed with a substance use or behavioral health disorder. Tribal communities can fight to end discrimination against people in recovery from substance use and behavioral health disorders. Tribal health providers can work toward complete integration of the treatment of substance use and behavioral health disorders. Tribal leaders can support tribal codes that protect confidentiality of and prevent discrimination and stigma against people living with behavioral health and substance use disorders. Lastly, non-tribal public health organizations can work to improve AI/AN surveillance data quality and participate in data sharing between organizations to better serve the AI/AN population and allow for more extensive assessments of behavioral health and substance use disorders.

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ANALYSIS HIGHLIGHTS

Top Behavioral Health and Substance Abuse Indicators in Indian Health Service (IHS) facilities for American Indian/Alaska Natives (AI/AN)

Behavioral Health Indicators

1. All mental health disorders
2. All mental health disorders except alcohol- and drug-induced disorders
3. Mood and depressive disorders
4. Schizophrenic disorders
5. Post-traumatic stress disorder

Substance Abuse Indicators

1. All substance abuse
2. Drug use in pregnancy and associated conditions
3. Opioid dependence
4. Cocaine dependence
5. Other opioid poisoning
6. Benzodiazepine poisoning

Top Behavioral Health and Substance Abuse Indicators in Arizona for AI/AN

Behavioral Health Indicators

1. All mental health disorders
2. All mental health disorders except alcohol- and drug-induced disorders
3. Mood and depressive disorders
4. Schizophrenic disorders
5. Post-traumatic stress disorder

Substance Abuse Indicators

1. All substance abuse
2. Other opioid poisoning
3. Drug use in pregnancy and associated conditions
4. Benzodiazepine poisoning
5. Opioid dependence
6. Amphetamine poisoning

Top Behavioral Health and Substance Abuse Indicators in Nevada for AI/AN

Behavioral Health Indicators

1. All mental health disorders
2. All mental health disorders except alcohol- and drug-induced disorders
3. Mood and depressive disorders
4. Schizophrenic disorders

Substance Abuse Indicators

1. All substance abuse
2. Opioid dependence
3. Benzodiazepine

Top Behavioral Health and Substance Abuse Indicators in Utah for AI/AN

Behavioral Health Indicators
1. All mental health disorders
2. All mental health disorders except alcohol- and drug-induced disorders
3. Mood and depressive disorders
4. Schizophrenic disorders

Substance Abuse Indicators
1. All substance abuse
2. Opioid dependence

Top Five Causes of Death among AI/AN in Arizona, Nevada, and Utah, 2016

Arizona
1. Heart disease
2. Unintentional injury
3. Cancer
4. Liver disease and cirrhosis
5. Diabetes

Nevada
1. Heart disease
2. Cancer
3. Respiratory diseases
4. Unintentional injury
5. Liver disease and cirrhosis

Utah
1. Cancer
2. Heart disease
3. Unintentional injury
4. Diabetes
5. Liver disease and cirrhosis

BEHAVIORAL HEALTH

Hospital Discharges for Behavioral Health Disorders

The literature suggests that AI/AN populations are disproportionally affected by behavioral health disorders. Relative to the general population, AI/AN are more likely to experience psychological distress; higher rates of PTSD and suicide have also been reported in this population.[6]

IHS Facilities - Phoenix Service Area

Table 1 and Figure 1 show the number, prevalence, and rate of hospitalization for behavioral health indicators in IHS facilities in the Phoenix Service Area. Of the indicators included in this report, *all mental health disorders* was the one most frequently observed among AI/AN patients seeking care at IHS facilities in the Phoenix Service Area between 2012 and 2016, followed by *all mental health disorders except alcohol- and drug-induced disorders, mood and depressive disorders, schizophrenic disorders* and *post-traumatic stress disorder (PTSD).* The rates of hospitalization for *all mental health disorders, all mental health disorders except alcohol- and drug-induced disorders,* and *mood and depressive disorders* demonstrated an overall increasing trend over the period between 2012 and 2016, while the rates of hospitalization for *schizophrenic disorders* and *PTSD* remained steady.

Table 1. Number, Prevalence, and Crude Rate of Hospitalizations Attributable to Behavioral Health Indicators among AI/AN at IHS Facilities in the Phoenix Service Area per 10,000 CAIR, FY 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE OF HOSPITALIZATIONS (%)	CRUDE RATE OF HOSPITALIZATION PER 10,000
BEHAVIORAL HEALTH INDICATORS			
All Mental Health Disorders			
2012	2206	6.61	132.57
2013	2080	6.45	123.04
2014	2046	6.79	118.78
2015	1982	7.63	113.74
2016	2504	8.68	142.23
All Mental Health Disorders Except Alcohol- and Drug-Induced Disorders			
2012	401	1.20	24.10
2013	399	1.24	23.60
2014	366	1.21	21.25
2015	380	1.46	21.81
2016	779	2.70	44.25
Mood and Depressive Disorders			
2012	144	0.43	8.65
2013	126	0.39	7.45
2014	125	0.41	7.26
2015	97	0.37	5.57
2016	329	1.14	18.69

Schizophrenic Disorders			
2012	53	0.16	3.19
2013	46	0.14	2.72
2014	37	0.12	2.15
2015	38	0.15	2.18
2016	55	0.19	3.12
Post-Traumatic Stress Disorder			
2012	23	0.07	1.38
2013	18	0.06	1.06
2014	19	0.06	1.10
2015	28	0.11	1.61
2016	41	0.14	2.33
Data from the Indian Health Service Epi Data Mart Abbreviations: AI/AN: American Indians/Alaska Natives; CAIR: Countable Active Indian Registrants; IHS: Indian Health Service; FY: Fiscal Year			

Figure 1. Rate of Hospitalization for Behavioral Health Disorders per 10,000 CAIR among AI/AN in the IHS Phoenix Service Area, FY 2012-2016

Data from the Indian Health Service Epi Data Mart
Abbreviations: AI/AN: American Indians/Alaska Natives; CAIR: Countable Active Indian Registrants; IHS: Indian Health Service; FY: Fiscal Year

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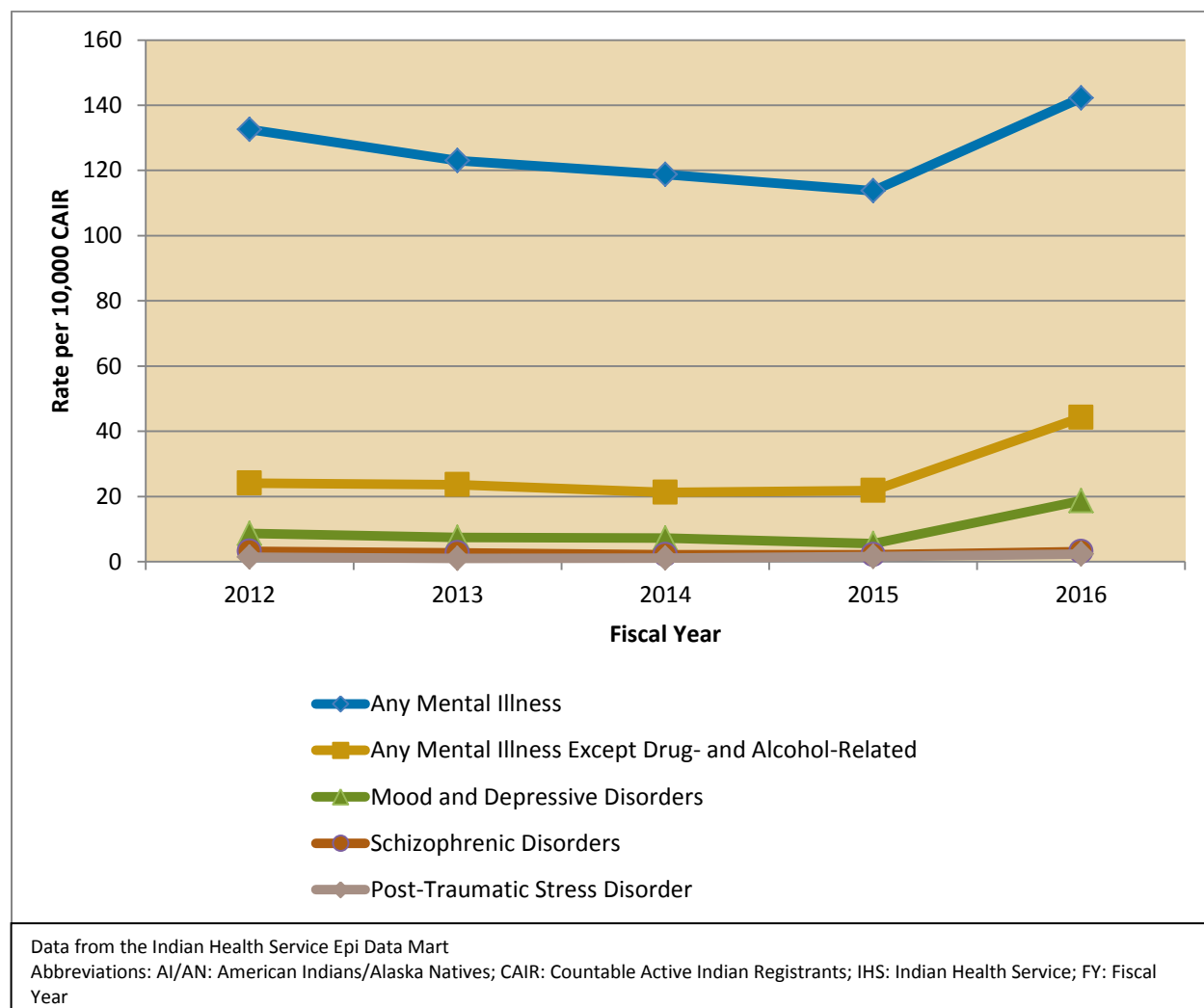
Arizona

Table 2 and Figure 2 show the number and prevalence of behavioral health hospitalizations in Arizona. Of the indicators included in this report, *all mental health disorders* was the one most frequently observed among AI/AN patients seeking care in Arizona between 2012 and 2016, followed by *all mental health disorders except alcohol- and drug-induced disorders, mood and depressive disorders, schizophrenic disorders* and *PTSD.* The prevalence of *all mental health disorders, all mental health disorders except alcohol- and drug-induced disorders, mood and depressive disorders, schizophrenic disorders,* and *PTSD* were greater in 2014 than in the years preceding and following.

Table 2. Number and Prevalence of Hospitalizations Attributable to Behavioral Health Disorders among AI/AN in Arizona, 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE OF HOSPITALIZATIONS (%)
BEHAVIORAL HEALTH INDICATORS		
All Mental Health Disorders		
2012	1495	5.40
2013	1498	5.44
2014	4066	13.27
2015	1955	7.04
2016	2064	7.30
All Mental Health Disorders Except Alcohol- and Drug-Induced Disorders		
2012	1006	3.64
2013	1003	3.64
2014	3294	10.75
2015	1323	4.76
2016	1438	5.08
Mood and Depressive Disorders		
2012	630	2.28
2013	637	2.31
2014	2595	8.47
2015	831	2.99
2016	963	3.40
Schizophrenic Disorders		
2012	192	0.69
2013	203	0.74
2014	395	1.29
2015	296	1.07
2016	382	1.35
Post-Traumatic Stress Disorder		
2012	13	0.05
2013	17	0.06
2014	29	0.09
2015	28	0.10
2016	33	0.12
Data from Arizona Department of Health Services, Bureau of Public Health Statistics Abbreviations: AI/AN: American Indians/Alaska Natives		

Figure 2. Prevalence of Hospitalizations among AI/AN in Arizona by Behavioral Health Disorder Indicator, 2012-2016

Data from Arizona Department of Health Services, Bureau of Public Health Statistics
Abbreviations: AI/AN: American Indians/Alaska Natives

Nevada

Table 3 and Figure 3 show the number and prevalence of behavioral health hospitalizations in Nevada. Of the indicators included in this report, *all mental health disorders* was the one most frequently observed among AI/AN patients seeking care in Nevada between 2012 and 2016, followed by *all mental health disorders except alcohol- and drug-induced disorders, mood and depressive disorders,* and *schizophrenic disorders.* The prevalence of *all mental health disorders, all mental health disorders except alcohol- and drug-induced disorders, mood and depressive disorders,* and *schizophrenic disorders* were greater in 2015 than in the years preceding and following.

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Table 3. Number and Prevalence of Hospitalizations Attributable to Behavioral Health Disorders among AI/AN in Nevada, 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE (%) OF HOSPITALIZATIONS
BEHAVIORAL HEALTH INDICATORS		
All Mental Health Disorders		
2012	107	4.84
2013	501	11.89
2014	665	13.71
2015	637	20.89
2016	332	10.94
All Mental Health Disorders Except Alcohol- and Drug-Induced Disorders		
2012	76	3.44
2013	423	10.04
2014	577	11.90
2015	585	19.18
2016	272	8.96
Mood and Depressive Disorders		
2012	42	1.90
2013	225	5.34
2014	361	7.44
2015	314	10.30
2016	162	5.34
Schizophrenic Disorders		
2012	14	0.63
2013	82	1.95
2014	115	2.37
2015	209	6.85
2016	106	3.49
Post-Traumatic Stress Disorder		
2012	0	0
2013	*	*
2014	*	*
2015	*	*
2016	*	*
Data from Nevada Division of Public and Behavioral Health, State Biostatistician; * Data suppressed due to low counts (n<6) Abbreviations: AI/AN: American Indians/Alaska Natives		

Figure 3. Prevalence of Hospitalizations among AI/AN in Nevada by Behavioral Health Disorder Indicator, 2012-2016

Data from Nevada Division of Public and Behavioral Health, State Biostatistician
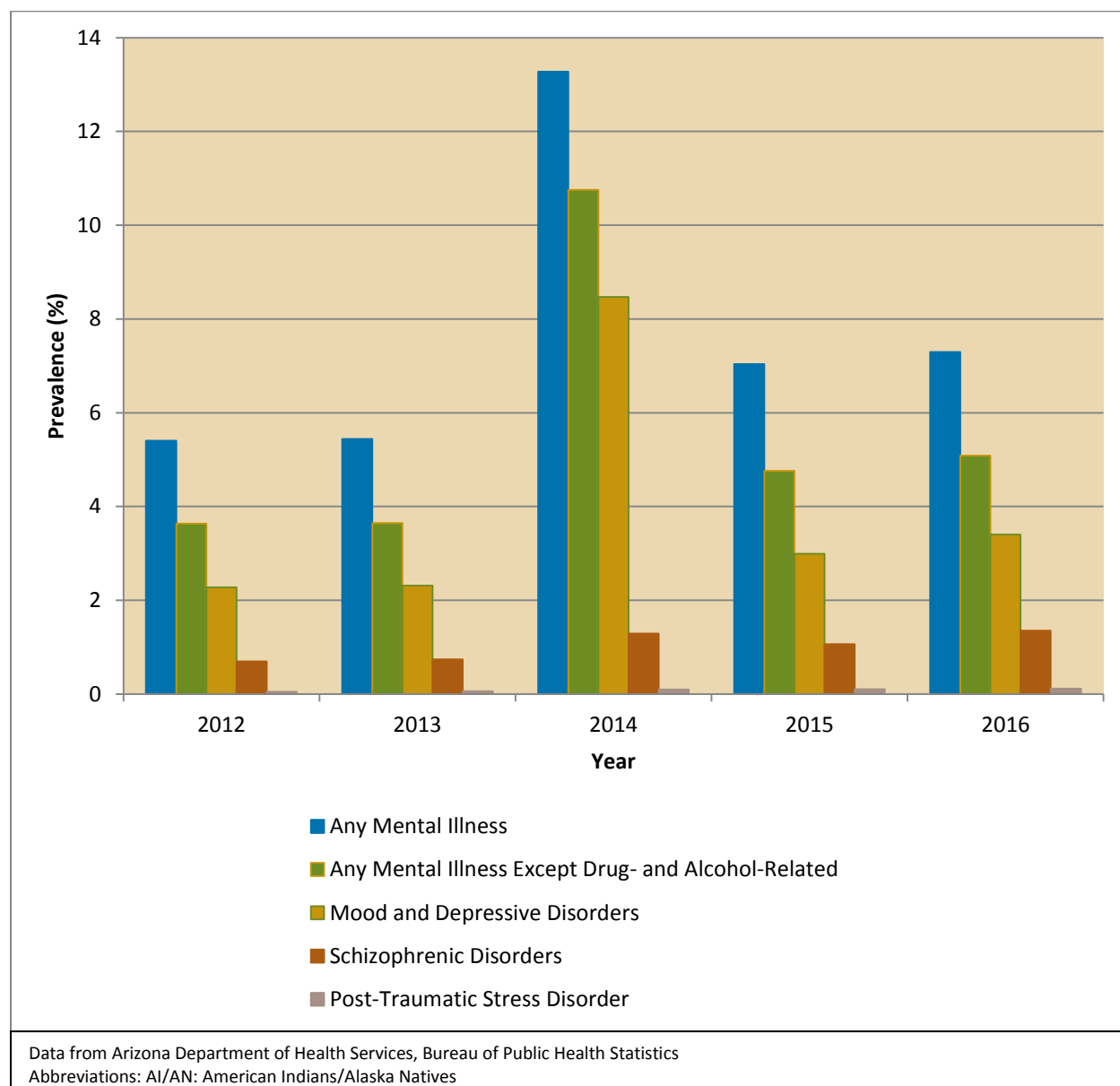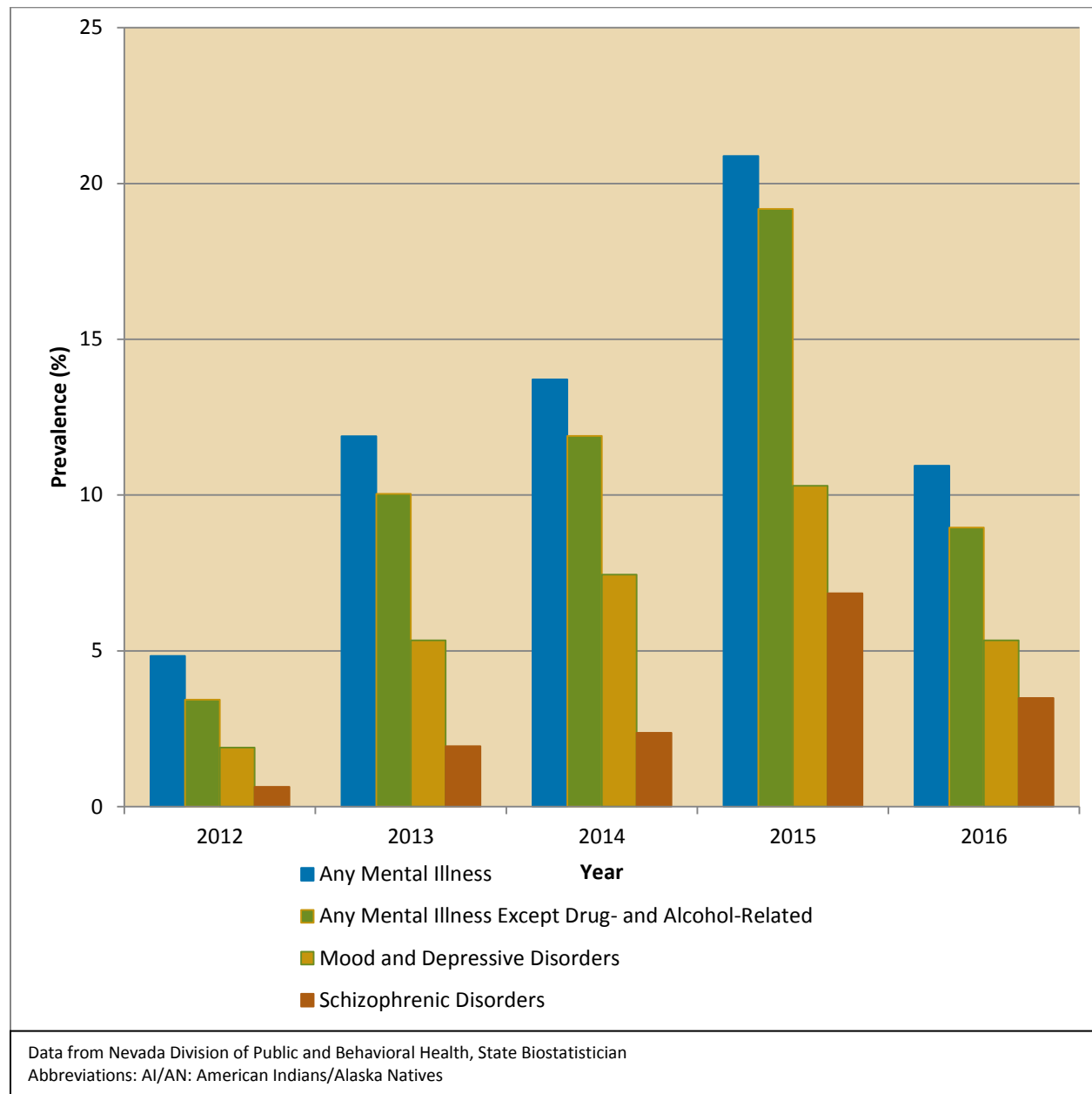Abbreviations: AI/AN: American Indians/Alaska Natives

Utah

Table 4 and Figure 4 show the number and prevalence of behavioral health hospitalizations in Utah. Of the indicators included in this report, *all mental health disorders* was the one most frequently observed among AI/AN patients seeking care in Utah between 2012 and 2016, followed by *all mental health disorders except alcohol- and drug-induced disorders, mood and depressive disorders,* and *schizophrenic disorders.* The prevalence of *all mental health disorders* were greater in 2013 and 2015, exhibiting a bimodal distribution. The prevalence of *all mental health disorders except alcohol- and drug-induced disorders* remained steady, and the prevalence of *mood and depressive disorders* and *schizophrenic disorders* increased over the time period under study.

Table 4. Number and Prevalence of Hospitalizations Attributable to Behavioral Health Disorders among AI/AN in Utah, 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE (%) OF HOSPITALIZATIONS
BEHAVIORAL HEALTH INDICATORS		
All Mental Health Disorders		
2012	105	5.94
2013	81	6.57
2014	66	5.15
2015	113	6.47
2016	157	4.71
All Mental Health Disorders Except Alcohol- and Drug-Induced Disorders		
2012	27	1.53
2013	18	1.46
2014	25	1.95
2015	30	1.72
2016	63	1.89
Mood and Depressive Disorders		
2012	0	0.00
2013	*	*
2014	6	0.47
2015	9	0.52
2016	19	0.57
Schizophrenic Disorders		
2012	*	*
2013	*	*
2014	0	0
2015	*	*
2016	8	0.24
Post-Traumatic Stress Disorder		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	0	0
Data from Utah Department of Health, Bureau of Epidemiology; * Data suppressed due to low counts (n<6) Abbreviations: AI/AN: American Indians/Alaska Natives		

Figure 4. Prevalence of Hospitalizations among AI/AN in Utah by Behavioral Health Disorder Indicator, 2012-2016

Data from Utah Department of Health, Bureau of Epidemiology, State Biostatistician
Abbreviations: AI/AN: American Indians/Alaska Natives
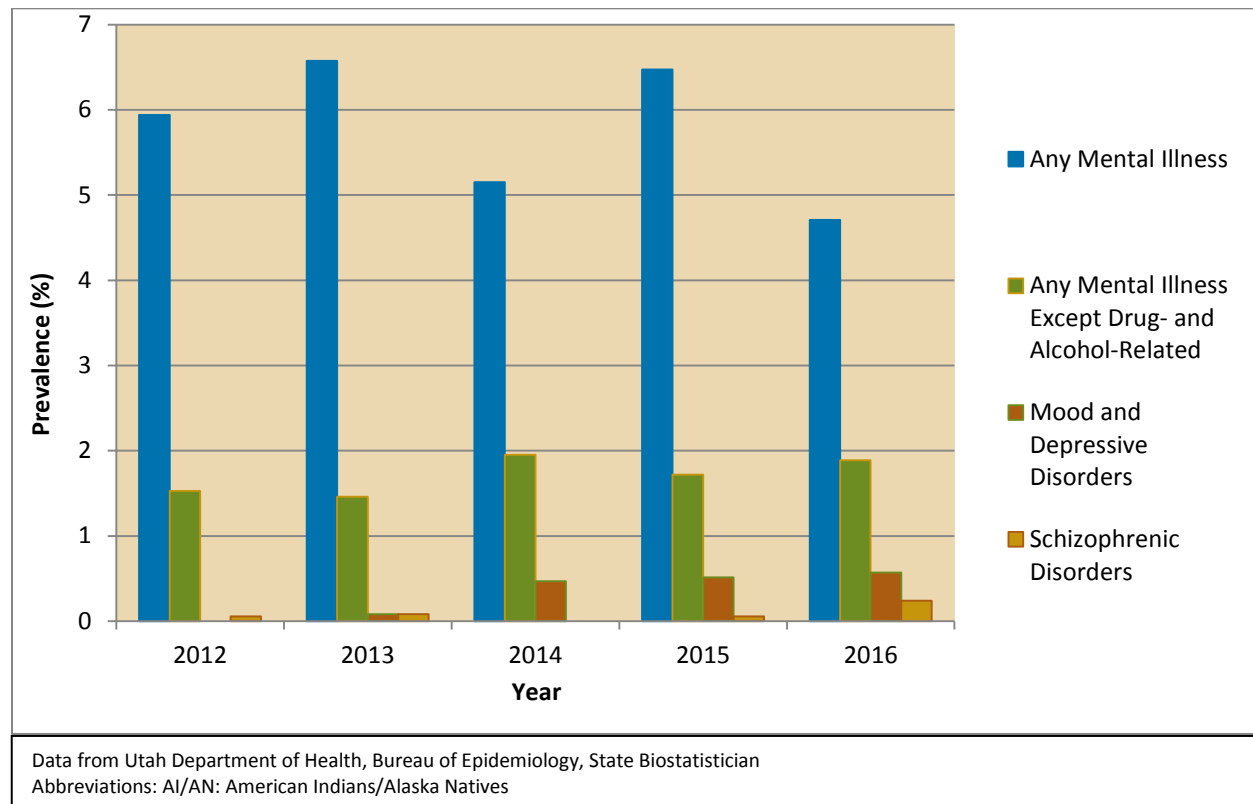
Self-Reported Youth Suicide Attempts

Recent data suggest that the rate of suicide among AI/AN youth is twice the national average.[7] Similarly, the YRBSS data displayed in Figure 5 suggest that the prevalence of suicide attempts among AI/AN youth was almost double that of the overall prevalence among youth regardless of race/ethnicity. However, this information may not be translatable to the other states understudy, as AI/AN data were not available for Utah or Nevada. These data are also limited by time, as AI/AN data were not available for Arizona for 2013.

Figure 5. Prevalence of Self-Reported Suicide Attempts among AI/AN Youth and Youth of All Races/Ethnicities in Arizona, 2015*
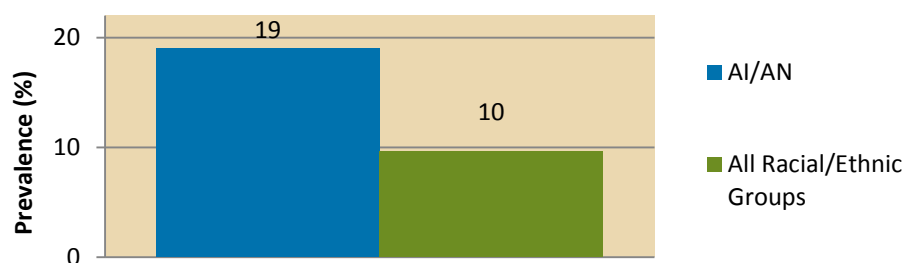
*Data from YRBSS; Abbreviations: AI/AN: American Indian/Alaska Native

Suicide Mortality

Suicide of concern among AI/AN adults. The rate of which continues to exceed the national average. The data presented in Table 5 suggest that the rate of suicide was greatest in Utah, followed by Nevada and Arizona (Table 5). In Arizona, the rate of suicide among AI/AN reached its greatest levels in 2016 (24.2 deaths per 100,000 population). In Nevada, the rate of suicide among AI/AN reached its greatest levels in 2012 (31.3 deaths per 100,000 population). In Nevada, the rate of suicide among AI/AN reached its greatest levels in 2015 (34.9 deaths per 100,000 population).

Table 5. Number of Suicide Deaths and Mortality Rate per 100,000 Population among AI/AN in AZ, NV, and UT by State, 2012-2016

STATE (YEAR)	NUMBER OF DEATHS	MORTALITY RATE PER 100,000
SUICIDE		
Arizona [a,c]		
2012	60	17.9
2013	69	21.9
2014	53	13.9
2015	58	19
2016	75	24.2
Nevada [b,d]		
2012	10	31.3
2013	8	24.8
2014	9	27.8
2015	6	17.6
2016	7	20.4
Utah [b,e]		
2012	9	21.2
2013	13	29.74
2014	9	20.1
2015	16	34.9
2016	9	18.9

[a] Mortality Rate Age-adjusted to the 2000 U.S. Standard Population; [b] Crude Mortality Rate; [c] Data from Arizona Department of Health Services, Bureau of Public Health Statistics; [d] Data from Nevada Division of Public and Behavioral Health, State Biostatistician, [e] Data from Utah Department of Health, Bureau of Epidemiology

Abbreviations: AI/AN: American Indians/Alaska Natives

SUBSTANCE ABUSE

Adult Binge Drinking

Data from the NSDUH suggest that the rate of binge drinking among AI/AN was 23.5 percent in 2013. Our data revealed similar prevalence in Arizona in 2015 and 2016 (Table 6).[2] Our data is not without limitations. Of the five years under study (2012-2016), data for Arizona were only available in 2015 and 2016, and Utah data were only available in 2016. No data were available for Nevada. Due to methodological differences, the NSDUH and BRFSS data may not be directly comparable.

Table 6. Prevalence of Binge Drinking among AI/AN Adults in Arizona and Utah, 2015-2016

STATE (YEAR)	PREVALENCE (%)
ADULT BINGE DRINKING	
Arizona	
2015	19
2016	21
Utah	
2016	19
Data from the Behavioral Risk Factor Surveillance System (BRFSS) Abbreviations: AI/AN: American Indians/Alaska Natives	

Youth Binge Drinking

Binge drinking has also been found to be an issue among AI/AN youth. In a 2008 study, AI/AN youth were found to be more likely than White youth to consume alcohol in their lifetime, have been intoxicated in the past 30 days, and have gotten alcohol from an adult or someone under the age of 21 years.[8] Contrary to these results, the data in Figure 6 suggest that the prevalence of binge drinking among AI/AN youth in Arizona in 2015 was almost twice that observed in all racial/ethnic groups combined. This indicator does have some limitations, however. Data on the prevalence of youth binge drinking were only available in 2013 for Arizona. No data on youth binge drinking were available for either Nevada or Utah during the five years under study.

Figure 6. Prevalence of Binge Drinking among AI/AN Youth and Youth of All Races/Ethnicities in Arizona, 2015*
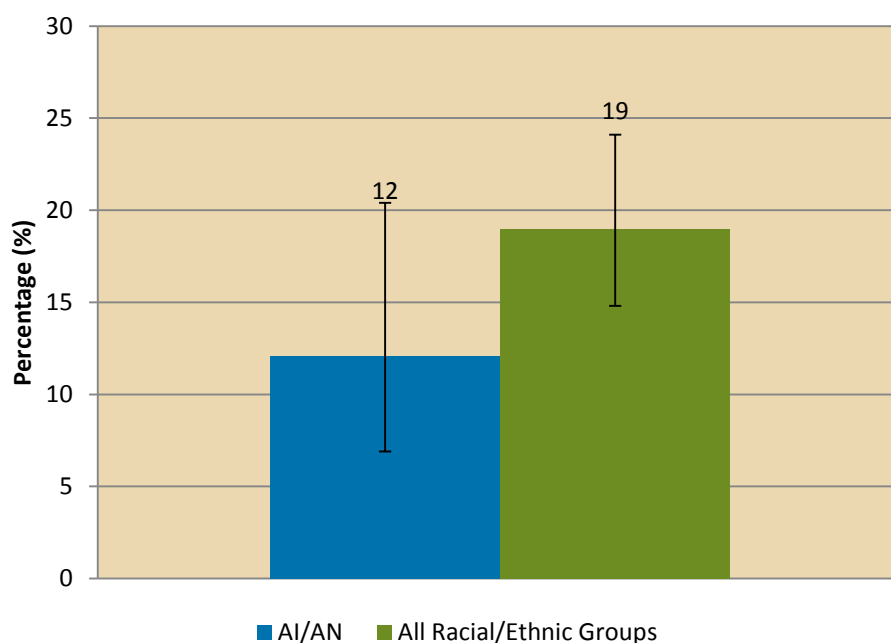
*Data from YRBSS; Abbreviations: AI/AN: American Indian/Alaska Native

Mortality from Liver Disease and Cirrhosis

The burden of excessive alcohol use is substantial in Arizona, Nevada, and Utah; such alcohol consumption patterns can result in a number of conditions and disease states, the most severe of which is death. Data suggest that AI/AN populations may be particularly affected by chronic liver disease mortality.[9] Table 7 shows the number of deaths identified in the three states during each year of the time period under study and their corresponding mortality rate. In Arizona, the mortality due to liver disease and cirrhosis increased between 2012 and 2016. The trends in mortality rate observed in Nevada and Utah were less clear, with the highest rate being observed in 2015 and 2014 in Nevada and Utah, respectively. However, this may be due to the relatedly low sample sizes in these states.

Table 7. Number of Liver Disease and Cirrhosis Deaths and Mortality Rate per 100,000 Population among AI/AN in Arizona, Nevada, and Utah by State, 2012-2016

STATE (YEAR)	NUMBER OF DEATHS	MORTALITY RATE PER 100,000
LIVER DISEASE AND CIRRHOSIS		
Arizona [a,c]		
2012	148	59.2
2013	166	62.0
2014	162	52.7
2015	193	77.6
2016	217	85.9
Nevada [b,d]		
2012	8	25.0
2013	13	40.3
2014	7	21.6
2015	15	44.0
2016	10	29.1
Utah [b,e]		
2012	12	28.2
2013	13	29.7
2014	18	40.2
2015	16	34.9
2016	8	16.8

[a] Mortality Rate Age-adjusted to the 2000 U.S. Standard Population; [b] Crude Mortality Rate; [c] Data from Arizona Department of Health Services, Bureau of Public Health Statistics; [d] Data from Nevada Division of Public and Behavioral Health, State Biostatistician, [e] Data from Utah Department of Health, Bureau of Epidemiology
Abbreviations: AI/AN: American Indians/Alaska Natives

Drug Overdose Mortality, All Drugs

Data suggest that the rate of drug overdose mortality observed among AI/AN may exceed that observed in other races. A report published using Minnesota vital statistics data suggested that the drug overdose mortality rate in 2016 was almost 6 times higher among AI/AN than White Minnesotans.[10] Table 8 shows the number of drug overdose deaths identified among AI/AN in Arizona, Nevada, and Utah during each year of the time period under study and their corresponding mortality rate. Our data suggest that the drug overdose mortality rates were highest in 2013 in Arizona, 2016 in Nevada, and 2014 in Utah. These data are limited by the use of a different data source for the Utah data and low counts in Utah in 2012 and 2013.

Table 8. Number of All-Cause Drug Overdose Deaths and Mortality Rate per 100,000 Population among AI/AN in Arizona, Nevada, and Utah by State, 2012-2016

STATE (YEAR)	NUMBER OF DEATHS	MORTALITY RATE PER 100,000
DRUG OVERDOSE		
Arizona [a]		
2012	38	13.4
2013	54	18.7
2014	45	13.4
2015	45	15.8
2016	50	17.8
Nevada		
2012	11	34.4
2013	10	31.0
2014	8	24.7
2015	8	23.5
2016	11	32.0
Utah [b,f]		
2012	*	*
2013	*	*
2014	17	33.6
2015	10	19.3
2016	10	18.6
[a] Mortality Rate Age-adjusted to the 2000 U.S. Standard Population; [b] Crude Mortality Rate; [c] Data from Arizona Department of Health Services, Bureau of Public Health Statistics; [4] Data from Nevada Division of Public and Behavioral Health, State Biostatistician, [e] Data from Utah Department of Health, Bureau of Epidemiology, [f] Data from Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research, * Data suppressed due to low counts (n<6) Abbreviations: AI/AN: American Indians/Alaska Natives		

Hospitalization Attributable to Drugs with Potential for Abuse and Dependence

AI/AN have also been found to be disproportionately affected by substance abuse and its sequelae. NSDUH data suggest that the rate of substance dependence or abuse exceeds that identified in all other races and that the rate of illicit drug use exceeds that observed in Whites, Hispanics, and Blacks.[2]

IHS Facilities - Phoenix Service Area

Table 9 and Figure 7 show the number, prevalence, and rate of hospitalization for substance abuse hospitalizations in IHS facilities in the Phoenix Service Area. Of the indicators included in this report, *all substance abuse* was the one most frequently observed among AI/AN patients seeking care at IHS facilities in the Phoenix Service Area between 2012 and 2016, followed by *drug use in pregnancy and associated conditions, opioid dependence, cocaine dependence, other opioid dependence,* and *benzodiazepine prevalence.* The rates at which *opioid dependence, cocaine dependence* were observed remained relatively steady over the period between 2012 and 2016, while the rate of *all substance abuse oscillated, and the rate at which drug use in pregnancy and associated conditions* was observed exhibited a slight increase.

Table 9. Number, Prevalence, and Rate of Hospitalizations Attributable to Substance Use disorders among AI/AN at IHS Facilities per 10,000 CAIR in the Phoenix Service Area, FY 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE (%) OF HOSPITALIZATIONS	RATE OF HOSPITALIZATION per 10,000
SUBSTANCE ABUSE INDICATORS			
All Substance Abuse			
2012	691	2.07	41.53
2013	552	1.71	32.65
2014	618	2.05	35.88
2015	511	1.97	29.32
2016	642	2.23	36.47
Opioid Dependence			
2012	69	0.21	20.05
2013	45	0.14	19.07
2014	63	0.21	17.49
2015	62	0.24	14.91
2016	59	0.20	16.38
Cocaine Dependence			
2012	25	0.07	1.50
2013	23	0.07	1.36
2014	14	0.05	0.81
2015	11	0.04	0.63
2016	8	0.03	0.45
Heroin Poisoning			
2012	0	0	0
2013	*	*	*
2014	0	0	0
2015	0	0	0
2016	0	0	0
Cocaine Poisoning			
2012	*	*	*
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
Other Opioid Poisoning			
2012	*	*	*
2013	*	*	*
2014	*	*	*
2015	*	*	*
2016	9	0.03	0.51
Benzodiazepine Poisoning			
2012	*	*	*
2013	6	0.02	0.35
2014	*	*	*
2015	*	*	*
2016	*	*	*

Amphetamine Poisoning			
2012	0	0	0
2013	*	*	*
2014	*	*	*
2015	*	*	*
2016	*	*	*
Drug Use in Pregnancy and Associated Conditions			
2012	107	0.32	6.43
2013	82	0.25	4.85
2014	90	0.30	5.23
2015	55	0.21	3.16
2016	149	0.52	8.46

Data from the Indian Health Service Epi Data Mart; Data suppressed due to low counts (n<6)
Abbreviations: AI/AN: American Indians/Alaska Natives; CAIR: Countable Active Indian Registrants; IHS: Indian Health Service; FY: Fiscal Year

Figure 7. Prevalence of Hospitalizations among AI/AN at IHS Facilities by Substance Use Disorder Indicator, 2012-2016

Data from the Indian Health Service Epi Data Mart
Abbreviations: AI/AN: American Indians/Alaska Natives; CAIR: Countable Active Indian Registrants; IHS: Indian Health Service; FY: Fiscal Year
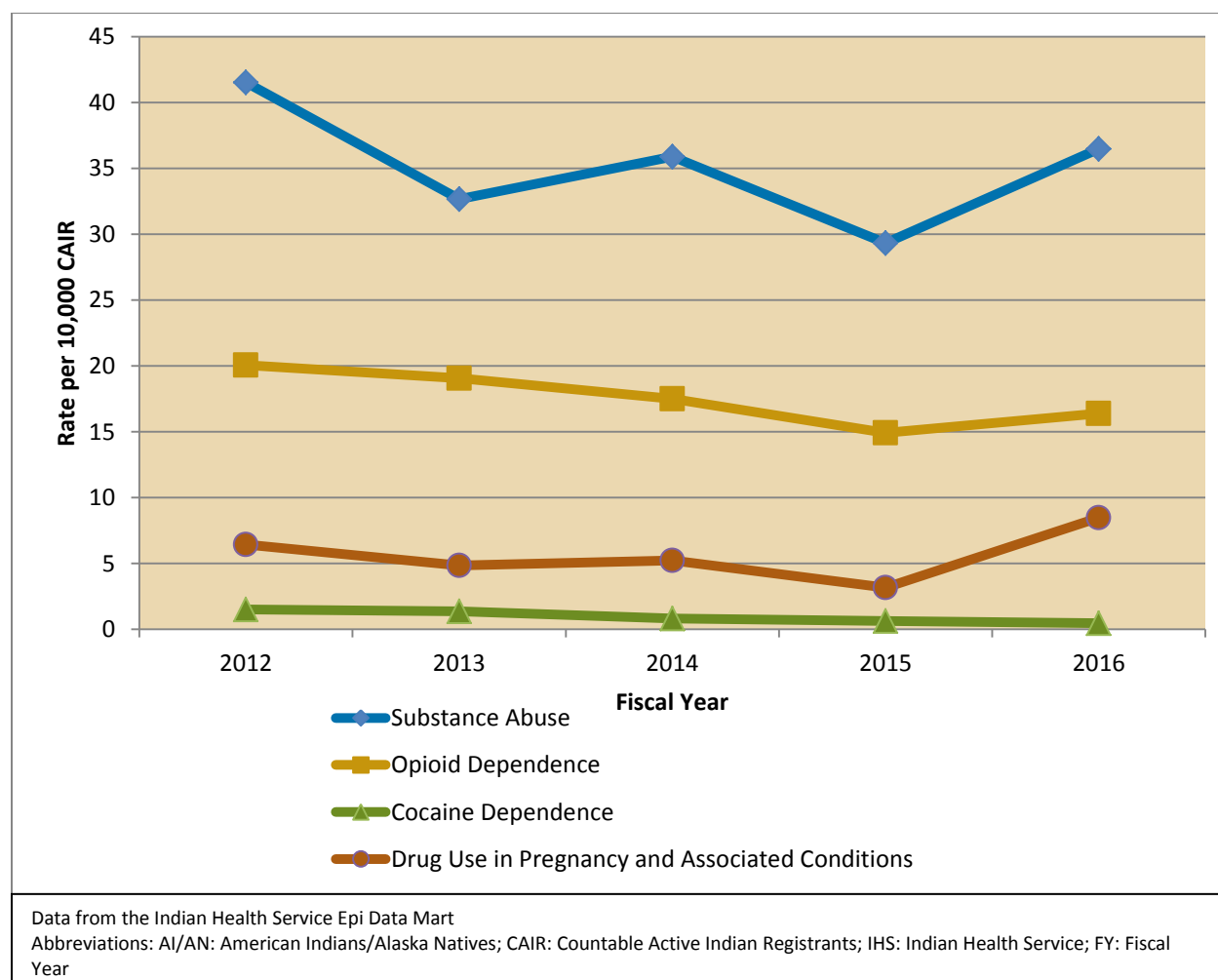
Arizona

Table 10 and Figure 8 show the number and prevalence of substance abuse hospitalizations in Arizona. Of the indicators included in this report, *all substance abuse* was the one most frequently observed among AI/AN patients seeking care in Arizona between 2012 and 2016, followed by *other opioid poisoning, drug use in pregnancy and associated conditions, benzodiazepine poisoning, opioid dependence, and amphetamine poisoning.* The prevalence of *all substance abuse, opioid dependence, amphetamine poisoning,* and *drug use in pregnancy and associated conditions* exhibited an increasing trend, whereas *other opioid poisoning* remained fairly steady, and the prevalence of *benzodiazepine poisoning* decreased over time.

Table 10. Number and Prevalence of Hospitalizations Attributable to Substance Use disorders among AI/AN in Arizona, 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE (%) OF HOSPITALIZATIONS
SUBSTANCE ABUSE INDICATORS		
All Substance Abuse		
2012	136	0.49
2013	132	0.48
2014	219	0.71
2015	195	0.70
2016	215	0.76
Opioid Dependence		
2012	*	*
2013	9	0.03
2014	7	0.02
2015	19	0.07
2016	28	0.10
Cocaine Dependence		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	*	*
Heroin Poisoning		
2012	*	*
2013	8	0.03
2014	*	*
2015	7	0.03
2016	*	*
Cocaine Poisoning		
2012	*	*
2013	6	0.02
2014	*	*
2015	0	0
2016	*	*

Other Opioid Poisoning		
2012	28	0.10
2013	30	0.11
2014	35	0.11
2015	33	0.12
2016	28	0.10
Benzodiazepine Poisoning		
2012	17	0.06
2013	14	0.05
2014	13	0.04
2015	13	0.04
2016	13	0.04
Amphetamine Poisoning		
2012	7	0.03
2013	15	0.05
2014	10	0.03
2015	15	0.05
2016	16	0.06
Drug Use in Pregnancy and Associated Conditions		
2012	6	0.02
2013	*	*
2014	9	0.03
2015	23	0.08
2016	47	0.17
Data from Arizona Department of Health Services; Data suppressed due to low counts (n<6) Abbreviations: AI/AN: American Indians/Alaska Natives		

Figure 8. Prevalence of Hospitalizations among AI/AN in Arizona by Substance Use Disorder Indicator, 2012-2016

Data from Arizona Department of Health Services, Bureau of Public Health Statistics
Abbreviations: AI/AN: American Indians/Alaska Natives

Nevada

Table 11 and Figure 9 show the number and prevalence of substance abuse hospitalizations in Nevada. Of the indicators included in this report, *all substance abuse* was most frequently observed among AI/AN patients seeking care in Nevada between 2012 and 2016, followed by *opioid dependence* and *benzodiazepine poisoning*. The prevalence of *all substance abuse* was greater in 2014 than in the years preceding and following, thereby demonstrating a unimodal distribution, and the prevalence of *opioid dependence* and *benzodiazepine poisoning* only exceeded zero or the level of suppression in 2014 and 2015 and 2014 and 2016, respectively.
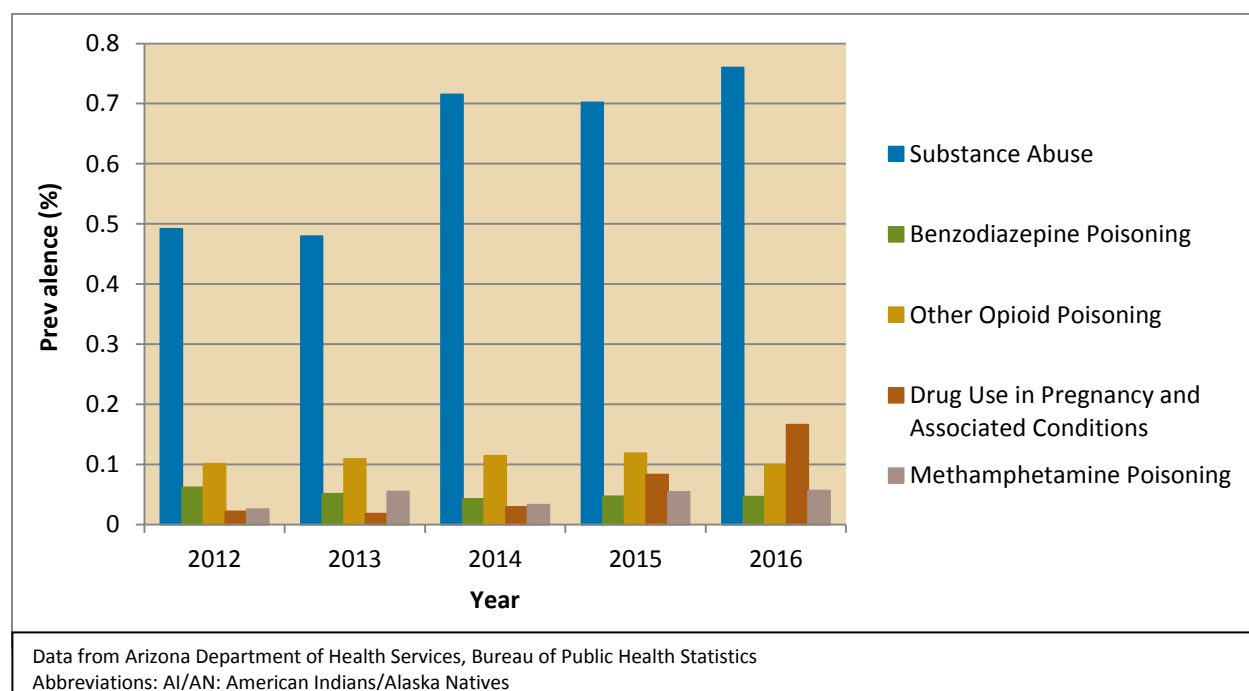
Table 11. Number and Prevalence of Hospitalizations Attributable to Substance Use disorders among AI/AN in Nevada, 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE (%) OF HOSPITALIZATIONS
SUBSTANCE ABUSE INDICATORS		
All Substance Abuse		
2012	12	0.54
2013	51	1.21
2014	63	1.30
2015	32	1.05
2016	24	0.79
Opioid Dependence		
2012	0	0
2013	*	*
2014	14	0.29
2015	10	0.33
2016	*	*
Cocaine Dependence		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	0	0
Heroin Poisoning		
2012	0	0
2013	*	*
2014	0	0
2015	0	0
2016	*	*
Cocaine Poisoning		
2012	*	*
2013	0	0
2014	0	0
2015	0	0
2016	0	0
Other Opioid Poisoning		
2012	*	*
2013	*	*

2014	*	*
2015	*	*
2016	0	0
Benzodiazepine Poisoning		
2012	*	*
2013	*	*
2014	7	0.14
2015	*	*
2016	7	0.23
Amphetamine Poisoning		
2012	0	0
2013	*	*
2014	*	*
2015	*	*
2016	*	*
Drug Use in Pregnancy and Associated Conditions		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	*	*

Data from Nevada Division of Public and Behavioral Health, State Biostatistician
Abbreviations: AI/AN: American Indians/Alaska Natives

Figure 9. Prevalence of Substance Use Disorder Hospitalizations among AI/AN in Nevada, 2012-2016

Data from Nevada Division of Public and Behavioral Health, State Biostatistician
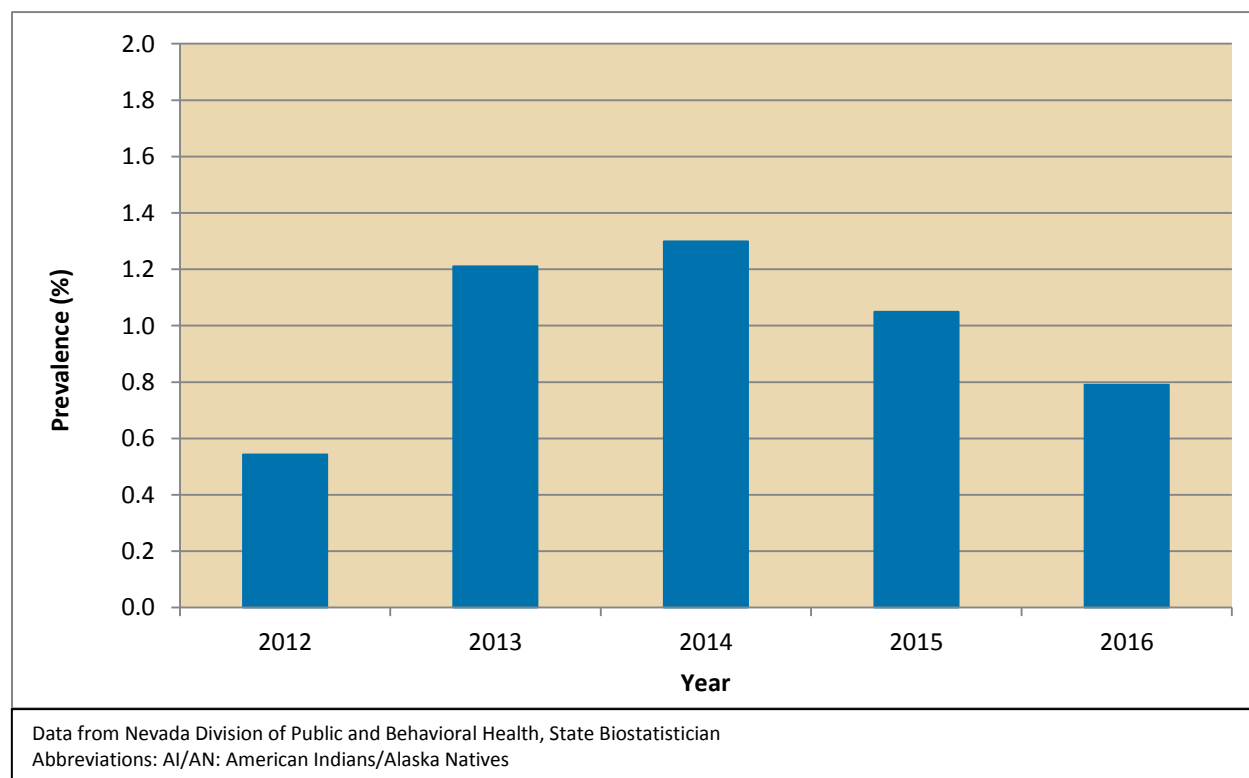Abbreviations: AI/AN: American Indians/Alaska Natives

Utah

Table 11 and Figure 9 show the number and prevalence of substance abuse hospitalizations in Utah. Of the indicators included in this report, *all substance abuse* was the one most frequently observed among AI/AN patients seeking care in Utah between 2012 and 2016, followed by *opioid dependence.* The prevalence of *all substance abuse* and *opioid dependence* exhibited an increasing trend.

Table 12. Number and Prevalence of Hospitalizations Attributable to Substance Use disorders among AI/AN in Utah, 2012-2016

INDICATOR (YEAR)	NUMBER OF HOSPITALIZATIONS	PREVALENCE (%) OF HOSPITALIZATIONS
SUBSTANCE ABUSE INDICATORS		
All Substance Abuse		
2012	*	*
2013	8	0.65
2014	*	*
2015	11	0.63
2016	39	1.17
Opioid Dependence		
2012	0	0
2013	*	*
2014	0	0
2015	*	*
2016	10	0.30
Cocaine Dependence		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	*	*
Heroin Poisoning		
2012	0	0
2013	*	*
2014	0	0
2015	0	0
2016	*	*
Cocaine Poisoning		
2012	*	*
2013	0	0
2014	0	0
2015	*	*
2016	0	0
Other Opioid Poisoning		
2012	*	*
2013	*	*
2014	0	0
2015	*	*
2016	0	0

Benzodiazepine Poisoning		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	*	*
Amphetamine Poisoning		
2012	0	0
2013	0	0
2014	*	*
2015	0	0
2016	*	*
Drug Use in Pregnancy and Associated Conditions		
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	0	0
Data from Utah Department of Health, Bureau of Epidemiology, State Biostatistician Abbreviations: AI/AN: American Indians/Alaska Natives		

Figure 10. Prevalence of Hospitalizations Attributable to Substance Abuse among AI/AN in Utah, 2012-2016

Data from Utah Department of Health, Bureau of Epidemiology, State Biostatistician
Abbreviations: AI/AN: American Indians/Alaska Natives

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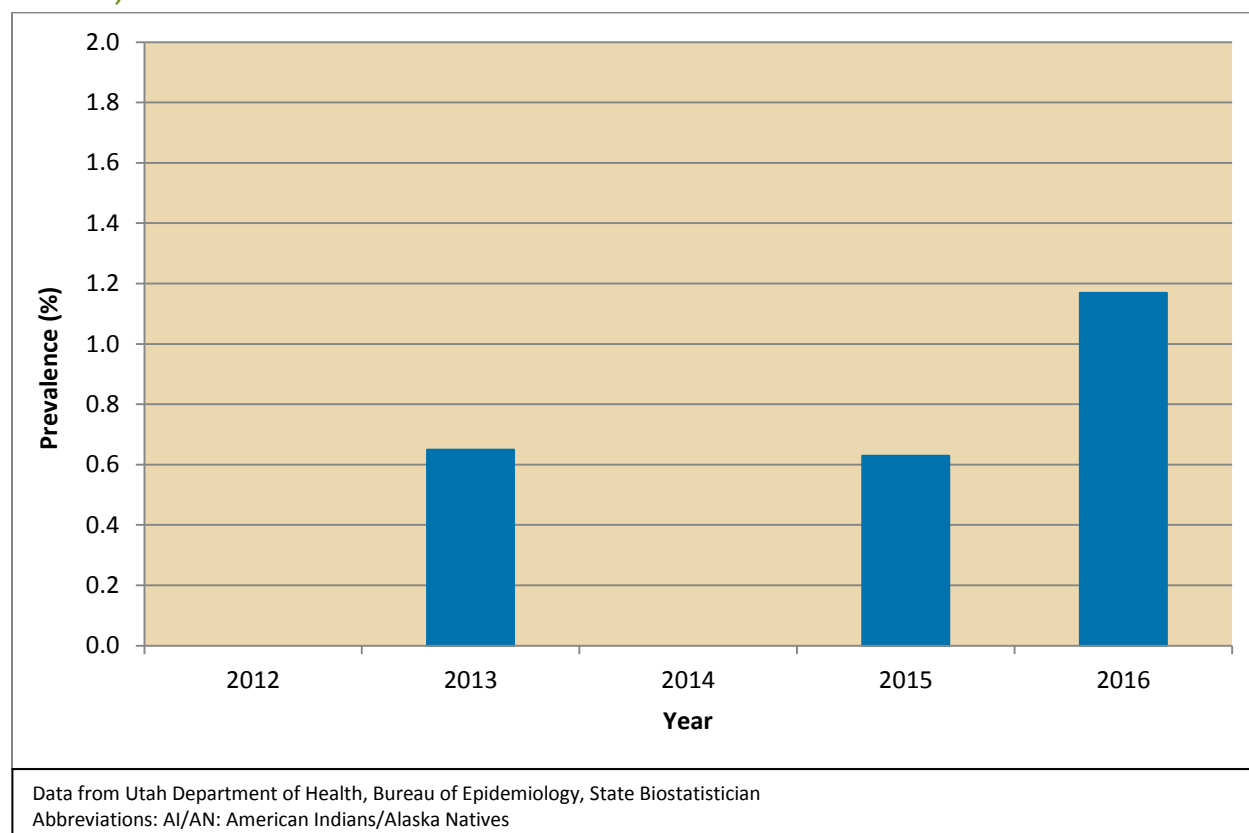
ACTION ITEMS

Below are points of action specifically geared toward individuals, tribal health care providers, tribal leaders, and researchers working in tribal communities to lessen the burden of behavioral health and substance use disorders. These action items are mostly specific to disorders that have high rates or show disparities among American Indians in Arizona, Nevada, and Utah; however, many action items may apply to several or all behavioral health and substance use disorders in general.

Individuals

Individuals can help reduce the burden of behavioral health and substance use disorders in their communities by recognizing warning signs, seeking care early, and following their treatment plan. Below are some specific actions individuals can take to reduce the burden of behavioral health and substance use disorders in their communities:

- Learn to be aware of common signs of behavioral health and substance use disorders and watch for these in yourself and others around you
- See a healthcare practitioner if you exhibit these symptoms
- If you have been diagnosed with a behavioral health or substance use disorder, regularly take your medication and stay in contact with your healthcare provider

Tribal Leaders

Tribal leaders can help reduce the burden of behavioral health and substance use disorders through enacting and enforcing codes that allow better monitoring of these conditions and protect the confidentiality of those affected. Below are some specific actions tribal leaders can take to reduce the burden of behavioral health and substance use disorders in their communities:

- Develop tribal codes that protect confidentiality of people with behavioral health or substance use disorders
- Implement and engage in community-grounded and culturally appropriate behavioral health and substance abuse programs

Tribal Health Care Providers

Tribal health care providers can help reduce the burden of behavioral health and substance use disorders by ensuring that prevention and treatment services are widely and readily available. Below are some specific actions tribal health care providers can take to reduce the burden of behavioral health and substance use disorders in their communities:

- Improve patient follow-up to ensure medication compliance
- Work toward complete integration of the treatment of substance use and behavioral health disorders
- Practice with methods used within Tribal communities to show respect for and understanding of the cultural differences that may be present

Non-Tribal Public Health Professionals

Non-tribal public health professionals can help reduce the burden of behavioral health and substance use disorders in tribal communities by assisting tribes with disease reporting and improving race/ethnicity reporting. Below are some specific actions tribal researchers can take to reduce behavioral health and substance use disorders in AI/AN communities:

- Work to improve AI/AN surveillance data with tribes, the Indian Health Service, and Tribal Epidemiology Centers.
- Work with tribes, the Indian Health Service, and Tribal Epidemiology Centers to conduct data quality checks for race/ethnicity data to reduce misclassification.

TECHNICAL NOTES

Delphi Analysis of CSTE Indicators

In 2015, the CSTE established a substance abuse and behavioral health indicator workgroup in order to establish a set of indicators for the use of local and state health departments.[4] This group assessed over 50 indicators via three rounds of Delphi prioritization, ultimately recommending 18 indicators present in seven existing data systems. While these indicators are currently undergoing pilot testing, the available literature suggests that Tribal public health is not currently involved in this pilot testing. Furthermore, no Tribal representatives are listed as being involved in the indicator development process. As such, our analysis was conducted to evaluate the feasibility and applicability of utilizing the recommended CSTE indicators to assess substance abuse and behavioral health in the Indian Health Service Phoenix and Tucson Service Areas.

To perform this analysis, we recruited a panel of 43 experts in the fields of behavioral health/substance abuse and Tribal epidemiology. We then conducted a two-round Delphi survey including questions on which the importance of each of the CSTE's recommended indicators was rated for each of the participant's community and free response questions on which indicators could be modified or new indicators could be suggested. Measures of central tendency and dispersion were calculated for each of the indicators, and only those with a mean ≥ 4, median ≥ 4, and standard deviation ≤ 1 moved on to the subsequent round. A total of 13 indicators were selected using the Delphi methodology. Of these, only the following nine indicators were included in this report due to a lack of data availability: adult binge drinking, youth binge drinking, liver disease and cirrhosis mortality, drug overdose mortality, drug hospitalizations, suicide rate, behavioral health hospitalizations (with the addition of PTSD), youth suicide attempts, and drug use in pregnancy and associated conditions.

BRFSS and YRBSS

The BRFSS is a national phone-based survey administered each year by states and territories in conjunction with the Centers for Disease Control and Prevention (CDC). It assesses health risk behaviors, preventive health practices, and healthcare access, primarily related to the areas of chronic disease and injuries among adults. The YRBSS, on the other hand, is a class-based survey assessing priority health risk behavior, including physical inactivity, dietary behaviors, the prevalence of obesity, and asthma among students in grades 9–12.[11] These surveys have several limitations. One limitation of the BRFSS and YRBSS is that they are phone-based; this may potentially exclude AI/AN, as data from the 2000 census suggested that this population may be less likely to have a home telephone.[12] Additional limitations include a potential recall bias (participants may not remember information accurately) and social desirability bias (participants may not answer truthfully, especially if the question is sensitive in nature). The way that a question is worded may also impact the way that it is interpreted.

One limitation of the BRFSS and YRBSS observed in this surveillance report was the presence of insufficient sample sizes. For example, adult binge drinking data could not be obtained from the BRFSS for Arizona or Utah in 2012-2014. No adult binge drinking data could be obtained for Nevada in the time period under study. For the YRBSS, youth binge drinking and youth suicide attempt data could only be

obtained for Arizona in 2015. However, data were available for these indicators in neither Utah nor Nevada during the time period under study.

NSDUH

All indicators derived from NSDUH data were excluded from this analysis, as data could not be obtained with sufficient granularity to examine only AI/AN at the state-level.

Hospital Discharge Data

Hospitalization data were derived using discharge data obtained from Arizona, Nevada, and Utah. Patient encounter data for facilities in the IHS Phoenix Service Area were obtained from the Epidemiology Data Mart, which contains patient registration and encounter data that has been processed in the National Data Warehouse. The three states under study collect hospital discharge records for inpatient hospitalizations from all licensed hospitals. The data used to generate this report have several limitations. The numbers and rates of hospitalizations were calculated using administrative hospital discharge data. As such, these data were limited to basic demographic and diagnostic information. Because these data were collected from numerous facilities throughout the IHS Phoenix Service Area, Arizona, Nevada, and Utah, there may be considerable variability in data quality, including the presence of missing or unknown variables. This may be particularly important for race/ethnicity variables, which may be collected based upon visual inspection rather than patient report, resulting in misclassification; furthermore, even if these data are collected accurately, they may go unrecorded on the chart or be inconsistently coded. With the exception of the IHS dataset, the datasets utilized in this report were based on visits or hospitalizations instead of individual patients; as such, we were not able to identify unique patients or which visit was the first for a given condition.[13,14]

Mortality Data

Mortality data were obtained from the Arizona Bureau of Vital Records, Nevada Office of Vital Statistics, Mortality, Utah Office of Vital Records and Statistics, and CDC Wide-ranging Online Data for Epidemiologic Research. These data also have some limitations. Between-county differences in causes of death could reflect a difference in the death reporting practices used by local physicians, coroners, or medical examiners. Also, death records provide insufficient information on factors contributing to death (i.e., the health status of an individual prior to death), and cause of death may be coded inconsistently. Race/ethnicity reporting may also be inconsistent because it is reported by someone other than the decedent, thereby exhibiting limitations similar to hospitalization data.[15]

Data Analysis

For the discharge data, ICD-9 and ICD-10 codes for behavioral health and substance use disorders were identified based upon those utilized by CSTE, with codes translated between the two ICD versions using the Nextgen Healthcare online tool when necessary.[4,16] Frequency distributions were generated for all hospital discharge data and plotted when obtained at the state-level to examine the prevalence of the behavioral health and substance abuse indicators under study herein. For IHS data, rates were calculated and plotted. Mortality rates were compared between states and across time. BRFSS and

YRBSS data were compared over time or by race, depending on data availability. All analyses were performed using SAS 9.4.

Data Barriers

There are several barriers that are important to this report; as such, any comparisons of data from the IHS, Arizona, Nevada, and Utah should be completed with care. For the Arizona data, it was not possible to extract cases only occurring in the IHS Phoenix Service Area, so the data from the IHS Navajo Service Area is included. The data in this report is not directly comparable to the state-reported and nationally-reported counts and rates for AI/ANs because Hispanic AI/ANs are included as AI/ANs in this report. In other reports, Hispanic AI/ANs are classified as Hispanic. This primarily affects the Arizona AI/AN counts and rates. It is known that race/ethnicity, particularly among AI/AN, is often misclassified or AI/AN are considered a different racial/ethnic group. This race/ethnicity misclassification likely results in underreporting of the number of cases among AI/AN. The lower number of cases would then lower the rate of behavioral health and substance use disorders observed among AI/AN. At the time of writing, none of the surveillance systems had formally investigated misclassification of race/ethnicity among AI/AN. Disease cases with a race classified as unknown, missing, other, or unspecified multiple race were considered non-AI/AN in this report. Another potential limitation is the difference in the way years are reported in IHS and state-level discharge data; while IHS reports data based on the fiscal year, the state-level data is reported based on the calendar year. Finally, bear in mind that this report only captures reported cases, and the actual community rates are suspected to be higher.

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GLOSSARY

Alaska Native – a member or descendant of indigenous peoples in Alaska.

American Indian – a member or descendant of indigenous people in the United States; this term is generally used for indigenous peoples who are members of tribes in all states except Alaska and Hawaii.

Count – the number of disease, events, or other health-related occurrences.

Countable Active Indian Registrants – American Indian and Alaska Native (AI/AN) registrants who have had a direct or contract inpatient, ambulatory, or dental encounter with the health system during the last three years.

Data – items of information expressed as measurements or statistics used to learn more about a disease or risk factor. Data are used for calculations, support of evidence, assessments, and often for decision making.

Ethnicity – relating to cultural factors such as a shared creation narrative, ancestry, language, and beliefs. A social group characterized by ethnic affiliation or distinctiveness. Ethnicity is largely self-identified.

Indian Health Service (IHS) – U.S. Department for Health and Human Services funded agency responsible for providing health services to American Indians and Alaska Natives. The IHS provides health services for approximately 1.9 million American Indians and Alaska Natives who belong to 566 federally recognized Tribes, state recognized Tribes, and California Indians in 35 states. The IHS is divided into 12 geographic "Areas" of the United States: Alaska, Albuquerque, Aberdeen, Bemidji, Billings, California, Nashville, Navajo, Oklahoma, Phoenix, Portland, and Tucson.

Misclassification – the incorrect assignment of a person, value, or item into a grouping which it should not be assigned.

Phoenix Service Area – the Phoenix Service Area is one of 12 geographic "Areas" within the Indian Health Service (IHS). The Phoenix Service Area serves the majority of its tristate "Area" in Arizona, Nevada, and Utah.

Prevalence – the proportion of a population that is found to have a specified condition. This measure is often presented as a percentage, a fraction, or the number of cases per 10,000 or 100,000 people.

$$Prevalence = \frac{\text{Number of new and existing cases in specified period}}{\text{Population during the same time period}} \times 10^n$$

Race – a social construct created to categorize human beings into broad and generic groupings that are self-identified.

Rate – a measure of how fast a disease is occurring in the population. Rate is measured by the following formula:

$$Rate = \frac{\text{Number of events in specified period}}{\text{Total population during the same time period}} \times 10^{n}$$

Standard population – A set population that is used to standardize age-adjusted rates so rates in different populations are comparable.

Statistics – the act of collecting, summarizing, and analyzing data.

Surveillance – systematic (orderly) and continuous collection, analysis and interpretation of data, along with the timely dissemination (distribution) of the results to those who have the right to know so that action can be taken.

ITCA Tribal Epidemiology Center

STATISTICAL NOTES TABLE

MEASUREMENT NAME	TECHNICAL DEFINITION OF MEASUREMENT	MEASUREMENT PUBLIC HEALTH USE	MEASUREMENT FORMULAS
Crude rate	The simplest rate for a population over a specific time period. The number of new cases of disease that occurred during a specific time period in a population at risk without accounting for the differences in the composition of the population.	A crude rate includes time so this is a measure of disease risk for the population.	$\left(\dfrac{\text{Number of cases during a specific time period}}{\text{American Indian population during the same time period}} \times 100{,}000 \right)$
Stratified Rate	A crude rate calculated for a specific subgroup or stratum of people within a population. The stratified rate includes the number of new cases of disease that occurred during a specific time period in a population at risk for each subgroup or stratum of interest without accounting for other differences in the composition of the population.	A stratified rate includes time, so this is a measure of disease risk for a specific subgroup in the population (age, race-ethnicity, gender).	$\left(\dfrac{\text{Number of cases within a subgroup during a specific time period}}{\text{American Indian population within a subgroup during the same time period}} \times 100{,}000 \right)$
Age-adjusted Rate	A direct age-adjusted rate is a rate that is calculated to "control" for any differences in the age structure of a population like the US population and American Indian/Alaska Native population.	An age-adjusted rate includes time so this is a measure of disease risk for the population.	Crude Rate x Standard Population = Expected Cases $\left(\dfrac{\text{Total Expected Cases}}{\text{Total Standard Population}} \times 100{,}000 \right)$
Count/number	The number of times an event is observed	Used to calculated the number of disease events or health-related occurrences	Σ Observed Events
Mortality Rate	A health statistic that corresponds to the total number of deaths per unit time in a population divided by the population's number	A mortality rate includes time so this is a measure of the risk of death within a population.	$\left(\dfrac{\text{Number of deaths during a specific time period}}{\text{American Indian population during the same time period}} \times 100{,}000 \right)$
Suicide rate	A health statistic that corresponds to the total number of suicides per unit time in a population divided by the population's number	A mortality rate includes time so this is a measure of the risk of suicide within a population.	$\left(\dfrac{\text{Number of suicides during a specific time period}}{\text{American Indian population during the same time period}} \times 100{,}000 \right)$
Prevalence	The proportion of a population with a disease or a particular condition at a specified point in time or over a specified period of time	A prevalence is the quantification of the presence of a disease or condition in a population	$\dfrac{\text{Number of cases during a specified time period}}{\text{American Indian population during the same time period}}$