

# REPORT OF THE Navajo Epidemiology Center

February 29, 2020

By David Foley, MSPH, Epidemiologist



## Navajo Nation Mortality Report Deaths: 2015 - 2017

The purpose of this Mortality Report is to quantify the leading causes of death among Navajos living within the borders of the Navajo Nation and its border towns. Because this is the second iteration of a Navajo mortality report, data for many of the leading causes of death can be compared across time. This report also highlights key mortality differences between genders and between age group. Age can influence mortality rates, therefore these rates have also been adjusted by age (a further explanation of age adjustment can be found in the technical notes at the end of this report). Age-adjusted rates allow comparisons between the Navajo Nation and other geographical locations including the U.S., Arizona, New Mexico, and Utah. Tracking these rates can help health programs evaluate their progress in reducing the burden of these diseases and inform decision makers in the allocation of resources.

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# Navajo Nation Mortality Report

## Deaths: 2015-2017

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### Abstract

*Objectives*—This report presents final 2015-2017 data on Navajo deaths, death rates, life expectancy, years of potential life lost, and trends by age, sex and Navajo Agency.

*Methods*—Information reported on death certificates is presented in descriptive tables, figures and charts. Data were contributed by Arizona, New Mexico, and Utah vital records offices. Causes of death are processed in accordance with the *International Classification of Diseases, 10<sup>th</sup> Revision*. Population numbers are interstitial estimates calculated based on tables produced by the U.S. Census Bureau.

*Results*—From 2015-2017 there were a total of 5,231 Navajo deaths reported. The age-adjusted death rate was 1027.8 per 100,000. This is an increase of 31% from the 2006-2009 rate. Life expectancy at birth was 71.4 years. Average age at death for males was 57.3 years, and for females was 66.4 years. This is an increase of 2.0% for males and a decrease of 0.2% for females. There was one change in the leading 15 causes of death from the 2006-2009 to the 2015-2017 study years. Hypertensive disease dropped out of the leading causes and Other diseases of the respiratory system principally affecting the interstitium joined the leading 15 causes. The rank order of the leading 5 causes of death was unchanged but there were a few changes for causes 6-15: Cerebrovascular disease (stroke) increased from the 8<sup>th</sup> leading cause to the 6<sup>th</sup> leading cause, Dementia increased from 11<sup>th</sup> to 9<sup>th</sup>, Assault increased from 12<sup>th</sup> to 11<sup>th</sup>. Males had significantly higher age-adjusted mortality for Intentional self-harm (suicide), Assault,

Alcohol dependence, and Unintentional injuries. The Eastern Agency had the highest age-adjusted mortality rates among the 5 Navajo Agencies.

*Conclusions*—The age-adjusted death rates have increased over the previous study years. This increase may be due to improved collection of Navajo death data. Because of increases in Navajo deaths found, the inclusion of Utah and additional border town populations, the results in this report may not always be comparable to the 2006-2009 Navajo Mortality report. Continued emphasis should be placed on addressing external injury deaths, the influence of alcohol, and Diabetes.

## Highlights

### Mortality

- There was an average of 1,743.7 deaths per year among Navajos living on the Navajo Nation and its border towns.
- The age-adjusted death rate was 1027.8 per 100,000 (Females: 877.3, Males: 1191.3)
- Life expectancy at birth was 71.4 years (Females: 77.2 years, Males: 66.2)
- The Leading 15 Causes of death were
  1. Unintentional Injuries
  2. Diseases of heart
  3. Malignant Neoplasms
  4. Diabetes
  5. Chronic Liver Disease & Cirrhosis
  6. Cerebrovascular diseases (stroke)
  7. Influenza & Pneumonia
  8. Intentional self-harm (suicide)
  9. Dementia
  10. Alcohol Dependence
  11. Assault
  12. Other diseases of the respiratory principally affecting the interstitium

13. Septicemia
14. Renal Failure
15. Chronic lower respiratory disease

## Trends

- The age-adjusted death rate increased by 31% from 2006-2009 (Females: 27%, Males: 36%)
- The 30-39 year old age group had the largest increase in mortality rate: 107%
- Among the 15 leading causes of death the proportion of deaths to the following causes has decreased (absolute percentage change in parenthesis): Unintentional Injuries (-2.0%), Malignant neoplasms (-1.2%), Influenza and pneumonia (-1.7%), Intentional self-harm (-0.1%), Septicemia (-0.4), Renal Failure (-0.5)
- Among the 15 leading causes of death the proportion of deaths to the following all had an absolute percentage increase of 0.8%: Diabetes, Chronic liver disease and cirrhosis, and Alcohol dependence
- Among females the greatest changes in cause of death were for Influenza and pneumonia (-1.9%) and Cerebrovascular disease (stroke: 1.4%)
- Among males the greatest changes in cause of death were for Unintentional injuries (-2.8%) and Chronic liver disease and cirrhosis (2.4%)

## Introduction

The purpose of this mortality report is to quantify the leading causes of death among Navajos living within the borders of the Navajo Nation and its border towns. Because this is the second iteration of a Navajo mortality report<sup>i</sup>, data for many of the leading causes of death can be compared across time. This report also highlights key mortality differences between genders and between age group. Age can influence mortality rates, therefore these rates have also been adjusted by age (a further explanation of age adjustment can be found in the technical notes at the end of this report). Age-adjusted rates allow comparisons between the Navajo Nation and other geographical locations including the U.S., Arizona, New Mexico, and Utah. Tracking these rates can help health programs evaluate their progress in reducing the burden of these diseases and inform decision makers in the allocation of resources.

## Methods

The Navajo Epidemiology Center has data sharing agreements with all 3 states that overlap the Navajo Nation. Each State provided death record data for all Navajo people with a place of residence found on the Navajo Nation or within one of its border towns. <sup>ii</sup> Three years of data were compiled to smooth the data and allow for stable rates since the count for many rare causes of death are low on the Navajo Nation. Causes of death were classified according to the *International Classification of Diseases, 10<sup>th</sup> Revision* and reported by underlying cause of death in similar fashion to the National Vital Statistics Reports Volume 68, Number 9. Deaths were also organized according to the National Center for Health Statistics 113 select causes of death. Deaths were organized by 10 year age groups and age-adjusted rates were calculated using the 2000 U.S. population as the standard population. Some deaths that are of unique importance to the Navajo Nation but not at the State and National level are also included in this report (e.g. Cold Exposure, Alcohol Dependence, Animal Rider).

Population data for 2015-2017 were estimated utilizing 2000 and 2010 U.S. Census data found in Summary File 2 tables and the American Community Survey (ACS) 5-year estimates. People were included in these tables if they resided within Navajo Chapters or border towns if they identified as being Navajo alone or in combination. Percent change in population was calculated for each single year age group for the period between 2000 and 2010. This percent change was then applied uniformly over the 10 year period, and then applied for the years 2011 through 2017. Percent change in population between 2010 and 2015 ACS for single year age groups was applied for 2016 and 2017. The single year population average between the two sources was then used for the denominator. Chapters and border towns were organized into their respective Navajo agencies. The 3 year population total for the Navajo Nation was 607,343 (202,447 per year). Tables with population by agency and age group are included in the *Technical Notes* section of this report.

## Results & Discussion

### Deaths and death rates: Leading Causes, by Age Group

There were 5,231 Navajo Nation deaths from 2015-2017, which is 1,743 deaths per year. In the previous study years there were 997.8 deaths per year. The current report includes Utah while the previous study did not. There were only 40 deaths per year in the Utah portion of the Navajo Nation so this cannot explain alone the large increase in death numbers. Other contributing

factors may include the addition of Flagstaff (AZ), Hopi Nation (AZ), Aztec (NM), Grants (NM), Kirtland (NM), Socorro (NM), Tse Bonito (NM), and Zuni (NM) as border towns (152 deaths), and better identification of Navajo deaths by the state Vital Records offices. The crude death rate for 2015-2017 was 861.3 per 100,000 which is 51% higher than 2006-2009 (Table 1). It is possible that there has been a real spike in mortality between the 2006-2009 study and the present study, that cannot be explained simply through data collection changes. The largest single increase in crude death rate was for 30-39 years (107%).

The age-adjusted death rate for 2015-2017 was 1027.8 per 100,000 which was 31% higher than the death rate for 2006-2009. Age is a major factor for disease and mortality rates (e.g. older persons are much more likely to die due to chronic disease issues such as heart disease, cancer, Alzheimer's). For purposes of comparing the same population to itself over time, or different populations to each other it becomes necessary to adjust rates for age in the event that the populations being compared have a different underlying age structure. According to the NCHS, "Age-adjusted death rates should be viewed as relative indexes rather than as actual measures of mortality risk. They are constructs that show what the level of mortality would be if no changes occurred in the age composition of the population from year to year. Thus, age-adjusted death rates are better indicators than unadjusted (crude) death rates for examining changes in the risk of death over a period of time when the age distribution of the population is changing. Age-adjusted death rates also are better indicators of relative risk when comparing mortality across geographic areas or between sex or race subgroups of the population that have different age distributions."<sup>vi</sup>

As in the first study the leading cause of death on the Navajo Nation are Unintentional injuries. In fact there was no change in rank order for the leading 5 causes of death. Figure 1 displays the leading 15 causes of death for each study period by percent of total deaths. While Unintentional injuries are still the leading cause of death there was a 2% (absolute percent) decrease in Unintentional injury death. There was a 0.8% decrease in Malignant neoplasm (cancer). Both Diabetes and Chronic liver disease and cirrhosis increased by 0.8%. Stroke and Dementia both increased by 0.7%.

The leading 5 causes for females on the Navajo Nation remained the same, however, in 2015-2017 Diabetes moved up one spot to 4<sup>th</sup> and Chronic liver disease and cirrhosis dropped one spot to 5<sup>th</sup>. Malignant neoplasm, not Unintentional Injuries, is the leading cause of death among females. Cerebrovascular disease (stroke) had a 1.4% absolute percent increase from the first study to the current study. A comparison of rank for females can be seen in Figure 2.

The rank order for the leading 3 causes for males on the Navajo Nation was unchanged however Intentional self-harm (suicide) dropped out of the top 5 to 6<sup>th</sup> place and Chronic liver disease and cirrhosis jumped 2 ranked spots and by 2.4%. Figure 3 displays the comparison of rank for males across study periods. While Unintentional injuries remain the leading cause of death among males the absolute percent of deaths decreased by 2.8%. There was an increase of 0.9% for Alcohol Dependence.

Table 1 Percent change in crude death rate, age-adjusted death rate and 10-year age group from 2006-2009 and 2015-2017.

<b>Group</b>	<b>Percent Change</b>
<b>Crude Rate Both Genders</b>	50.6
<b>Age Adjusted Rate Both Genders</b>	30.8
<b>Crude Rate Females</b>	50.9
<b>Age Adjusted Females</b>	26.6
<b>Crude Rate Males</b>	50.9
<b>Age Adjusted Rate Males</b>	35.1
<b>&lt;10 Years</b>	23.5
<b>10 to 19 Years</b>	-14.8
<b>20 to 29 Years</b>	18.3
<b>30 to 39 Years</b>	106.7
<b>40 to 49 Years</b>	40.2
<b>50 to 59 Years</b>	55.1
<b>60 to 69 Years</b>	30.5
<b>70 to 79 Years</b>	16.6
<b>80+ Years</b>	19.7

Figure 1 Leading 15 Causes of death, both Genders from 2006-2009 and 2015-2017

Rank 2006-2009	Percent of Total deaths 2006-2009	Percent of Total deaths 2015-2017	Rank 2015-2017
1	Unintentional Injuries 18.9	Unintentional Injuries 16.9	1
2	Malignant neoplasm 12.7	Diseases of heart 12.3	2
3	Diseases of heart 12.2	Malignant neoplasm 11.5	3
4	Diabetes 5.7	Diabetes 6.5	4
5	Chronic liver disease and cirrhosis 5.6	Chronic liver disease and cirrhosis 6.4	5
6	Influenza and pneumonia 4.6	Cerebrovascular disease (stroke) 3.4	6
7	Intentional self-harm (suicide) 3.0	Influenza and pneumonia 2.9	7
8	Cerebrovascular disease (stroke) 2.7	Intentional self-harm (suicide) 2.9	8
9	Septicemia 2.3	Dementia 2.8	9
10	Other diseases of the respiratory system principally affecting the interstitium 2.2	Alcohol Dependence 2.8	10
11	Dementia 2.1	Assault 2.2	11
12	Assault 2.1	Other diseases of the respiratory system principally affecting the interstitium 1.9	12
13	Alcohol Dependence 2.0	Septicemia 1.9	13
14	Renal Failure 1.9	Renal Failure 1.4	14
15	Chronic lower respiratory disease 1.2	Chronic lower respiratory disease 1.4	15

Figure 2 Leading 15 Causes of death, Females from 2006-2009 and 2015-2017

Rank 2006-2009	Percent of Total deaths 2006-2009	Percent of Total deaths 2015-2017	Rank 2015-2017
1	Malignant neoplasm 16.1	Malignant neoplasm 14.4	1
2	Diseases of heart 11.8	Diseases of heart 11.9	2
3	Unintentional injuries 11.5	Unintentional injuries 10.6	3
4	Chronic liver disease and cirrhosis 7.6	Diabetes 6.6	4
5	Diabetes 6.1	Chronic liver disease and cirrhosis 6.2	5
6	Influenza and pneumonia 5.7	Cerebrovascular disease (stroke) 4.5	6
7	Dementia 3.7	Dementia 4.1	7
8	Septicemia 3.1	Influenza and pneumonia 3.8	8
9	Cerebrovascular disease (stroke) 3.1	Septicemia 2.5	9
10	Renal Failure 2.8	Other diseases of the respiratory system principally affecting the interstitium 1.9	10
11	Other diseases of the respiratory system principally affecting the interstitium 2.6	Chronic lower respiratory disease 1.8	11
13	Chronic lower respiratory disease 1.1	Alcohol dependence 1.6	12
13	Alzheimer's 1.1	Renal Failure 1.6	12
16	Alcohol dependence 1.0	Other liver disease 1.5	14
NA	Other liver disease Not available (NA)	Alzheimer's 1.4	15

Note: Suicide was tied for 13<sup>th</sup> in 2006-2009 but ranked 16<sup>th</sup> (1.2%) in 2015-2017

Figure 3 Leading 15 Causes of death, Males from 2006-2009 and 2015-2017

Rank 2006-2009	Percent of Total deaths 2006-2009	Percent of Total deaths 2015-2017	Rank 2015-2017
1	Unintentional injuries 24.2	Unintentional injuries 21.4	1
2	Diseases of heart 12.5	Diseases of heart 12.6	2
3	Malignant neoplasms 10.3	Malignant neoplasms 9.4	3
4	Diabetes 5.5	Chronic liver disease and cirrhosis 6.6	4
5	Intentional self-harm (suicide) 4.3	Diabetes 6.5	5
6	Chronic liver disease and cirrhosis 4.2	Intentional self-harm (suicide) 4.1	6
7	Influenza and pneumonia 3.8	Alcohol dependence 3.7	7
8	Assault 2.9	Assault 3.1	8
	Alcohol dependence 2.8	Cerebrovascular disease (stroke) 2.6	9
10	Cerebrovascular disease (stroke) 2.4	Influenza and pneumonia 2.3	10
11	Other diseases of the respiratory system principally affecting the interstitium 1.9	Dementia 1.9	11
12	Septicemia 1.6	Other diseases of the respiratory system principally affecting the interstitium 1.8	12
14	Renal Failure 1.3	Septicemia 1.4	13
14	Chronic lower respiratory disease 1.3	Renal Failure 1.3	14
16	Dementia 1.0	Chronic lower respiratory disease 1.1	15
17	Parkinson's 0.9	Parkinson's 1.1	15

Death count, percent of all deaths, crude, and age adjusted rates for the leading causes of death can be seen in Table 2. Male to female ratios were created to compare age-adjusted rates by gender. The greatest gender disparities for leading causes of death wherein males are higher than females are for suicide (5.6), Assault (4.3), Alcohol Dependence (3.5) and Unintentional injuries (2.9). The greatest disparity wherein females were higher than males was for Dementia (1.7).

Data were organized by Navajo Agency to help communities understand their burden of disease and to allow public health and government agencies to better understand how to allocate resources. The Eastern Agency had the highest age-adjusted rates for 12 of the 15 leading causes of death (Table 3). The Chinle Agency had the highest age-adjusted rates of Unintentional injury and Assault, and the Northern Agency had the highest age-adjusted rate of Cerebrovascular disease.

Unintentional injuries are the leading cause of death for ages 10-59. The leading cause of death for those less than 10 years of age are Congenital malformations. The leading 5 causes of death for each age group for both genders, females and males can be seen in Figures 4, 5, and 6 respectively. Intentional self-harm, Assault, Chronic liver disease and cirrhosis, and Alcohol dependence are leading causes of death among youth, young adults, and middle age populations. Malignant neoplasm (cancer) is the leading cause of death for those aged 60-79, and Diseases of the heart are the leading cause of death for those 80 years or older. For males, Unintentional injuries are the leading cause of death from birth through age 69. For females Malignant neoplasms become the leading cause of death by age 50-59. Age group specific rates for each of the leading causes of death by gender can be seen in Charts 1-15. Three causes of death have peak age group rates in young adulthood (Ages 30-39): Chronic liver disease and cirrhosis, Intentional self-harm, and Assault. Diabetes rates begin to spike for males at age 50-59 while females spike at ages 60-69. Influenza and pneumonia rates begins to rise for males at ages 60-69 while female rates increase at 70-79. There was not enough data to calculate Septicemia rates for males over age 69, while rates climbed and peaked for females aged 70 and older.

Table 2 Leading Causes of Death: Count, Percent of Total, Rates and Male to Female Ratio

Rank	Cause of death (ICD-10)	Number	Percent of Total deaths	Crude Rate	Age Adjusted Rate	Male to Female
1	Unintentional Injuries (V01-X59, Y85-Y86)	883	16.9	145.4	162.7	2.89
2	Diseases of heart (I00-I09, I11, I13, I20-I51)	645	12.3	106.2	132.9	1.40
3	Malignant Neoplasms (C00-C97)	600	11.5	98.8	117.9	0.94
4	Diabetes (E10-E14)	340	6.5	56.0	66.6	1.31
5	Chronic liver disease and cirrhosis (K70, K73-K74)	336	6.4	55.3	64.0	1.58
6	Cerebrovascular diseases (stroke) (I60-I69)	179	3.4	29.5	38.2	0.77
7	Influenza and pneumonia (J09-J18)	152	2.9	25.0	31.8	0.82
8	Intentional self-harm (suicide) (X60-X84, Y87.0)	152	2.9	25.0	26.4	5.62
9	Dementia	148	2.8	24.4	33.7	0.59
10	Alcohol Dependence	146	2.8	24.0	26.9	3.50
11	Assault	117	2.2	19.3	21.0	4.27
12	Other diseases of the respiratory system principally affecting the interstitium	98	1.9	16.1	21.1	1.29
13	Septicemia (A40-A41)	97	1.9	16.0	19.3	0.77
14	Renal Failure	74	1.4	12.2	15.2	1.11
15	Chronic lower respiratory disease (J40-J47)	71	1.4	11.7	15.1	0.84

Table 3 Leading Causes of Death by Agency, Age-Adjusted Rates 2015-2017

Rank	Cause of Death (ICD-10)	Chinle	Eastern	Ft. Defiance	Northern	Western
1	Unintentional Injuries (V01-X59, Y85-Y86)	200.1	182.0	123.1	166.7	155.8
2	Diseases of heart (I00-I09, I11, I13, I20-I51)	101.5	168.5	124.7	118.7	144.1
3	Malignant Neoplasms (C00-C97)	67.3	155.3	108.1	143.9	96.2
4	Diabetes (E10-E14)	91.1	102.5	45.4	68.2	41.8
5	Chronic liver disease and cirrhosis (K70, K73-K74)	35.6	104.1	58.4	75.4	31.9
6	Cerebrovascular diseases (stroke) (I60-I69)	36.0	48.6	25.3	54.5	28.2
7	Influenza and pneumonia (J09-J18)	31.4	45.8	22.4	31.6	30.9
8	Intentional self-harm (suicide) (X60-X84, Y87.0)	27.4	30.5	25.3	29.4	20.1
9	Dementia	19.6	48.3	28.9	45.4	23.9
10	Alcohol Dependence	20.1	50.9	15.7	22.7	23.7
11	Assault	22.4	21.9	20.3	20.4	20.5
12	Other diseases of the respiratory system principally affecting the interstitium	1.6	7.5	2.6	6.2	2.0
13	Septicemia (A40-A41)	11.5	27.4	15.9	21.5	18.0
14	Renal Failure	3.3	27.8	15.1	14.9	12.8
15	Chronic lower respiratory disease (J40-J47)	11.3	24.2	12.8	12.6	15.2
	All Cause	920.41	1385.98	851.77	1079.28	895.76

Figure 4 Leading 5 Causes of death by Age Group, Both Genders: Count

<10 Years	10-19 Years	20-29 Years	30-39 Years	40-49 Years	50-59 Years	60-69 Years	70-79 Years	80+
Congenital malformations: 23	Unintentional injuries: 36	Unintentional injuries: 134	Unintentional injuries: 177	Unintentional injuries: 166	Unintentional injuries: 154	Malignant neoplasms: 128	Malignant neoplasms: 153	Diseases of heart: 275
Certain conditions originating in the perinatal period: 22	Intentional self-harm (suicide): 22	Intentional self-harm (suicide): 51	Chronic liver disease and cirrhosis: 76	Chronic liver disease and cirrhosis: 93	Malignant neoplasms: 93	Diseases of heart: 96	Diseases of heart: 148	Malignant neoplasms: 168
Unintentional injuries: 22	Malignant Neoplasms: 6	Assault: 34	Intentional self-harm (suicide): 36	Alcohol dependence: 40	Chronic liver disease and cirrhosis: 80	Unintentional injuries: 90	Diabetes: 97	Dementia: 124
Assault: 5	Assault: 4	Chronic liver disease and cirrhosis: 15	Assault: 31	Malignant neoplasms: 28	Diseases of heart: 64	Diabetes: 77	Unintentional injuries: 46	Cerebrovascular disease (stroke): 102
Influenza and pneumonia: 4	All Other Causes <4	Alcohol dependence: 14	Alcohol dependence: 26	Diseases of the heart: 28	Diabetes: 54	Chronic liver disease and cirrhosis: 47	Cerebrovascular disease (stroke): 33	Diabetes: 79

Figure 5 Leading 5 Causes of death by Age Group, Females: Count

	<10 Years	10-19 Years	20-29 Years	30-39 Years	40-49 Years	50-59 Years	60-69 Years	70-79 Years	80+
Certain conditions originating in the perinatal period: 14		Unintentional injuries: 11	Unintentional injuries: 40	Unintentional injuries: 49	Chronic liver disease and cirrhosis: 40	Malignant neoplasms: 54	Malignant neoplasms: 72	Malignant neoplasms: 72	Diseases of heart: 141
Congenital malformations: 12		Intentional self-harm (suicide): 8	Intentional self-harm (suicide): 12	Chronic liver disease & cirrhosis: 25	Unintentional injuries: 35	Unintentional injuries: 31	Diseases of heart: 33	Diseases of heart: 56	Malignant neoplasms: 90
Unintentional injuries: 9	All Other Causes <4	Alcohol Dependence: 8	Alcohol dependence: 7	Malignant neoplasms: 16	Chronic liver disease and cirrhosis: 30	Chronic liver disease and cirrhosis: 22	Diabetes: 53	Dementia: 80	
Assault: 4	All Other Causes <4	Malignant neoplasms: 6	Diseases of the heart : 6	Alcohol dependence: 9	Diseases of heart: 18	Diabetes: 18	Septicemia: 15	Cerebrovascular disease (stroke): 66	
All Other Causes <4	All Other Causes <4	All Other Causes <4	Malignant neoplasms: 5	Diabetes/Influenza & pneumonia: 7	Diabetes: 17	Unintentional injuries: 14	Cerebrovascular disease (stroke): 13	Diabetes: 47	

Figure 6 Leading 5 Causes of death by Age Group, Males: Count

<10 Years	10-19 Years	20-29 Years	30-39 Years	40-49 Years	50-59 Years	60-69 Years	70-79 Years	80+
Unintentional injuries: 13	Unintentional injuries: 25	Unintentional injuries: 94	Unintentional injuries: 128	Unintentional injuries: 131	Unintentional injuries: 123	Unintentional injuries: 76	Diseases of heart: 92	Diseases of heart: 134
Congenital malformations: 11	Intentional self-harm (suicide): 14	Intentional self-harm (suicide): 39	Chronic liver disease and cirrhosis: 51	Chronic liver disease and cirrhosis: 53	Chronic liver disease and cirrhosis: 50	Diseases of heart: 63	Malignant neoplasms: 81	Malignant neoplasms: 78
Certain conditions originating in the perinatal period: 8	Malignant neoplasms: 5	Assault: 32	Intentional self-harm (suicide): 33	Alcohol dependence: 31	Diseases of heart: 46	Diabetes: 59	Diabetes: 44	Dementia: 44
All Other Causes <4	All Other Causes <4	Chronic liver disease and cirrhosis: 12	Assault: 27	Diseases of heart: 23	Malignant neoplasms: 39	Malignant neoplasms: 56	Unintentional injuries: 37	Cerebrovascular disease (stroke): 36
All Other Causes <4	All Other Causes <4	Alcohol dependence: 6	Alcohol dependence: 19	Intentional self-harm (suicide): 21	Diabetes: 37	Chronic liver disease and cirrhosis: 25	Cerebrovascular disease (stroke): 20	Diabetes: 32

Chart 1 Unintentional Injuries Rates by Age Group and Gender

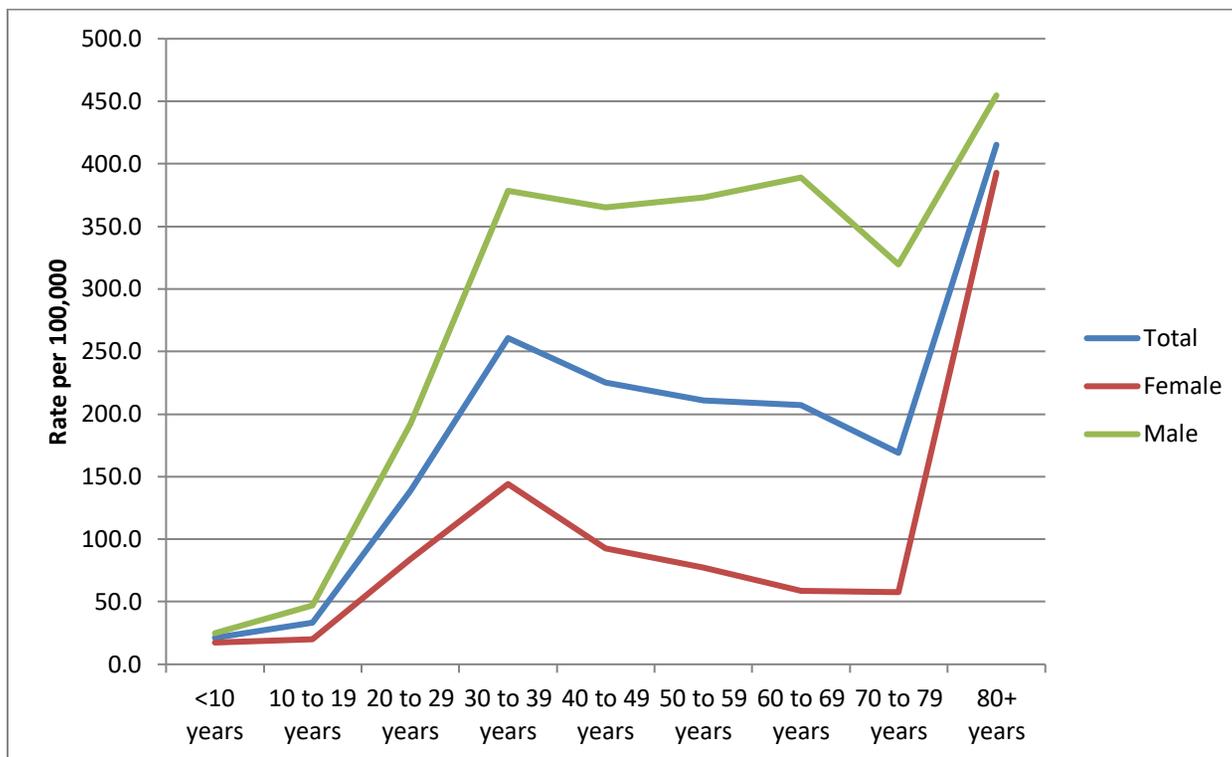


Chart 2 Diseases of the Heart Rates by Age Group and Gender

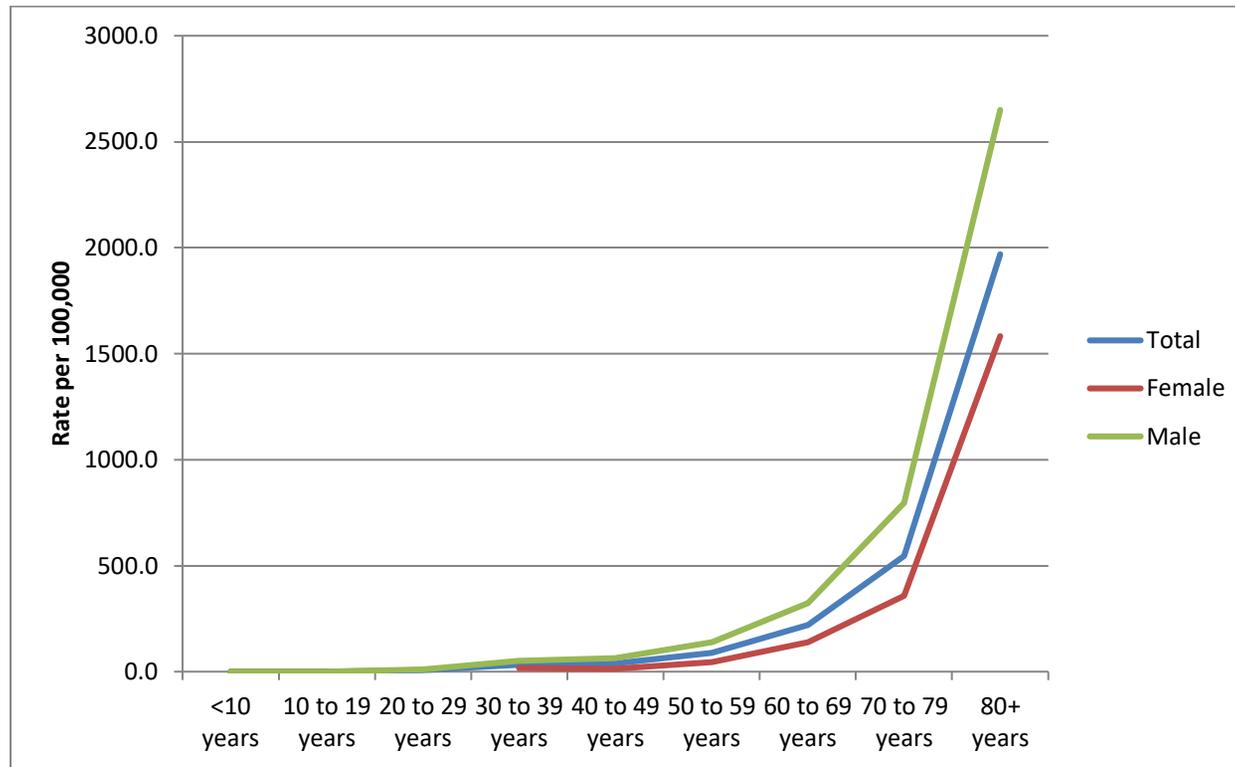


Chart 3 Malignant Neoplasm Rates by Age Group and Gender

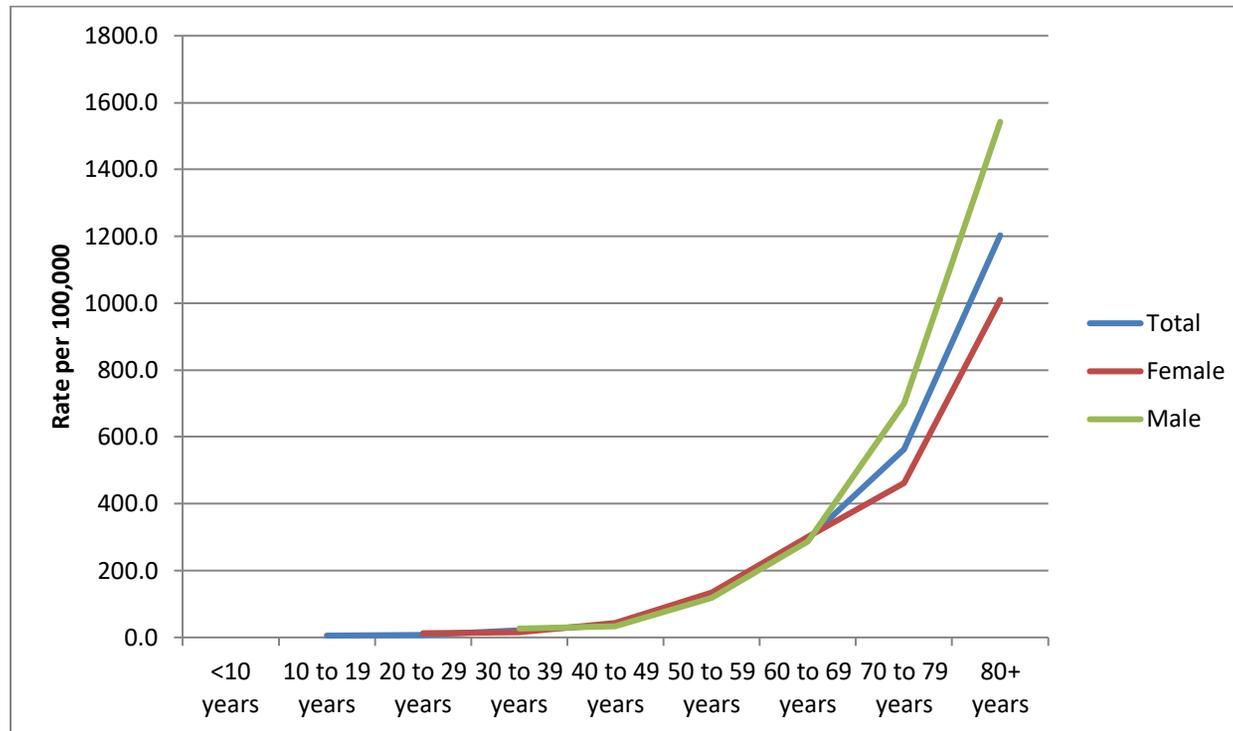


Chart 4 Diabetes Rates by Age Group and Gender

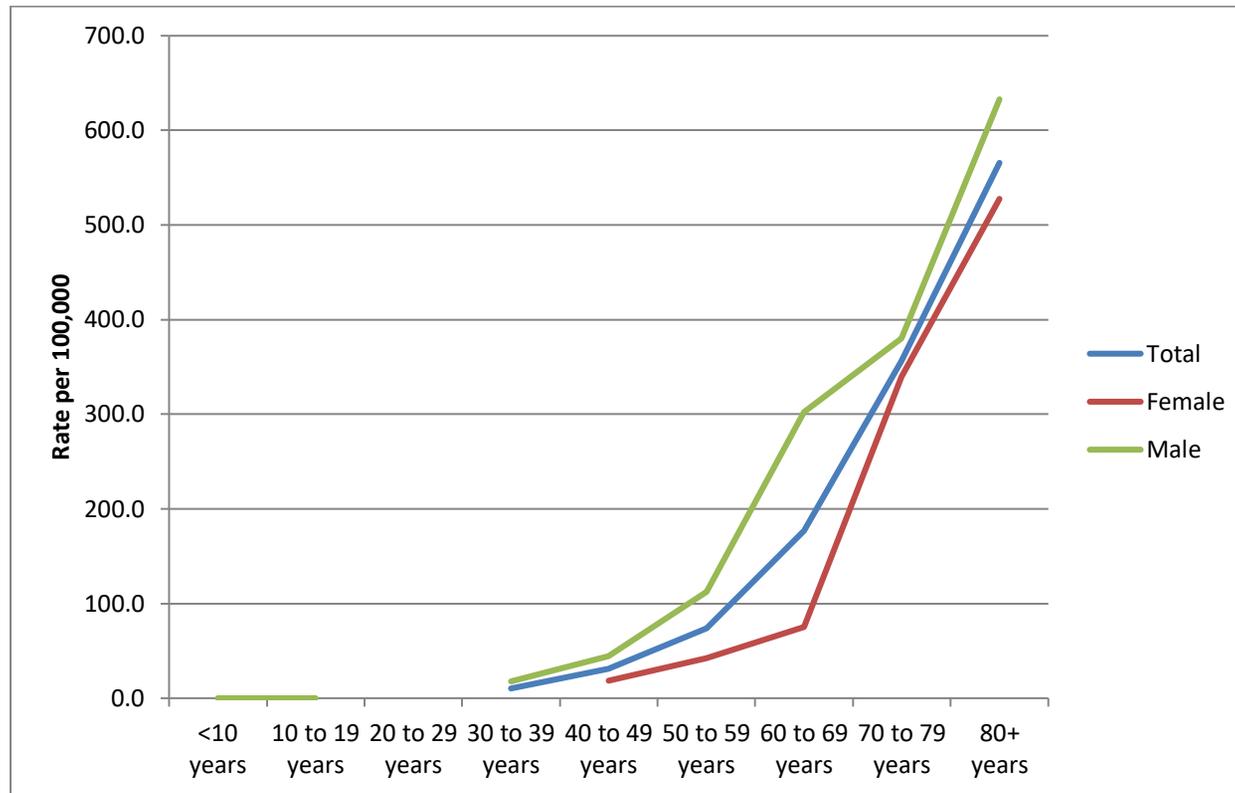


Chart 5 Chronic Liver Disease and Cirrhosis by Age Group and Gender

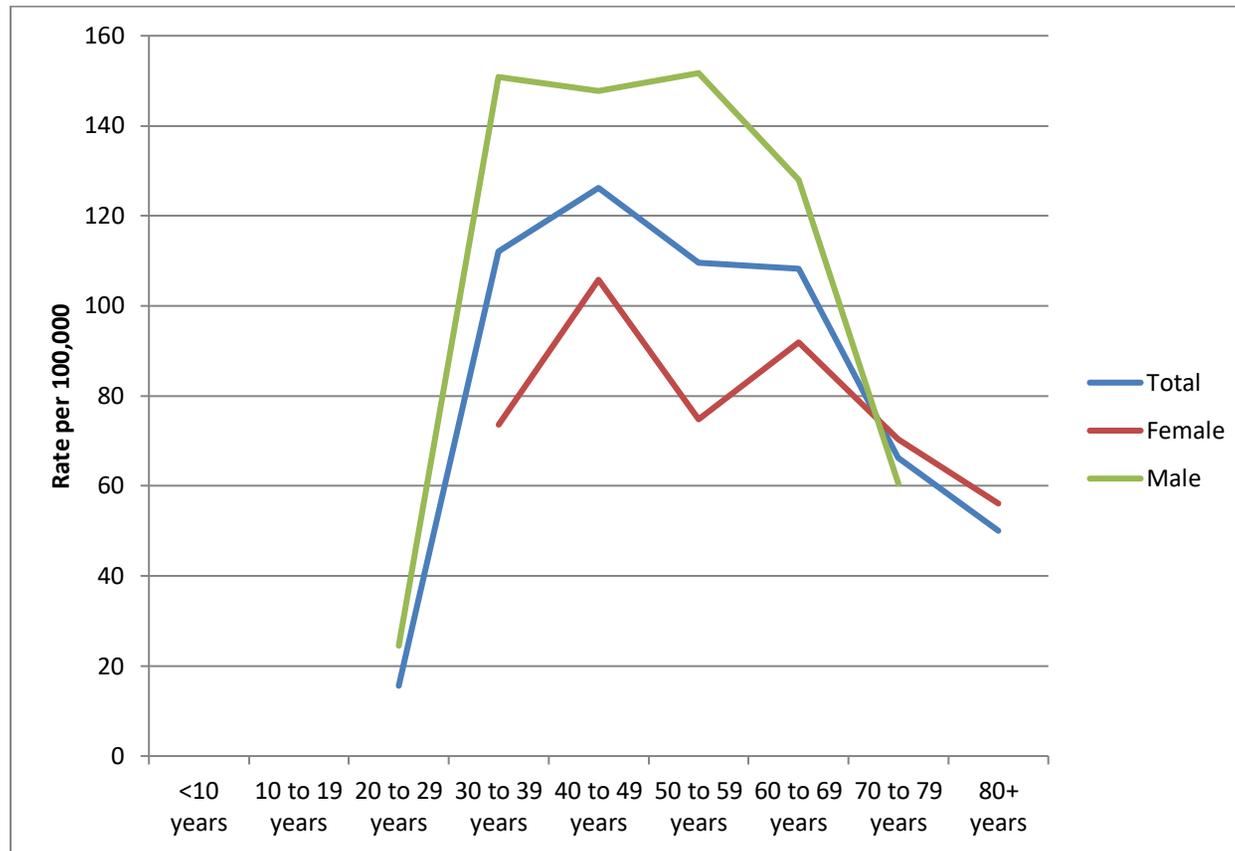


Chart 6 Cerebrovascular disease (stroke) Rates by Age Group and Gender

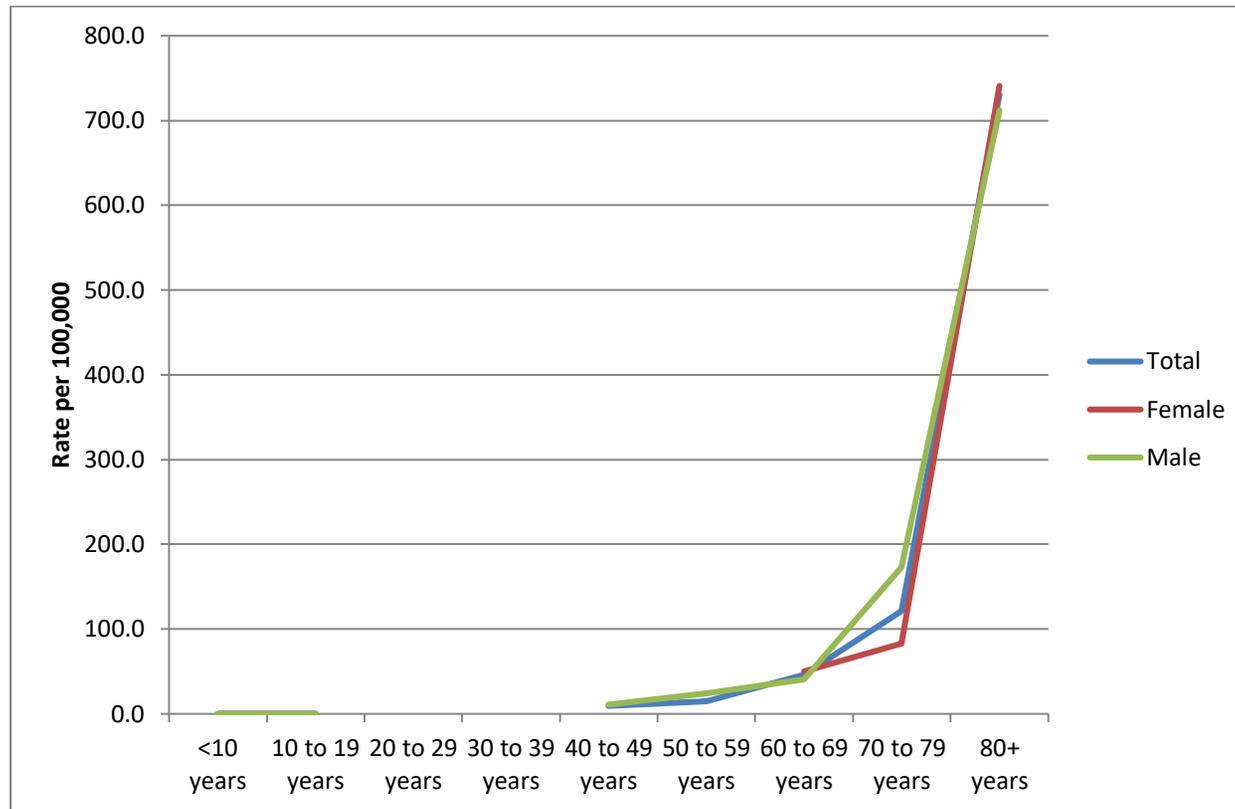


Chart 7 Influenza & Pneumonia Rates by Age Group and Gender

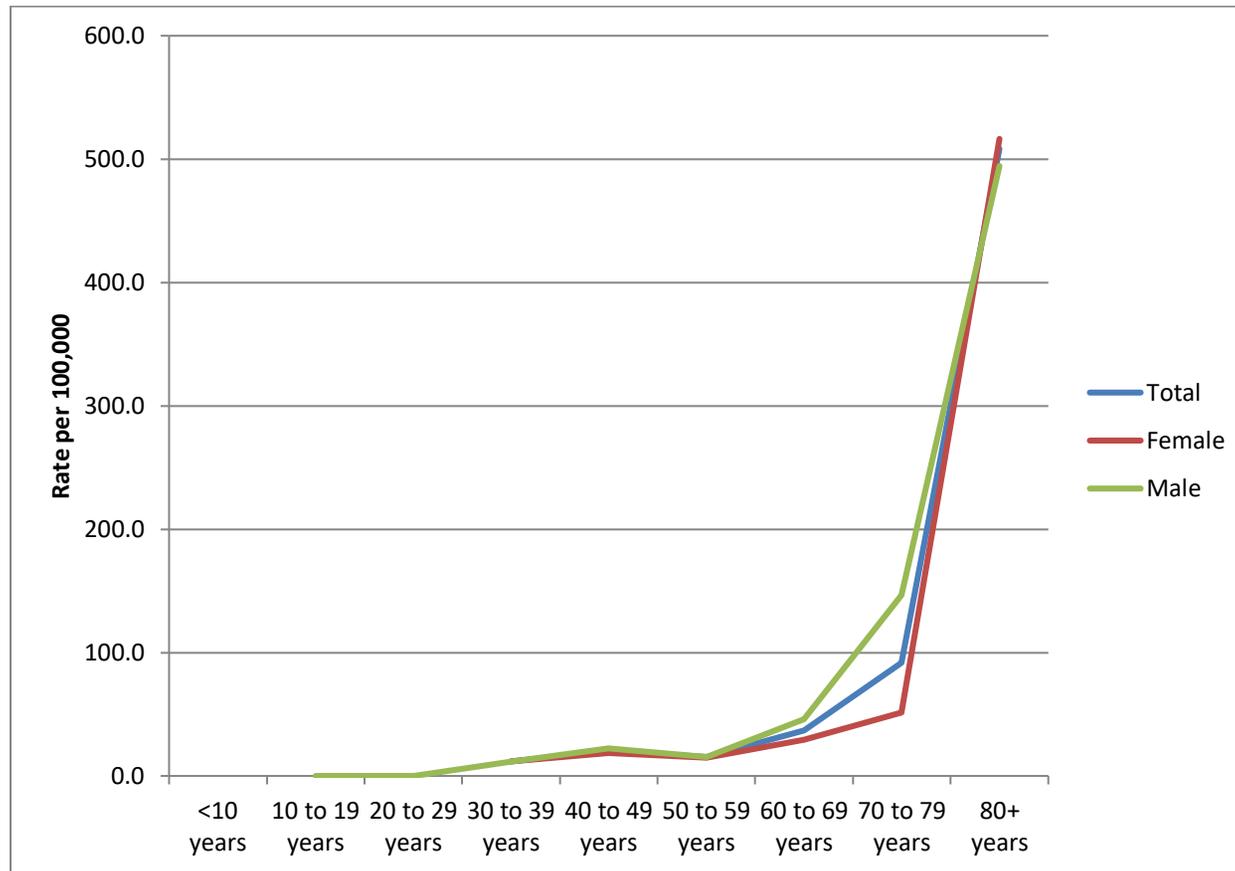


Chart 8 Intentional self-harm (suicide) Rates by Age Group and Gender

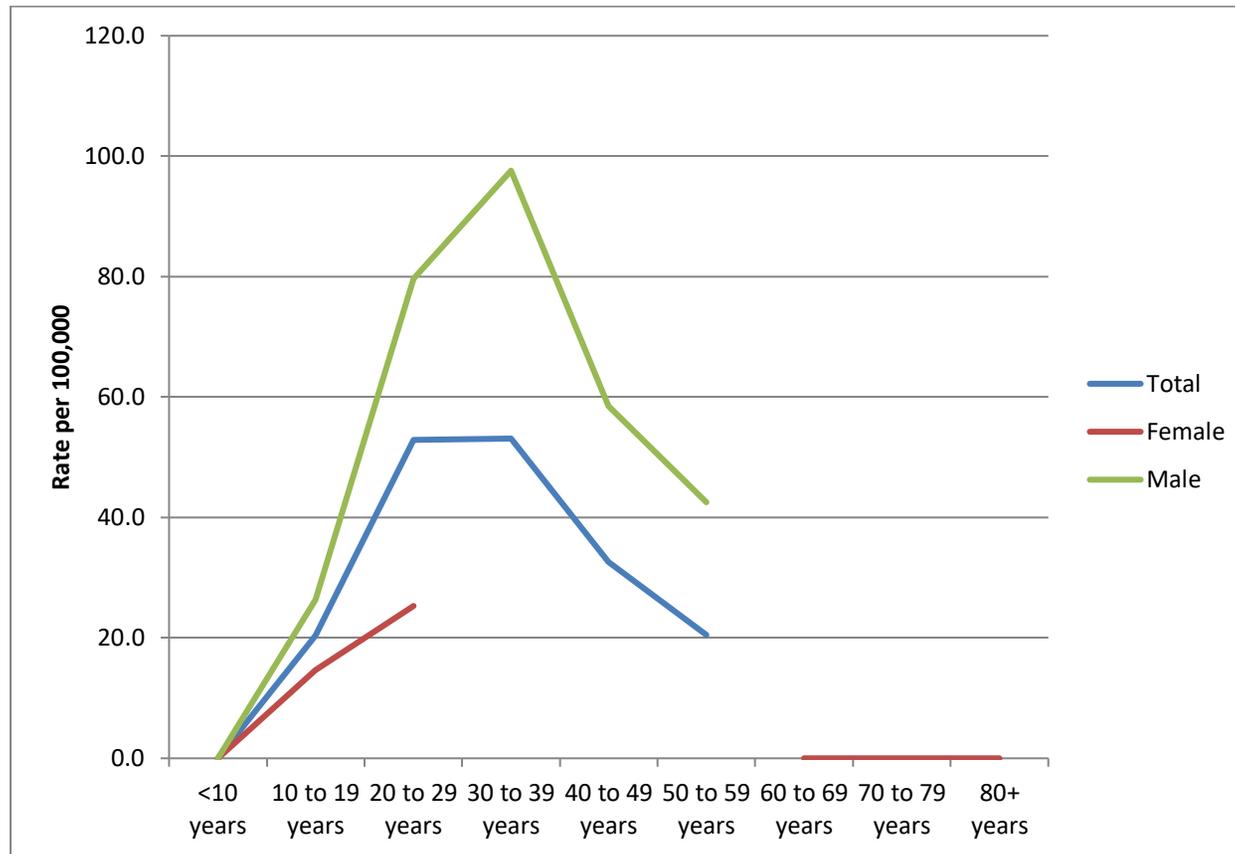


Chart 9 Dementia Rates by Age Group and Gender

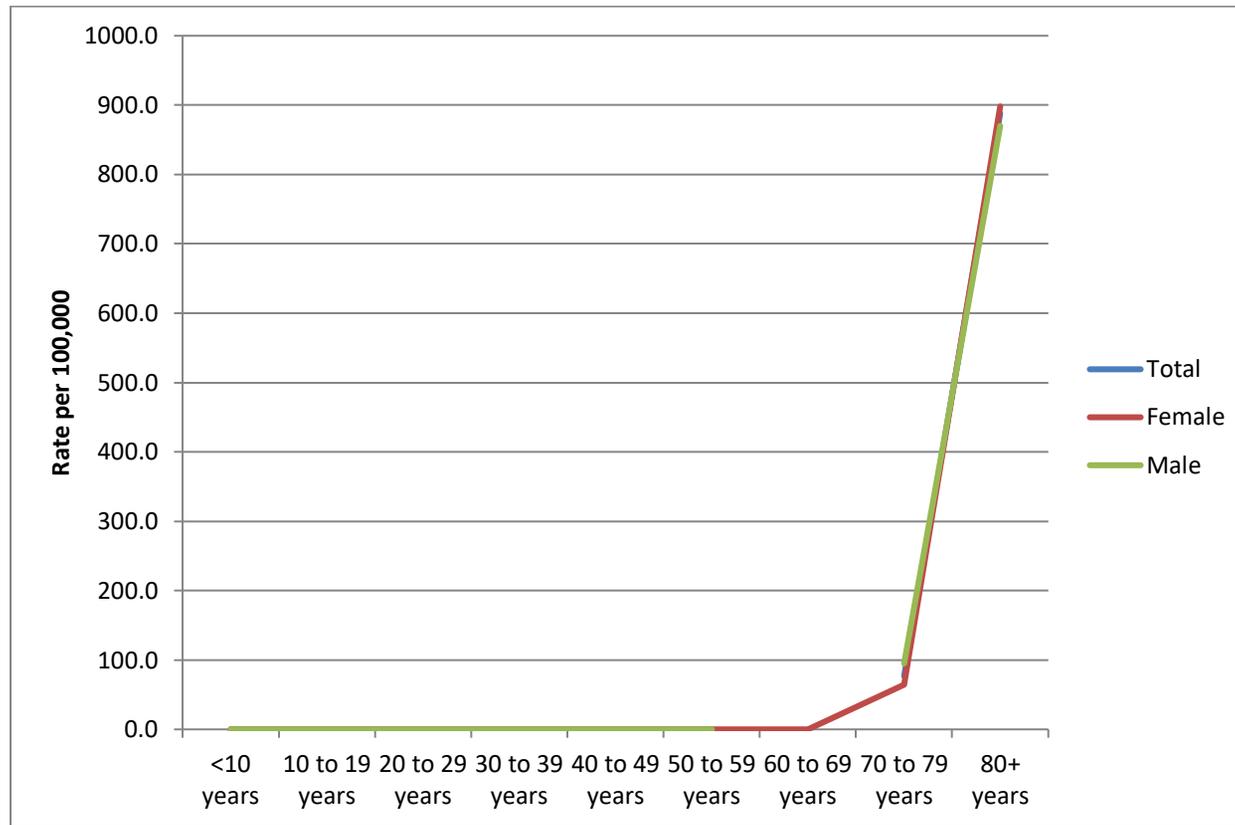


Chart 10 Alcohol Dependence Rates by Age Group and Gender

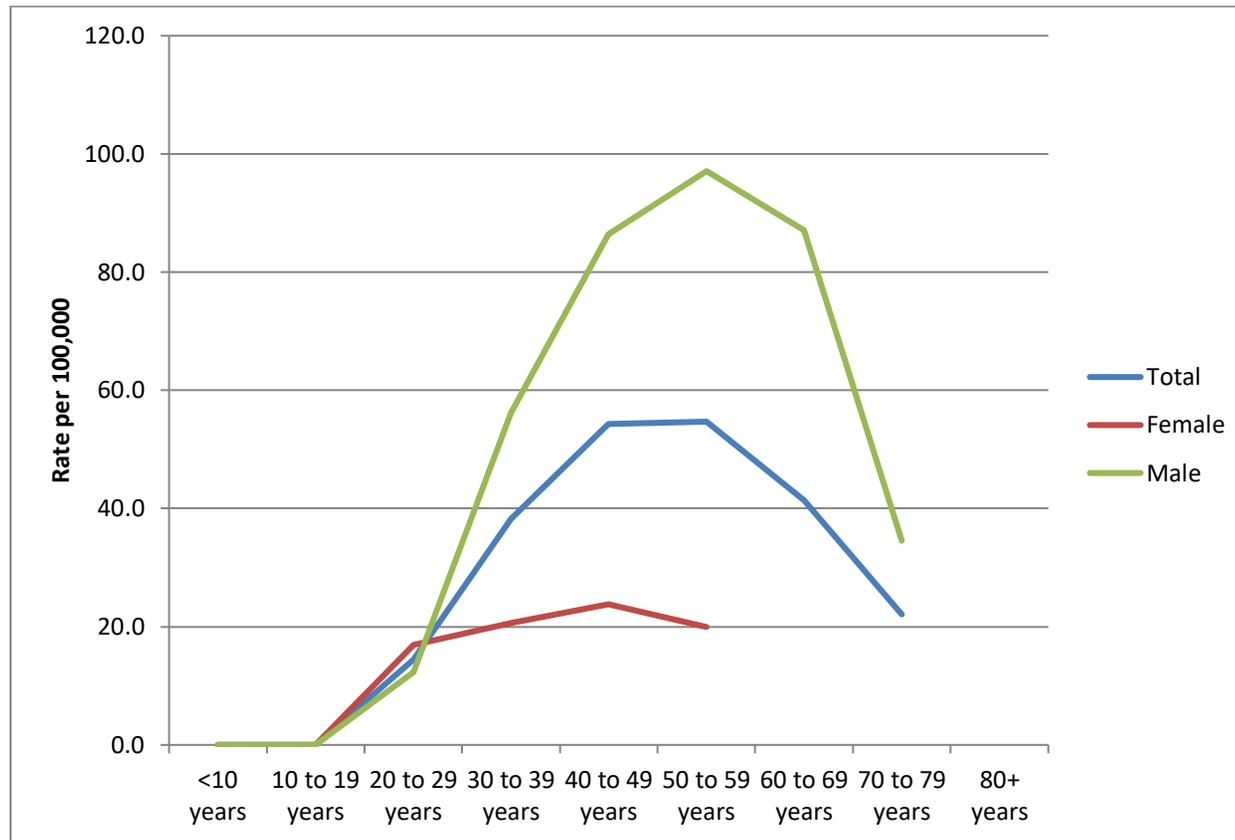


Chart 11 Assault Rates by Age Group and Gender

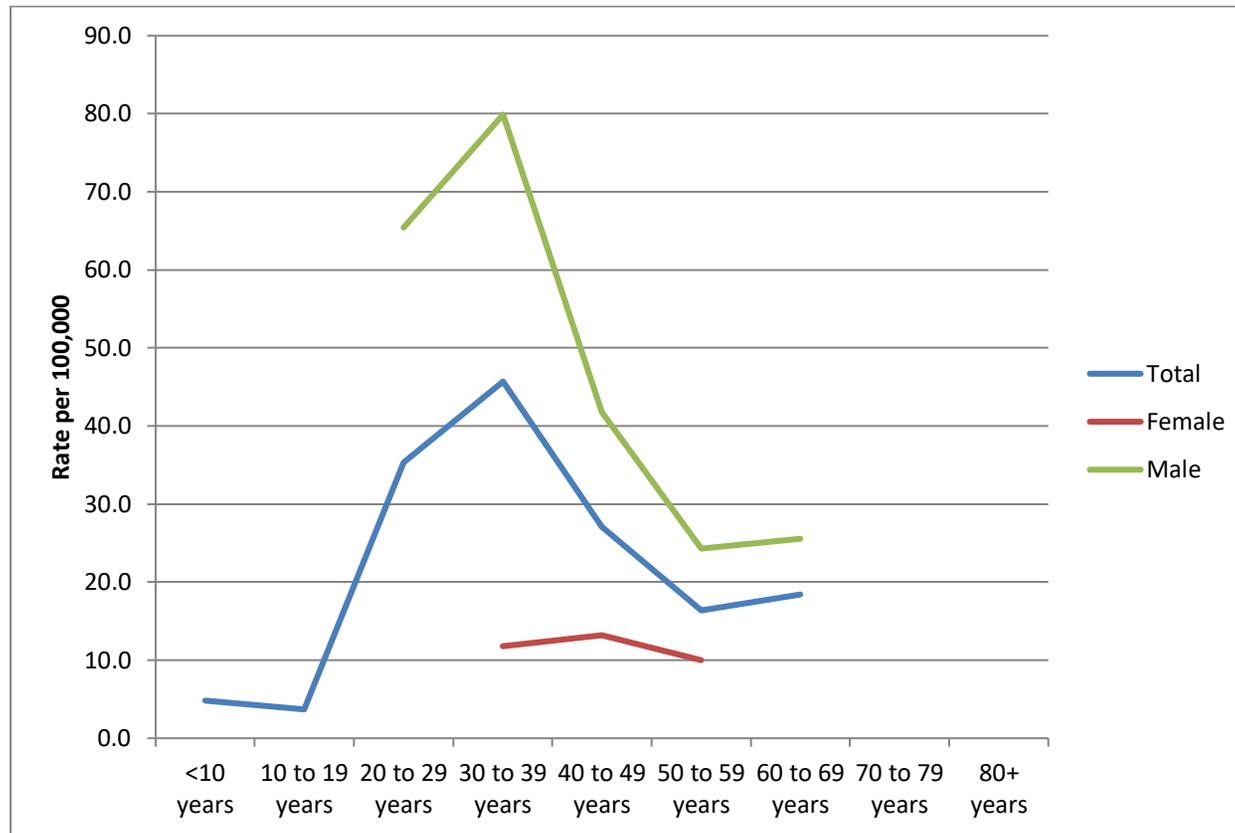


Chart 12 Other diseases of the respiratory system principally affecting the interstitium Rates by Age Group and Gender

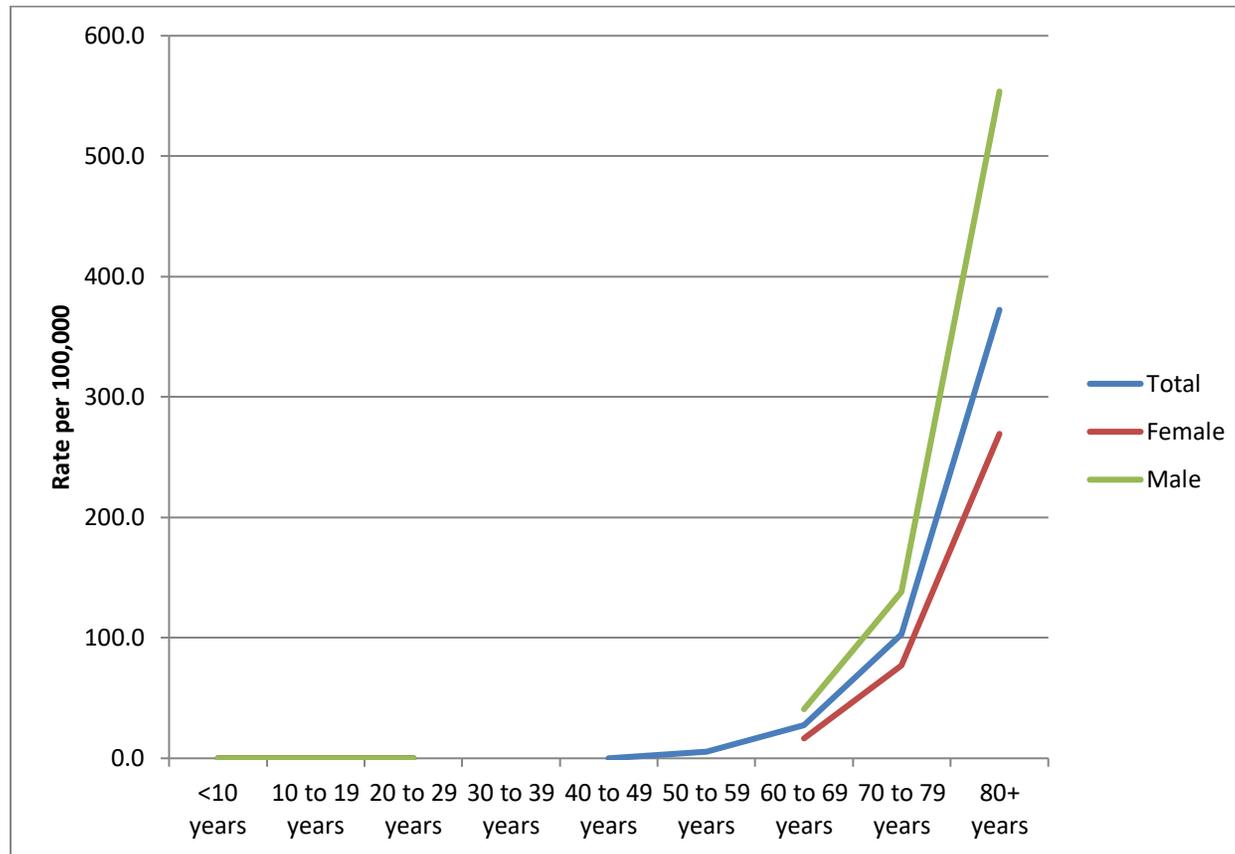


Chart 13 Septicemia Rates by Age Group and Gender

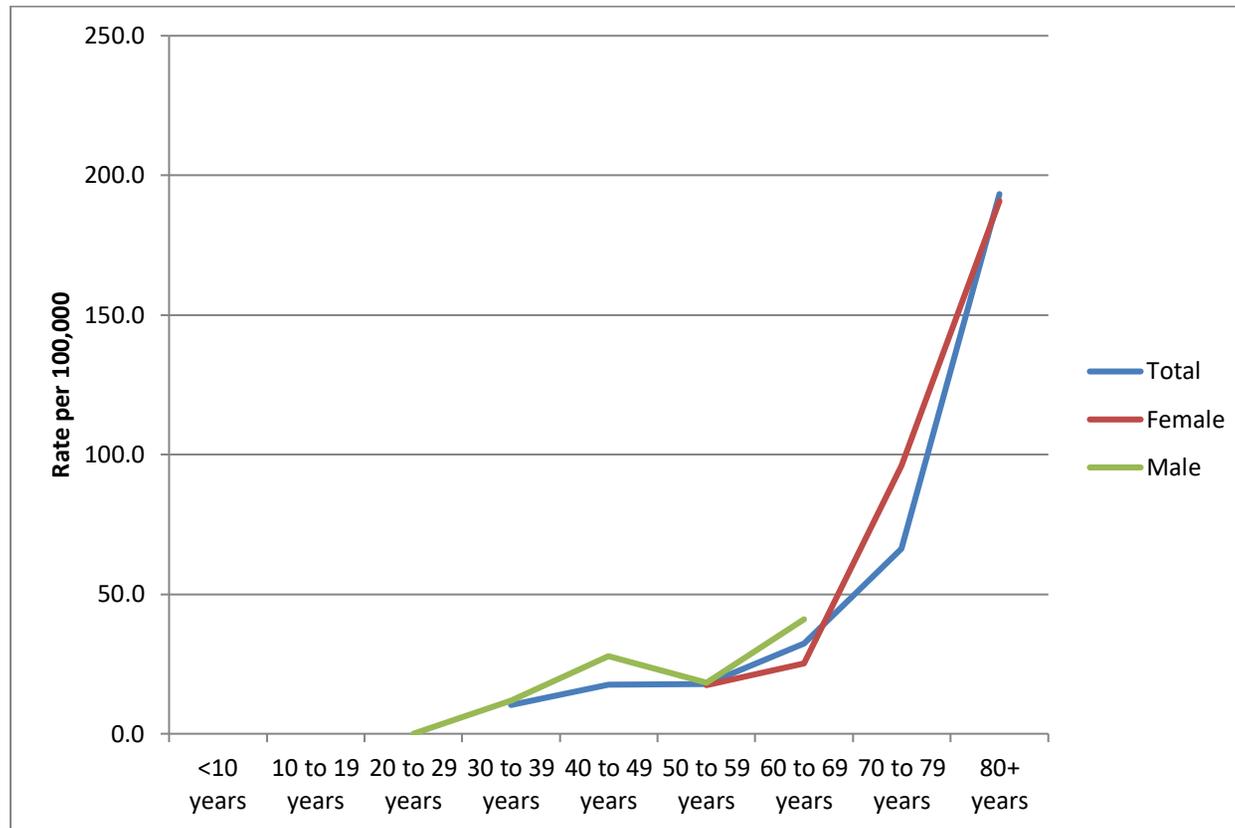


Chart 14 Renal Failure Rates by Age Group and Gender

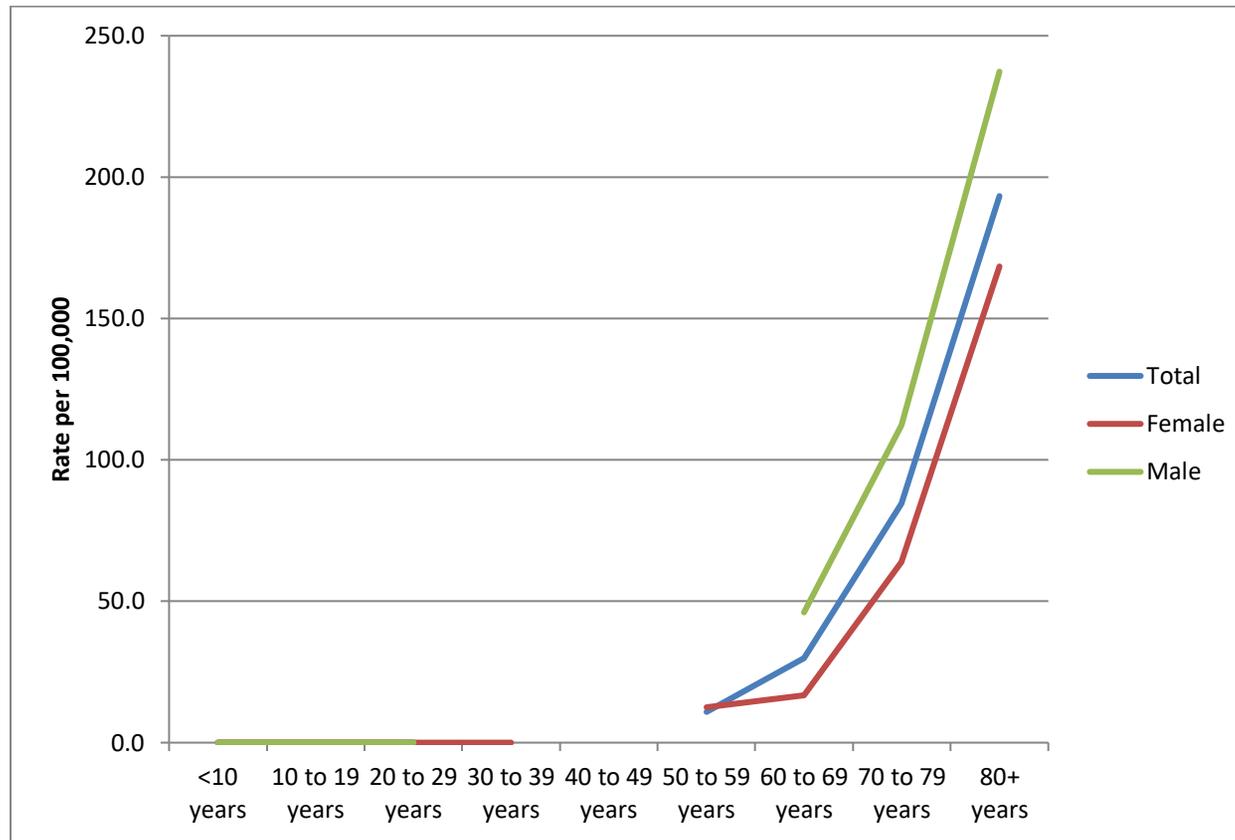
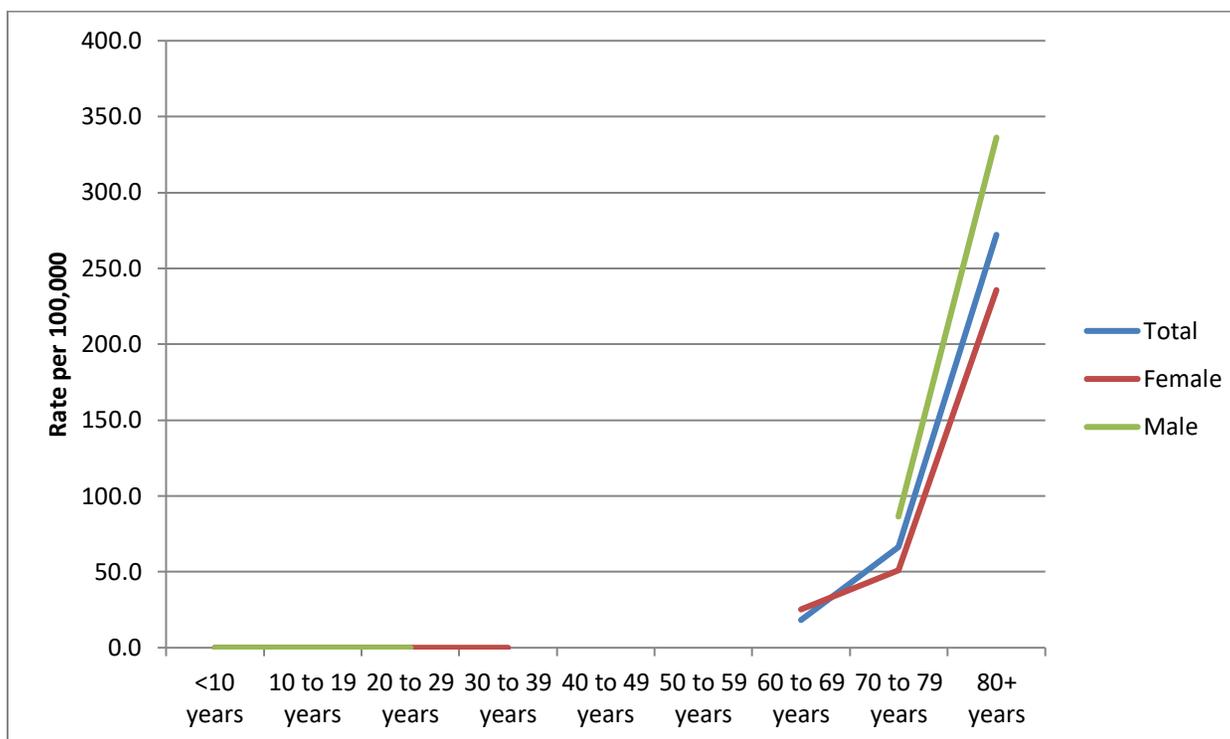


Chart 15 Chronic lower respiratory disease Rates by Age Group and Gender



NCHS 113

Health conditions are organized according to the International Classification of Diseases (ICD) 10 standards, and according to the National Center of Health Statistics (NCHS) guidelines for 113 selected causes of death. These causes of death are presented here because they often provide more specific information than in the Leading Causes section. For example, under Leading Causes all Malignant neoplasms (cancers) are reported as one cause of death, whereas with the NCHS 113 many cancer sites are specified. All of the NCHS 113 select causes with at least one cases reported are listed, however, if there are fewer than 6 deaths the count data is suppressed (Table 4).

The leading 5 types of cancer sites by count and in ranked order are colorectal, prostate, liver, breast and stomach. The 5 leading types of cancer sites by age-adjusted rate in ranked order are prostate, breast, colorectal, pancreas, and ovary. Many types

of major cardiovascular disease are grouped together. Among those with more specific categorization the leading types of major cardiovascular disease are stroke, acute myocardial infarction, atherosclerotic cardiovascular disease, heart failure and essential hypertension and hypertensive renal disease. Influenza and pneumonia are combined for Leading Causes of death but separated in the NCHS 113 categories. Pneumonia accounts for 92.7% of all Influenza and Pneumonia deaths. Of the 336 deaths due to Chronic liver disease and cirrhosis, which is the 5<sup>th</sup> leading cause of death, 81.5% are due to alcoholic liver disease. Nationally, 53.3% of all deaths due to Chronic liver disease and cirrhosis are due to alcoholic liver disease<sup>vi</sup>. Unintentional injuries are further broken down into the NCHS 113 categories. The 5 leading type of Unintentional injury death are motor vehicle crash, accidental poisoning, falls and drowning. There were more deaths from motor vehicle crashes than both assault and suicide combined.

Table 4 NCHS 113 Select Causes of death both Genders: Count, Age Adjusted Rate, and Count by Age Group

Cause of death	Count	Age Adjusted Rate	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+
All Cause	5,231	1027.8	116	88	321	519	556	704	706	834	1387
Salmonella	*	0.2	0	0	0	0	0	*	0	0	0
Certain other intestinal infections	25	4.8	*	0	0	*	*	*	5	*	8
Respiratory TB	3	0.7	0	0	0	0	0	0	0	1	2
Septicemia	97	19.1	0	*	*	7	13	13	14	18	27
Viral Hepatitis	10	1.8	0	0	0	*	*	*	*	0	*
Human immunodeficiency virus (HIV) disease	11	2.0	0	0	*	*	*	*	*	0	0
Other and unspecified infections and parasitic diseases and their sequelae	32	6.0	*	0	*	*	5	6	*	*	9
Malignant neoplasms											
lip, oral cavity and pharynx	7	1.3	0	0	0	0	*	*	*	*	*
esophagus	11	2.0	0	0	0	*	0	*	0	*	*
stomach	42	8.3	0	0	*	5	*	*	13	7	11
colon, rectum and anus	58	11.4	0	0	0	*	6	9	13	16	13
liver and intrahepatic bile ducts	44	8.5	0	0	0	0	0	5	15	16	8
pancreas	51	10.5	0	0	0	*	*	6	9	12	22
larynx	*	0.2	0	0	0	0	0	0	0	*	0
trachea, bronchus and lung	30	6.1	0	0	0	0	*	*	7	8	10

Cause of death	Count	Age Adjusted Rate	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+
skin	5	0.9	0	0	*	0	*	0	0	0	*
breast**	43	15.8	0	0	*	*	0	12	9	10	9
cervix uteri**	5	1.6	0	0	0	0	0	*	*	*	0
corpus uteri**	15	5.9	0	0	0	0	*	*	*	*	6
ovary**	27	9.4	0	0	0	0	0	8	9	7	*
prostate***	46	23.0	0	0	0	0	0	*	0	22	23
kidney and renal pelvis	28	7.4	0	0	0	0	*	*	*	8	13
bladder	8	1.7	0	0	*	0	*	0	*	0	*
meninges, brain and other parts of central nervous system	18	3.1	*	*	0	0	*	*	*	0	5
Hodgkin's disease	*	0.2	0	0	0	*	0	0	0	0	0
Non-Hodgkin lymphoma	20	4.2	0	0	0	0	*	*	*	11	*
multiple myeloma	11	2.3	0	0	0	0	0	*	*	5	*
Leukemia	12	2.1	0	*	*	0	0	*	*	*	*
All other neoplasms	91	18.8	*	*	0	0	6	21	10	21	29
In situ neoplasm	12	3.0	0	0	0	*	0	*	0	5	*
Anemias	9	1.9	0	0	0	0	0	*	*	0	6
Diabetes	340	66.6	0	*	*	7	23	54	77	97	79
Malnutrition	12	2.6	0	0	0	0	0	*	*	0	9
Other nutritional deficiencies	*	0.2	0	0	0	0	0	0	0	*	0
Meningitis	10	1.7	*	0	0	0	0	*	0	*	*
Parkinson's	56	12.4	0	0	0	0	0	0	*	19	34
Alzheimer's	47	10.5	0	0	0	0	0	0	*	11	34
Major cardiovascular diseases											
Acute rheumatic fever and chronic rheumatic heart diseases	7	1.3	0	0	0	0	0	*	*	*	*
Hypertensive heart disease	43	9.0	0	0	0	*	*	7	*	9	19
Hypertensive heart disease and rheumatic heart disease	5	1.1	0	0	0	0	*	0	0	*	*
Acute myocardial infarction	114	23.2	0	0	0	*	*	16	20	28	43

Cause of death	Count	Age Adjusted Rate	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+
Other acute ischemic heart disease	*	1.2	0	0	0	0	*	0	0	*	*
Atherosclerotic cardiovascular disease	100	20.3	0	0	0	*	7	15	16	24	37
All other forms of chronic ischemic heart disease	176	37.4	0	0	0	*	*	8	28	44	91
Acute and subacute endocarditis	*	0.9	0	0	0	*	0	0	0	*	*
Heart Failure	59	12.6	0	0	0	*	0	*	9	15	31
All other forms of heart disease	137	27.8	0	0	8	12	11	14	20	23	49
Essential hypertension and hypertensive renal disease	49	10.4	0	0	0	*	*	*	6	12	25
Cerebrovascular disease (stroke)	179	38.2	0	0	*	*	7	11	20	33	102
Atherosclerosis	*	0.4	0	0	0	0	*	0	0	0	*
Aortic aneurysm and dissection	7	1.5	0	0	0	0	0	0	*	*	*
Other diseases of the arteries	16	3.5	0	0	0	0	0	*	*	*	11
Other diseases of circulatory system	*	0.2	0	0	0	0	0	0	0	*	0
Influenza	11	2.3	0	*	0	*	*	0	0	*	*
Pneumonia	140	29.3	*	0	*	7	13	10	16	21	68
Emphysema	12	2.6	0	0	0	0	*	0	*	*	7
Asthma	8	1.4	0	0	*	*	0	*	*	0	*
Other chronic lower respiratory disease	51	11.1	0	0	0	0	0	0	6	15	30
Pneumoconioses and chemical effects	13	3.0	0	0	0	0	0	0	0	*	10
Pneumonities due to solids and liquids	37	7.8	0	0	*	0	*	*	*	7	20
Other diseases of the respiratory system	125	26.4	*	0	0	*	*	6	20	31	64
Peptic Ulcer	*	0.4	0	0	0	0	*	0	0	*	*
Diseases of appendix	*	0.4	0	0	0	0	0	*	0	0	*
Hernia	*	0.4	*	*	*	*	*	*	*	*	*
Alcoholic liver disease	274	52.2	0	0	14	71	80	71	29	6	*
Other chronic liver disease and cirrhosis	62	11.8	0	0	*	5	13	9	18	12	*

Cause of death	Count	Age Adjusted Rate	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+
Cholelithiasis and other disorders of gallbladder	15	3.0	0	0	0	*	0	*	*	5	*
Chronic glomerulonephritis, nephritis and nephritis not specified as acute or chronic, and renal sclerosis unspecified	*	0.7	0	0	0	0	0	0	0	0	*
Renal failure	75	15.3	0	0	0	*	*	9	13	23	27
Infections of kidney	*	0.6	0	0	0	0	0	*	*	0	*
Certain conditions originating in the perinatal period	23	3.2	22	*	0	0	0	0	0	0	0
Congenital malformations	33	4.9	23	*	*	*	*	*	0	*	*
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	197	36.9	16	*	19	33	27	29	27	13	30
Residual (All other diseases)	749	150.9	10	8	23	74	77	101	93	121	242
Unintentional Injuries											
Motor vehicle crash	389	68.3	16	24	90	81	59	73	28	11	7
Unintentional injury: Other land transport	13	2.2	0	*	*	*	*	*	*	0	0
Unintentional injury: Water, air and space, and other transport	*	0.5	0	0	*	0	0	*	0	*	0
Falls	68	13.6	0	0	5	5	*	7	13	12	23
Accidental discharge of firearms	*	0.4	0	0	*	*	0	0	0	0	0
Accidental drowning and submersion	19	3.3	*	*	*	*	*	5	*	0	0
Accidental exposure to smoke, fire and flames	17	2.8	*	0	*	0	*	6	*	*	*
Accidental poisoning and exposure to noxious substances	215	41.6	0	*	15	60	67	40	20	*	6
Other and unspecified non-transport accidents and their sequelae	158	30.2	*	6	13	23	32	20	23	16	22
Intentional self-harm (suicide) by discharge of firearms	27	5.0	0	*	*	6	7	*	*	*	0
Intentional self-harm (suicide) by other and unspecified means and their sequelae	125	20.2	0	19	47	30	17	11	0	*	0

Cause of death	Count	Age Adjusted Rate	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+
Assault (homicide) by discharge of firearms	33	5.3	*	*	17	5	*	*	*	*	*
Assault (homicide) by other and unspecified means and their sequelae	84	15.5	*	*	17	26	17	9	7	*	0
Legal intervention	5	0.9	0	0	*	*	*	0	0	0	0
Discharge of firearms, undetermined intent	*	0.3	0	*	0	0	0	0	0	0	0
Other and unspecified events of undetermined intent and their sequelae	43	7.8	*	0	6	8	10	12	*	*	0
Complications of medical and surgical care	11	2.3	0	0	0	0	*	*	*	*	5

\*Indicates fewer than 5 cases

\*\*no male cases so counts and rates are only among females

\*\*\*no female causes so counts and rates are only among males

As with the Leading Causes of death there are gender differences for the NCHS 113 select causes (Table 5). Human immunodeficiency virus (HIV) disease, kidney cancer, brain cancer, diabetes, atherosclerotic cardiovascular disease, alcoholic liver disease, and almost all types of injury deaths are more likely to affect males than females. Females have higher rates of death than males for liver cancer, non-Hodgkin lymphoma, malnutrition, Alzheimer's, stroke, and other chronic liver disease and cirrhosis.

Table 5 NCHS 113 Select Causes of death: Age-Adjusted Rates by Gender  
 Rates without stable confidence intervals are in italics.

<b>Cause of death</b>	<b>Female</b>	<b>Male</b>
All Cause	877.3	1191.3
Salmonella	0.0	<i>0.3</i>
Certain other intestinal infections	4.6	5.1
Respiratory TB	<i>1.4</i>	0.0
Septicemia	21.8	16.9
Viral Hepatitis	1.5	2.2
Human immunodeficiency virus (HIV) disease	<i>0.3</i>	3.8
Other and unspecified infections and parasitic diseases and their sequelae	5.3	6.8
Malignant neoplasms		
lip, oral cavity and pharynx	<i>0.3</i>	2.3
esophagus	1.2	3.3
stomach	7.7	9.2
colon, rectum and anus	11.5	11.4
liver and intrahepatic bile ducts	10.6	6.5
pancreas	10.9	9.9
larynx	0.0	<i>0.4</i>
trachea, bronchus and lung	4.5	7.6
skin	<i>1.4</i>	<i>0.4</i>
breast**	15.8	NA
cervix uteri**	1.6	NA
corpus uteri**	5.9	NA
ovary**	9.4	NA
prostate***	NA	23.0
kidney and renal pelvis	3.3	11.4
bladder	1.9	<i>1.3</i>

Cause of death	Female	Male
Meninges, brain and other parts of central nervous system	1.9	4.3
Hodgkin's disease	0.0	0.5
Non-Hodgkin lymphoma	5.7	2.8
multiple myeloma	2.9	1.7
Leukemia	1.9	2.3
All other neoplasms	22.7	14.6
In situ neoplasm	3.4	2.6
Anemias	2.0	1.7
Diabetes	58.4	76.3
Malnutrition	3.4	1.7
Other nutritional deficiencies	0.4	0.0
Meningitis	2.0	1.4
Parkinson's	10.8	13.7
Alzheimer's	13.8	7.3
Major cardiovascular diseases		
Acute rheumatic fever and chronic rheumatic heart diseases	2.3	0.3
Hypertensive heart disease	8.5	9.8
Hypertensive heart disease and rheumatic heart disease	0.9	1.3
Acute myocardial infarction	20.4	26.0
Other acute ischemic heart disease	1.1	1.3
Atherosclerotic cardiovascular disease	13.9	26.9
All other forms of chronic ischemic heart disease	29.9	43.0
Acute and subacute endocarditis	1.3	0.4
Heart Failure	11.9	13.3

<b>Cause of death</b>	<b>Female</b>	<b>Male</b>
All other forms of heart disease	23.8	31.9
Essential hypertension and hypertensive renal disease	12.0	8.9
Cerebrovascular disease (stroke)	43.2	33.2
Atherosclerosis	0.5	0.4
Aortic aneurysm and dissection	1.2	1.7
Other diseases of the arteries	4.9	2.1
Other diseases of circulatory system	0.4	0.0
Influenza	2.9	1.7
Pneumonia	32.1	26.6
Emphysema	3.0	2.2
Asthma	1.6	1.1
Other chronic lower respiratory disease	11.8	10.3
Pneumoconioses and chemical effects	0.5	5.2
Pneumonitis due to solids and liquids	7.6	7.9
Other diseases of the respiratory system	25.1	27.4
Peptic Ulcer	0.4	0.9
Diseases of appendix	0.8	0.0
Hernia	0.8	0.0
Alcoholic liver disease	37.0	68.8
Other chronic liver disease and cirrhosis	16.4	10.4
Cholelithiasis and other disorders of gallbladder	2.0	4.0
Chronic glomerulonephritis, nephritis and nephritis not specified as acute or chronic, and renal sclerosis unspecified	0.5	0.9
Renal failure	14.3	16.3
Infections of kidney	0.6	0.4
Hyperplasia of prostate***	NA	0.4

<b>Cause of death</b>	<b>Female</b>	<b>Male</b>
Certain conditions originating in the perinatal period	3.9	2.3
Congenital malformations	5.2	4.5
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	27.9	47.3
Residual (All other diseases)	151.6	152.2
Unintentional Injuries		
Motor vehicle crash	39.4	100.0
Unintentional injury: Other land transport	1.1	3.4
Unintentional injury: Water, air and space, and other transport	0.0	1.1
Falls	11.4	16.3
Accidental discharge of firearms	0.0	0.8
Accidental drowning and submersion	1.4	5.5
Accidental exposure to smoke, fire and flames	1.4	4.5
Accidental poisoning and exposure to noxious substances	17.2	67.8
Other and unspecified non-transport accidents and their sequelae	13.2	47.5
Intentional self-harm (suicide) by discharge of firearms	0.4	9.9
Intentional self-harm (suicide) by other and unspecified means and their sequelae	7.8	35.9
Assault (homicide) by discharge of firearms	2.6	9.0

Cause of death	Female	Male
Assault (homicide) by other and unspecified means and their sequelae	5.5	25.6
Legal intervention	0.0	1.8
Discharge of firearms, undetermined intent	0.3	0.8
Other and unspecified events of undetermined intent and their sequelae	2.7	13.4
Complications of medical and surgical care	1.9	2.5

### Years of Potential Life Lost & Life Table

One way to look at the health of a community is to look at life expectancy. “Life expectancy at birth represents the average number of years that a group of infants would live if the group was to experience throughout life the age-specific death rates present in the year of birth.”<sup>vi</sup> During the study years the average life expectancy on the Navajo Nation at birth is 71.4 years. This is 7.2 fewer years than the U.S. life expectancy at birth in 2017. Life expectancy at birth and age 65 for the Navajo Nation and its 5 agencies can be seen in Table 6. By age 65 life expectancy increases to 83.1 years. The lowest life expectancy is seen in the Eastern Agency. The highest life expectancy at birth is experienced in the Ft. Defiance Agency at 74.6 years with the Western Agency trailing by only 0.2 years. Females on the Navajo Nation have an additional 11 years of life expectancy at birth and 3.6 more years at age 65. At birth the Western Agency has the highest life expectancy for females (80.5 years), and Ft. Defiance has the highest life expectancy at birth (70.2 years) for males. The Eastern Agency has the lowest life expectancy for both females and males.

Table 6 Life expectancy at birth and age 65 by Gender: Navajo Nation and its Agencies

<b>Both Genders</b>						
	<b>Navajo Nation</b>	<b>Chinle</b>	<b>Eastern</b>	<b>Ft. Defiance</b>	<b>Northern</b>	<b>Western</b>
At Birth	71.4	72.4	67.6	74.6	71.4	74.4
Age 65	18.1	19.5	17.2	20.1	18.3	19.5
<b>Females</b>						
	<b>Navajo Nation</b>	<b>Chinle</b>	<b>Eastern</b>	<b>Ft. Defiance</b>	<b>Northern</b>	<b>Western</b>
At Birth	77.2	77.9	72.8	79.3	75.7	80.5
Age 65	20.4	21.5	18.0	21.3	19.8	21.4
<b>Males</b>						
	<b>Navajo Nation</b>	<b>Chinle</b>	<b>Eastern</b>	<b>Ft. Defiance</b>	<b>Northern</b>	<b>Western</b>
At Birth	66.2	67.5	62.2	70.2	67.3	68.3
Age 65	16.8	17.4	15.6	18.6	16.5	16.9

An additional way to understand the impact of different causes of death on the health of a people is through years of potential life lost (YPLL). This measure takes into account both the quantity (count) of deaths by cause, and the age of the decedent. Causes of death that affect younger populations, and most likely influence life expectancy, are reflected in this metric. YPLL was calculated using 2017 U.S. life expectancy as the baseline. The leading 10 causes of YPLL for both genders, females, and males can be seen in Charts 16-18 respectively. For both genders, three causes represent approximately half of the YPLL: Unintentional injuries, Chronic liver disease and cirrhosis, and Intentional self-harm (suicide). Approximately 7% of all YPLL are attributed to Signs, symptoms, and abnormal clinical lab findings. This category is typically used when there is no information on underlying cause of death, which underscores the need to improve the quantity and quality of data collected regarding Navajo deaths. Key differences between the genders are that Assault appears on the male list and Certain conditions originating in the perinatal period appears on the female list. Although unintentional injuries is the leading cause of YPLL for both genders the number of years for males is 2.67 times higher for males.

Chart 16 Leading 10 YPLL with Cumulative Percent: Both Genders

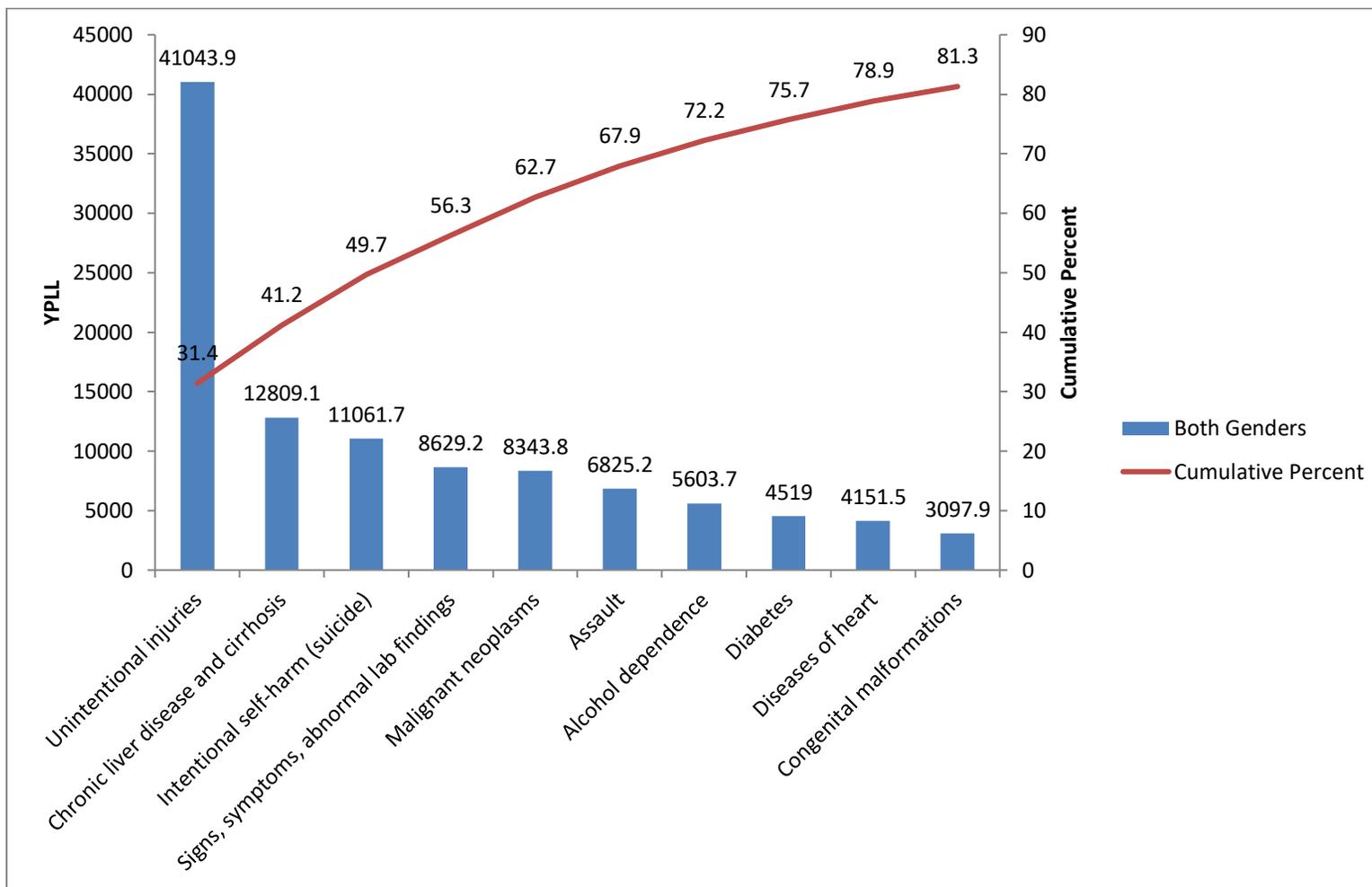


Chart 17 Leading 10 YPLL with Cumulative Percent: Females

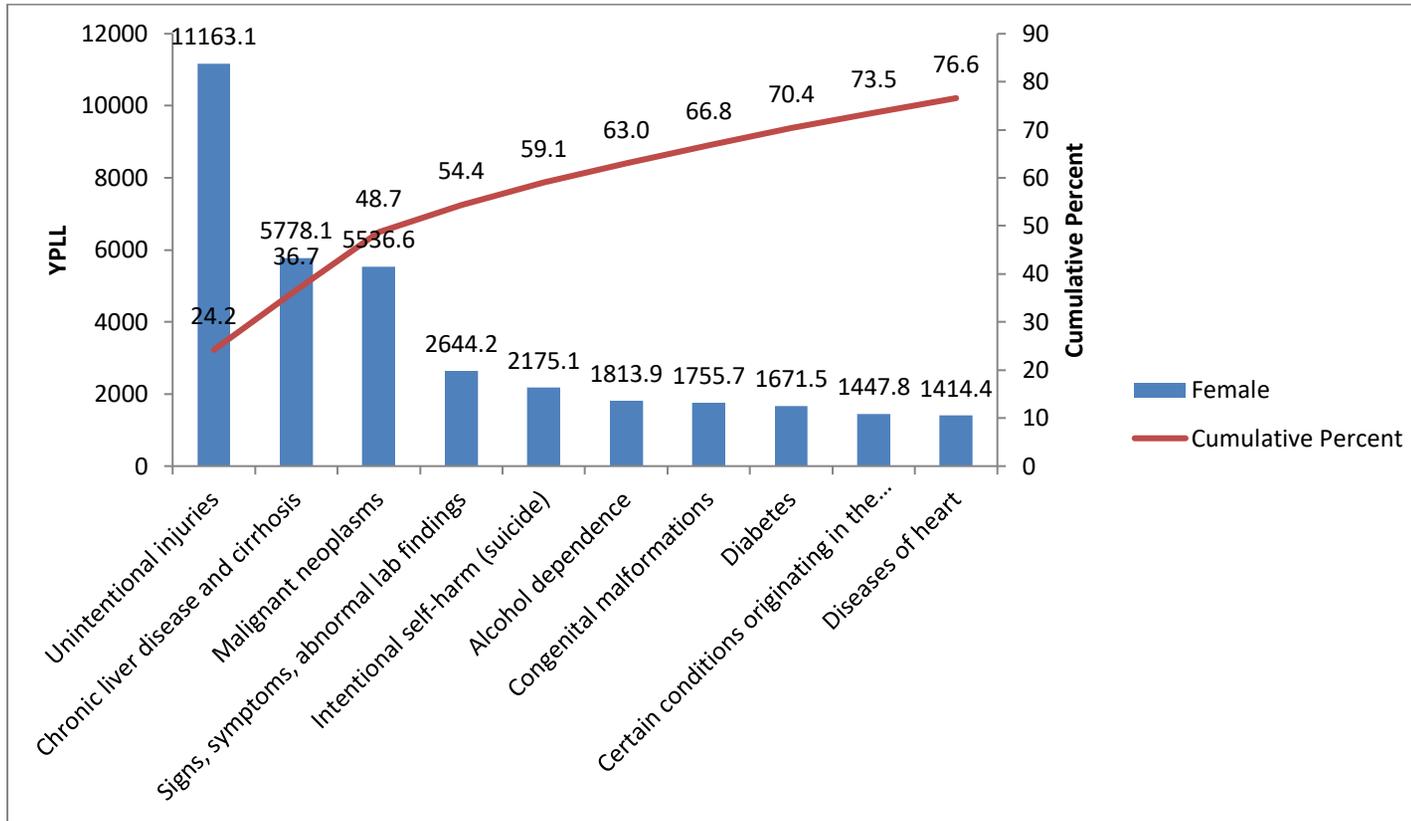
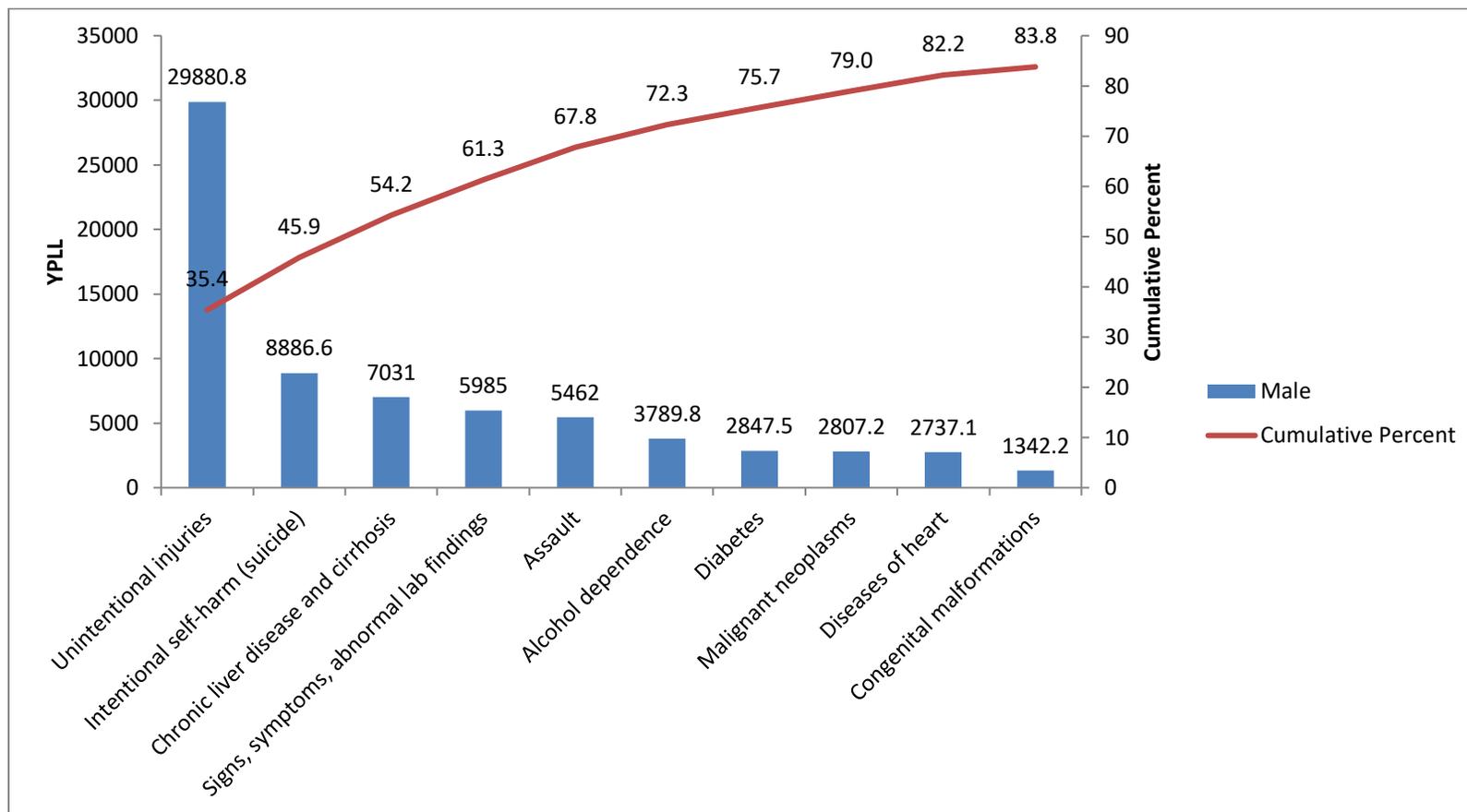


Chart 18 Leading 10 YPLL with Cumulative Percent: Males



A comparison of the percent of YPLL by cause of death between the 2006-2009 study and the 2015-2017 study can be seen in charts 19-21. Results for both genders are very similar. There's been a slight decrease in percent YPLL for Diseases of the heart, and Influenza and pneumonia. There's been a slight increase in percent of YPLL for Chronic liver disease and cirrhosis and Intentional self-harm (suicide). Data for Signs, symptoms, and abnormal laboratory findings was not created for the 2006-2009 study.

Chart 19 Comparison of YPLL 2006-2009 & 2015-2017: Both Genders

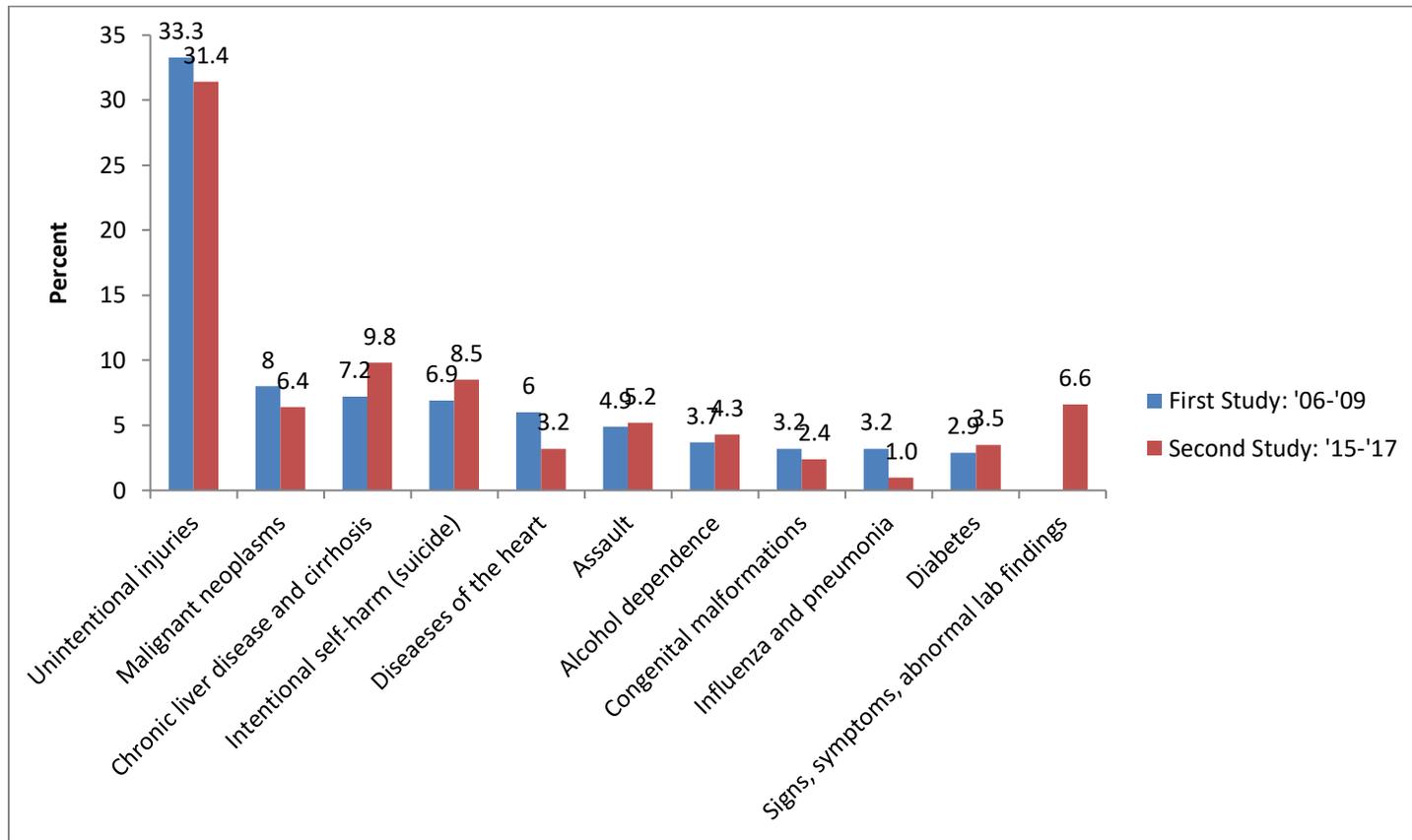


Chart 20 Comparison of YPLL 2006-2009 & 2015-2017: Females

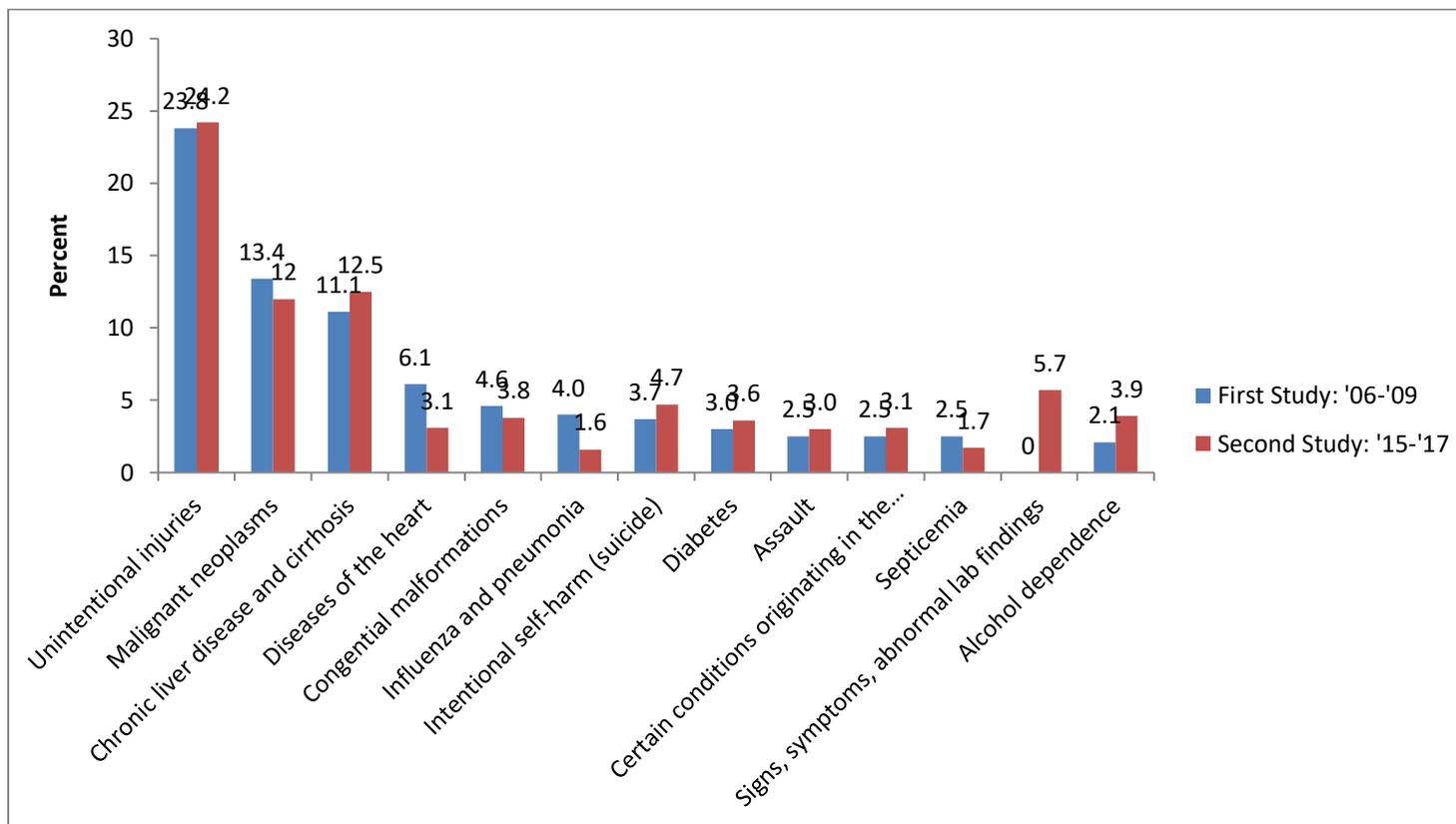
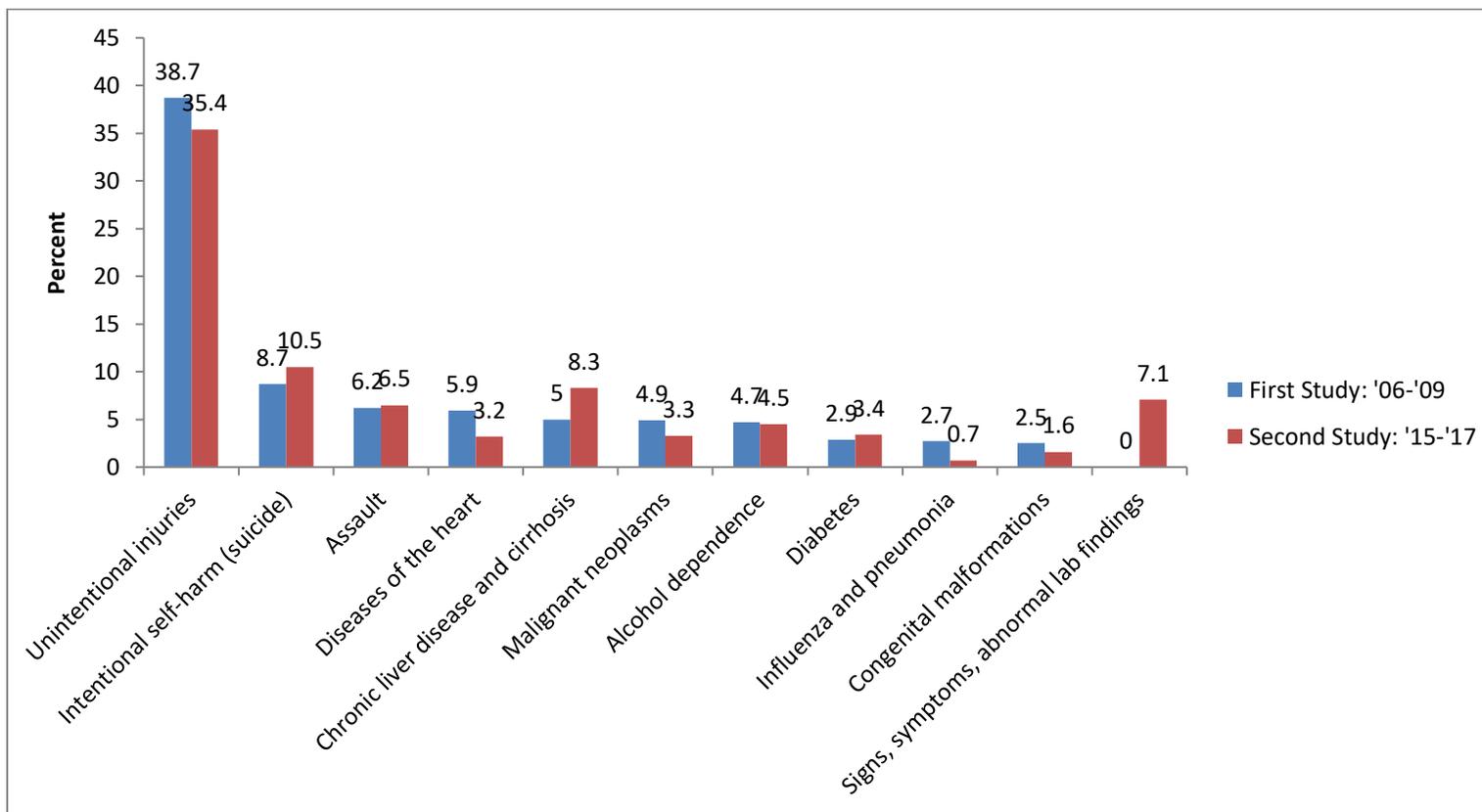


Chart 20 Comparison of YPLL 2006-2009 & 2015-2017: Males



Injury Specific Mortality

The NCHS 113 categories and leading cause of death categories don't capture all of the unique external injuries that are experienced on Navajo. Navajo specific categories can be seen in Table 7. The leading types of unintentional injuries are motor vehicle crash occupant, alcohol poisoning, pedestrian, falls, and cold exposure. Firearms were used in 28% of assaults and 18% of

suicides on the Navajo Nation. In the U.S. in 2017 firearms were used in 74.5% of assaults 50.6% of suicides.<sup>vi</sup> Tables 8 and 9 display external injuries by gender. The top 5 Unintentional injuries for each gender are the same except Cold exposure is tied for 5<sup>th</sup> for females and 4<sup>th</sup> for males. The tie for 5<sup>th</sup> leading cause of unintentional injuries for females is suffocation. Firearms were used more often in male suicides (21%) than female suicides (4%).

Table 7 External Injury Cause Both Genders: Count, Age-Adjusted Rate and 95% Confidence Intervals

Injury Type	Count	Point	Lower Estimate	Upper Estimate
Alcohol Poisoning	154	29.4	24.8	34
All-Terrain Vehicle	8	1.3	0.4	2.3
Animal Rider	5	0.9	0.1	1.6
Assault, Firearm	33	5.5	3.6	7.4
Assault, Other	54	10.1	7.4	12.9
Assault, Sharp Object	30	5.4	3.4	7.3
Cold Exposure	60	11.3	8.5	14.2
Drowning	19	3.3	1.8	4.8
Falls	68	13.6	10.6	16.5
MV Crash Occupant	266	47.1	41.4	52.7
Natural Heat	4	0.8	0.1	1.4
Opioid poisoning	28	5.8	3.6	7.9
Other Mechanical Forces	2	0.4	NA	0.9
Pedestrian	124	21.4	17.7	25.2
Sharp Objects	3	1.2	NA	1.23
Smoke, Fire, Flame	7	1.2	0.3	2
Suffocation	42	8.2	5.8	10.5
Suicide Firearms	27	5	3.2	6.8
Suicide Hanging	106	17.8	14.3	21.2
Suicide Other	19	3.6	2	5.2
Undetermined Intent	61	11.1	8.4	13.9

Table 8 External Injury Cause Females: Count, Age-Adjusted Rate and 95% Confidence Intervals

<b>Injury Type</b>	<b>Count</b>	<b>Point</b>	<b>Lower</b>	<b>Upper</b>
Alcohol Poisoning	30	11.2	7.1	15.2
All Terrain Vehicle	3	1	NA	2.1
Animal Rider	1	0.3	NA	0.8
Assault, Firearm	6	2.1	0.4	3.8
Assault, Other	12	3.9	1.6	6.2
Assault, Sharp Object	6	2.1	0.4	3.9
Cold Exposure	11	4.2	1.7	6.8
Drowning	5	1.4	0.2	2.5
Falls	26	11.4	6.9	15.8
MV Crash Occupant	85	29.3	22.9	35.7
Natural Heat	1	0.4	NA	1.2
Opioid poisoning	9	3.6	1.2	6
Other Mechanical Forces	NA			
Pedestrian	29	9.9	6.2	13.6
Sharp Objects	NA			
Smoke, Fire, Flame	2	0.7	NA	1.8
Suffocation	11	4.5	1.8	7.2
Suicide Firearms	1	0.4	NA	1.2
Suicide Hanging	21	6.1	3.4	8.8
Suicide Other	5	1.7	0.2	3.1
Undetermined Intent	13	4.4	2	6.9

Table 9 External Injury Cause Males: Count, Age-Adjusted Rate and 95% Confidence Intervals

<b>Injury Type</b>	<b>Count</b>	<b>Point</b>	<b>Lower</b>	<b>Upper</b>
Alcohol Poisoning	124	49	40.3	57.7
All Terrain Vehicle	5	1.8	0.2	3.4
Animal Rider	4	1.5	<0.1	3
Assault, Firearm	27	9	5.5	12.5
Assault, Other	42	16.7	11.6	21.9
Assault, Sharp Object	24	8.9	5.2	12.5
Cold Exposure	49	19	13.6	24.4
Drowning	14	5.5	2.6	8.3
Falls	42	16.3	11.3	21.3
MV Crash Occupant	181	66.3	56.4	76.1
Natural Heat	3	1.2	NA	2.6
Opioid poisoning	19	8.1	4.4	11.7
Other Mechanical Forces	NA			
Pedestrian	95	34.2	27.2	41.2
Sharp Objects	NA			
Smoke, Fire, Flame	5	1.7	0.2	3.1
Suffocation	31	12.1	7.8	16.5
Suicide Firearms	26	9.9	6	13.8
Suicide Hanging	85	30.2	23.6	36.8
Suicide Other	14	5.7	2.7	8.7
Undetermined Intent	48	18.3	13.1	23.6

## Comparisons to U.S. and Border States

The Navajo Nation has lower age-adjusted mortality than the U.S. and its border states for Malignant neoplasms and Diseases of the heart. The Navajo Nation has substantially higher mortality than the same groups for Unintentional injuries, motor vehicle accidents, accidental poisoning, and assault (Table 11). While the Navajo Nation has higher mortality than comparison groups for Intentional self-harm, the rates are very similar to New Mexico and Utah. Comparisons between the remaining Navajo Nation Leading causes of death and the U.S. can be seen in Table 12. The Navajo Nation is 2 or more times greater than the U.S. for Chronic liver disease and cirrhosis, Diabetes, and Influenza and pneumonia. The Navajo Nation is 2 or more times less than the U.S. for Chronic lower respiratory disease and Alzheimer’s.

Table 11 Age-Adjusted Rates for major causes of death: Navajo Nation, U.S., Arizona, New Mexico, and Utah (2017)<sup>vi</sup>

Geographic Location	All Causes	Malignant Neoplasms	Diseases of heart	Accidents (unintentional injuries)	Motor vehicle accidents	Accidental poisoning and exposure to noxious substances	Intentional self-harm (suicide)	Assault
<b>Navajo Nation</b>	1027.8	<b>117.9</b>	<b>132.9</b>	162.7	68.3	41.6	26.4	21.0
<b>U.S.</b>	731.9	152.5	165.0	49.4	12.0	20.1	14.0	6.2
<b>Arizona</b>	678.5	135.8	141.9	56.2	14.2	20.7	18.2	6.6
<b>New Mexico</b>	754.7	138.3	151.4	68.2	19.3	24.9	23.3	8.5
<b>Utah</b>	700.1	120.3	150.2	44.2	9.9	17.4	22.7	2.6

Table 12 Age-Adjusted Rates for additional Navajo and U.S. Leading Causes of Death (2017)

Cause of Death	Navajo Nation	U.S.	Ratio Navajo Nation to U.S.
Diabetes	66.6	21.5	3.1
Chronic liver disease and cirrhosis	64.0	10.9	5.9
Cerebrovascular disease (stroke)	38.2	37.6	1.02
Influenza and pneumonia	31.8	14.3	2.2
Septicemia	19.3	10.6	1.8
Renal failure	15.2	13.0	1.2
Chronic lower respiratory disease	15.1	40.9	0.4
Alzheimer's	10.5	31.0	0.3
Essential hypertension and hypertensive renal disease	10.4	9.0	1.2
Parkinson disease	12.4	8.4	1.5
Pneumonitis due to solids and liquids	7.8	5.1	1.5

Table 13 Age-Adjusted Rates for leading causes of death: Navajo Nation and Comparisons to recent State reports

Cause of Death	Navajo Nation	Arizona (2016) <sup>iii</sup>	New Mexico (2017) <sup>iv</sup>	Utah (2017) <sup>v</sup>
Diseases of the heart	132.9	142.5	185.3	151.1
Malignant neoplasms	117.9	140.7	172.1	120.8
Unintentional injuries	162.7	53.7	69.5	44.3
Chronic lower respiratory disease	15.1	45.0	54.4	32.3
Cerebrovascular disease	38.2	30.7	41.8	36.4
Alzheimer's	10.5	37.3	27.2	42.4
Diabetes	66.6	24.5	32.0	23.0
Influenza and pneumonia	31.8	10.4	16.1	13.4
Intentional self-harm	26.4	17.7	23.4	22.7
Chronic liver disease and cirrhosis	64.0	15.1	28.8	8.8

## Technical Notes

“In this report, tabulations of cause-of-death statistics are based solely on the underlying cause of death. The underlying cause is defined by WHO as “the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury” (5). The underlying cause is selected from the conditions entered by the medical certifier in the cause-of-death section of the death certificate. When more than one cause or condition is entered by the medical certifier, the underlying cause is determined by the sequence of conditions on the certificate, provisions of ICD, and associated selection rules and modifications. Generally, more medical information is reported on death certificates than is directly reflected in the underlying cause of death.”<sup>vi</sup>

### Population Estimates

A similar methodology used for population estimates is explained in the Methods of this report. The American Community Survey was used along with U.S. Census Bureau Summary Files to provide data that is more current than 2010 and to help smooth the estimates. The utilization of the ACS is the primary difference in methods for population estimates compared to the 2006-2009 study. The Utah portion of the Navajo Nation and more border towns are included which helps explain increased average population numbers per year compared to the 2006-2009 study. Tables A-1 through A-3 display population estimates for the study by Age Group and Gender. Differences in per year average population estimates between the 2006-2009 and the 2015-2017 study can be seen in Table A-4. Average population for 2006-2009 if Utah population numbers and border towns had been included can be seen in Table A-5. Total population growth under these circumstances is 3.7% from the initial study to this current study with most of the growth occurring among those 50 years and older.

Table A-1 Navajo Nation Estimated Population 2015-2017, Both Genders: by Agency and Age group

Agency	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+	Total
<b>Chinle</b>	13,073	15,725	11,073	7,786	9,232	8,804	5,329	3,432	1,995	
<b>Eastern</b>	22,469	23,868	19,791	14,311	15,007	14,736	9,265	5,315	2,427	
<b>Ft. Defiance</b>	19,898	21,409	19,552	13,820	16,403	17,095	11,537	7,317	3,622	
<b>Northern</b>	24,786	23,620	23,570	16,760	17,247	17,149	9,325	5,844	2,969	
<b>Western</b>	23,744	23,153	22,423	15,144	15,784	15,304	7,995	5,283	2,952	
<b>Total</b>	103,970	107,775	96,409	67,821	73,673	73,088	43,451	27,191	13,965	607,343

Table A-2 Navajo Nation Estimated Population 2015-2017, Females: by Agency and Age group

Agency	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+	Total
<b>Chinle</b>	6,767	7,862	5,258	3,865	4,739	4,847	2,819	2,018	1,248	
<b>Eastern</b>	11,183	12,220	9,667	7,548	7,875	8,319	5,120	3,148	1,461	
<b>Ft. Defiance</b>	9,588	10,610	9,888	6,629	8,396	9,266	6,360	4,274	2,308	
<b>Northern</b>	12,450	11,902	11,279	8,289	8,543	9,139	5,013	3,140	1,999	
<b>Western</b>	11,877	11,915	11,380	7,651	8,243	8,548	4,615	3,034	1,892	
<b>Total</b>	51,865	54,509	47,472	33,982	37,796	40,119	23,927	15,614	8,908	314,192

Table A-3 Navajo Nation Estimated Population 2015-2017, Males: by Agency and Age group

Agency	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+	Total
<b>Chinle</b>	6,306	7,863	5,815	3,921	4,493	3,957	2,510	1,414	747	
<b>Eastern</b>	11,286	11,648	10,124	6,763	7,132	6,417	4,145	2,167	966	
<b>Ft. Defiance</b>	10,310	10,799	9,664	7,191	8,007	7,829	5,177	3,043	1,314	
<b>Northern</b>	12,336	11,718	12,291	8,471	8,704	8,010	4,312	2,704	970	
<b>Western</b>	11,867	11,238	11,043	7,493	7,541	6,756	3,380	2,249	1,060	
<b>Total</b>	52,105	53,266	48,937	33,839	35,877	32,969	19,524	11,577	5,057	293,151

Table A-4 Differences in Average Estimated Navajo Population, Both Genders: 2006-2009 and 2015-2017 (Population numbers rounded to the nearest person)

Per year	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+	total
<b>2006-2009</b>	34756	37266	25257	21583	21562	17361	10991	6711	3243	178730
<b>2015-2017</b>	34656.67	35925	32136	22607	24558	24363	14484	9064	4655	202448
<b>% Change</b>	-0.3	-3.6	27.2	4.7	13.9	40.3	31.8	35.1	43.5	13.3

Table A-5 Differences in Average Estimated Navajo Population if Utah and additional border towns were included in 2006-2009, Both Genders: 2006-2009 and 2015-2017 (Population numbers rounded to the nearest person)

Per year	<10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80+	total
<b>2006-2009</b>	38250	40731	28236	23823	23432	18662	11639	7041	3427	195240
<b>2015-2017</b>	34657	35925	32136	22607	24558	24363	14484	9064	4655	202448
<b>% Change</b>	-9.4	-11.8	13.8	-5.1	4.8	30.5	24.4	28.7	35.9	3.7

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<sup>i</sup> Navajo Nation Mortality Report, 2006-2009, Arizona & New Mexico Data. Navajo Epidemiology Center.

<sup>ii</sup> Arizona: Flagstaff, Holbrook, Hopi Nation, Joseph City, Page, Sanders CDP, Winslow; New Mexico: Aztec, Bloomfield, Cuba, Farmington, Gallup, Grants, Kirtland, Socorro, Thoreau CDP, Tse Bonito, Waterflow, Zuni ; Utah: Blanding, Monticello

<sup>iii</sup> Arizona Health Status and Vital Statistics 2016 (accessed 1/28/20)

<sup>iv</sup> NM-IBIS, accessed 1/28/20

<sup>v</sup> UT-IBIS, accessed 1/28/20

<sup>vi</sup> Kochanek KD, Murphy SL, Xu JQ, Arias E. Deaths: Final data for 2017. National Vital Statistics Reports; vol 68 no 9. Hyattsville MD: National Center for Health Statistics. 2019.