OLMSTED COUNTY MORTALITY REPORT

Summary of Vital Statistics Death Data, 2011-2020
Effective Date: September 2022

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Overview

Summary: This report presents final death data for Olmsted County residents by age, race and ethnicity, sex, and cause of death. Mortality data is an important measure of community health, and overall mortality indicators can effectively measure changes by year. Differences in leading causes of death were observed based on sex, age group, and race and ethnicity. Only causes with at least 20 deaths were included.

Between 2011 and 2015, the leading causes of death accounted for 72.0% of all deaths occurring to Olmsted County residents. They were, in rank order:

1. Malignant neoplasms (cancer).
2. Diseases of heart.
3. Accidents (unintentional injuries).
4. Chronic lower respiratory diseases (CLRD).
5. Cerebrovascular diseases (stroke).
6. Alzheimer's disease.
7. Diabetes mellitus.
8. Intentional self-harm (suicide).
9. Parkinson's disease.

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8. Diabetes mellitus.
9. Intentional self-harm (suicide).
10. Chronic liver diseases and cirrhosis (CLD).

The age-adjusted death rate increased between 2011 and 2020, from 570.7 to 630.4 deaths per 100,000 individuals. The years of potential life lost rate also increased, from 2,853 to 2,933 person years per 100,000 individuals under 65.

Glossary

- **Accidents (unintentional injuries):** Unexpected and unintentional deaths.
- **Automated Classification of Medical Entities (ACME):** A software system that selects an underlying cause of death when multiple codes are entered.
- **Alzheimer's disease:** A progressive brain disease where the brain shrinks and becomes damaged over time[1].
- **Age-adjusted death rate (AADR):** Also called direct adjustment. AADR is a mortality rate calculated based on the U.S. 2000 standard population. The population of interest is changed (i.e., adjusted) to look like the U.S. 2000 standard population. AADRs are used to make fairer comparisons of relative mortality risk across groups and time. Rates are often calculated per 100,000 people. However, the rate is not an actual measurement of mortality risk.
- **Aggressive methods of suicide:** Deaths with an ACME code of X70 or X72-X82. Methods include firearms, hanging, jumping, self-mutilation, and drowning.
- **Cause specific mortality rate:** A crude mortality rate for the number of deaths due to a specific cause (e.g., cancer).
- **Cerebrovascular diseases (stroke):** An event where the blood's oxygen supply to the brain is stopped or reduced[1].
- **Chronic liver disease and cirrhosis (CLD):** An umbrella term for long-term diseases of the liver. Causes of CLD can include alcohol abuse and viral infections[1].
- **Chronic lower respiratory disease (CLRD):** An umbrella term for long-term diseases of the lungs. The most common CLRD is chronic obstructive pulmonary disease (COPD) [1].
- **Crude mortality rate (CMR):** A ratio of the total number of deaths recorded and the number of individuals in a specific population. It is then scaled by population size and time.
    - *E.g.*, In one year, there were 1,550 deaths in a community with 375,000 people. The rate is then scaled to 100,000 people. The CMR for that year would be 413.3 per 100,000 people.
- **Diabetes mellitus:** Diabetes includes type 1 and type 2 diabetes. In both types, diabetes affects the body's ability to use blood sugar[1].
- **Diseases of heart:** An umbrella term for diseases that affect the heart. Examples include coronary artery disease and arrhythmias[1].
- **Hypertensive heart disease:** Also called hypertension (HTN) or high blood pressure. Long-term high blood pressure can damage the heart and cause heart disease (HTN heart disease) [1].
- ***In situ* neoplasms:** Also called benign neoplasms. Pre-cancerous tumors that have not spread throughout the body. These can lead to cancer over time[1].
- **Influenza and pneumonia (I&P):** Influenza, also called the flu, is a viral infection that affects the lungs and respiratory system. Pneumonia is an infection of the tiny air sacs in the lungs. Influenza can cause pneumonia, but so can other viruses, bacteria, fungi, and parasites[1].
- **Intentional self-harm:** Also called suicide. Death where the individual intends to take their own life.
- **Ischemic heart disease:** Also called coronary heart disease (CHD). A disease where the blood vessels that supply the heart with blood are thickened or blocked. Blocked coronary arteries can cause a heart attack[1].
- **Malignant neoplasms:** Also called cancer. Numerous diseases where the cells of the body divide and spread uncontrollably[1].
- **Malignant neoplasms of breast:** Also called breast cancer. Cancerous tumors that affect the breast tissue. Mostly affects females[1].
- **Malignant neoplasms of colon, rectum and anus:** Also called colon cancer or colorectal cancer. Cancerous tumors that affect the end of the digestive tract, including the large intestine[1].

- **Malignant neoplasms of esophagus:** Also called esophageal cancer. Cancerous tumors that affect the esophagus[1].
- **Malignant neoplasms of liver and intrahepatic bile ducts:** Also called liver cancer. Cancerous tumors that affect the liver[1].
- **Malignant neoplasms of lymphoid, hematopoietic and related tissue:** Also called blood, bone, and lymph tissue cancers. Lymphoma, leukemia, and myeloma are all forms of this group of cancer[1].
- **Malignant neoplasms of meninges, brain and other parts of the central nervous system:** Also called brain cancer. Cancerous tumors that affect the brain and nervous system[1].
- **Malignant neoplasms of ovary:** Also called ovarian cancer. Cancerous tumors that affect the ovary tissue. Only affects females[1].
- **Malignant neoplasms of pancreas:** Also called pancreatic cancer. Cancerous tumors that affect the pancreas[1].
- **Malignant neoplasms of prostate:** Also called prostate cancer. Cancerous tumors that affect the prostate tissue. Only affects males[1].
- **Malignant neoplasms of trachea, bronchus and lung:** Also called lung cancer. Cancerous tumors that affect the trachea (windpipe) and lungs[1].
- **Non-aggressive methods of suicide:** Deaths with an ACME code of X60-X69 or X71. Methods include poisoning and drowning.
- **Parkinson's disease:** A progressive disease that affects the nervous system[1].
- **Rheumatic fever:** A condition that occurs after an untreated strep throat infection where the body's immune system attacks the healthy tissue of the heart[1].
- **Standardized mortality ratio (SMR):** Also called indirect adjustment. Indirect adjustment averages age-adjusted death rates and is used when deaths in a group are small. This value is a percentage given as an SMR. An SMR greater than 100 indicates that more deaths were observed than expected, while an SMR less than 100 indicates fewer deaths were observed than expected.
    - *E.g.*, SMR of 135 indicates there were 35% more deaths observed in a group than was expected.
- **Years of potential life lost (YPLL):** The addition of the number of deaths at each age subtracted from 65 years. Deaths that occurred after age 65 were excluded. YPLL can be expressed as a rate, using the same process as a crude mortality rate. However, the population would only be in individuals aged under 65.
    - *E.g.*, A town of 2,200 had ten deaths last year. If the deaths occurred at ages 2, 20, 44, and seven over 65 the YPLL would be 129. If 1,900 residents were under 65, the YPLL rate would be 6,789.5 per 100,000 people under 65.

Methods of Analysis

Data Source(s): Data was collected from yearly death and birth files. Data was obtained from the Minnesota Center for Health Statistics (MCHS). Data is based on Olmsted County death and birth certificates reported to MCHS. Population estimates are mid-year population estimates. Population estimates were collected from the Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER)[2].

Population: Olmsted County is the seventh largest county in Minnesota by population. The population of Olmsted County at the 2020 Census was 162,847. The population has grown 13% since 2000. Roughly 22% of the county's population is a member of a racial minority. The minority population has increased by over 200% since 2000.The median age in 2020 was 37.4 years and 51% of residents were female. The county is split into eight cities and 18 townships. Rochester is the capital and largest city. Approximately 75% of the population lives in Rochester. The county has six major school districts and a 4-year high school graduation rate of 87%.

Methods: Cause of death is classified by the *International Classification of Diseases, tenth Revision* (ICD-10)[3]. Due to the possibility of multiple causes of death, the Automated Classification of Medical Entities (ACME) underlying cause of death was used. The underlying cause of death was grouped based on the List of 113 Selected Causes of Death and Enterocolitis Due to *Clostridium Difficile.* The underlying cause of death for infants was grouped based on the List of 130 Selected Causes of Infant Death[4]. Events can be considered mutually exclusive. Data is collected from death certificates completed by funeral directors, physicians, medical examiners, and coroners. This includes out-of-state events.

Demographic information on people who died was collected from informants and reported on death certificates. Race and ethnicity were classified in accordance with the United States Office of Management and Budget 1997 standards.

The percentage of total deaths from rankable causes can show the impact of cause-specific mortality. However, even though the rank may stay the same, over time, the percentage of deaths for that group and cause may change. Additionally, two populations may have the same rank but different percentages of death for the same cause.

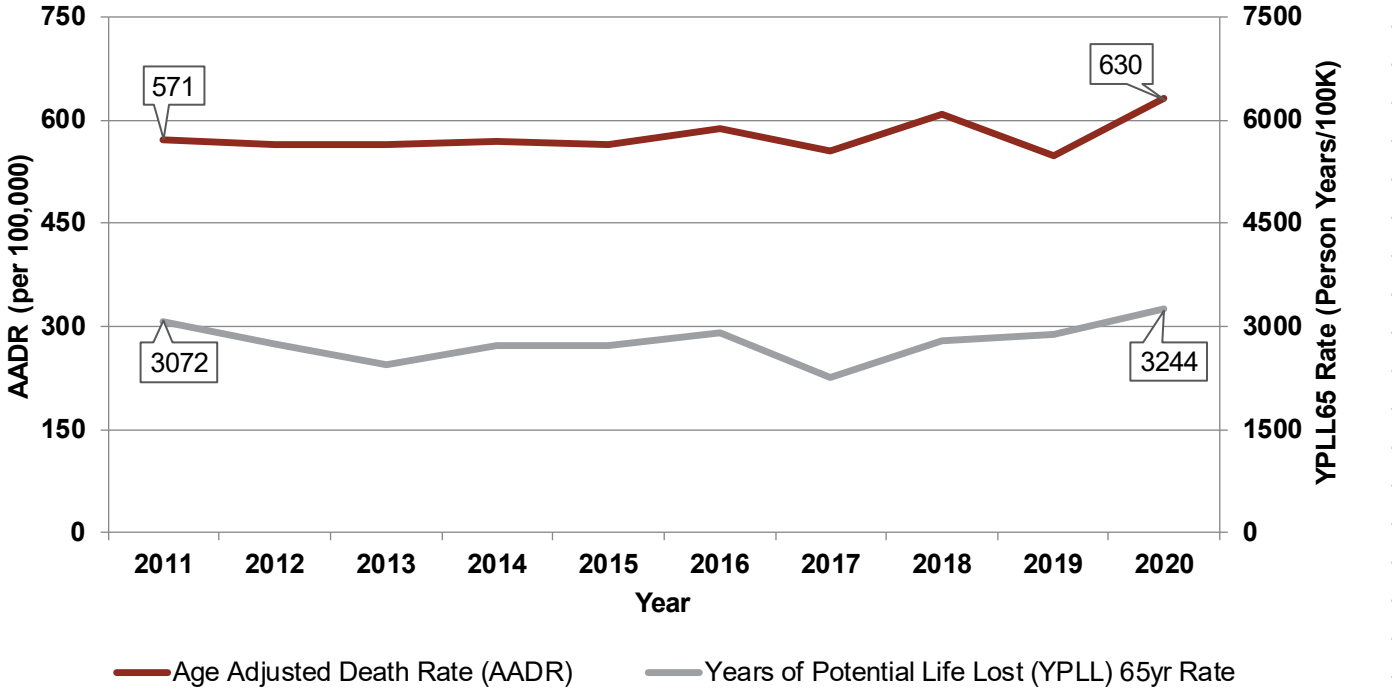
Age was grouped according to the U.S. standard population; <1 year, 1-4, 5-9, 10-14, 15-19, 20-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+. Summary age categories were also grouped; <1, 1-9, 10-24, 35-44, 45-64, and 65+. The leading cause of death for an age group does not necessarily align with the leading cause of death for a specific age. Descriptive statistics of less than 20 events were suppressed. Deaths were grouped into five-year bins to limit data suppression. IBM SPSS Statistics, Version 24 was used for analysis. Graphs and tables were created in Microsoft Excel.

Findings

The total number of resident deaths in Olmsted County has been increasing steadily since 2011. Over the past ten years, 10,495 deaths have been recorded. The average annual number of deaths was 1,049.5. There were 1,271 recorded deaths of Olmsted County residents in 2020, a 39.1% increase from 914 deaths in 2011. This is likely due to an aging population. Overall life expectancy stayed consistent between 2011 and 2016, ranging between 82.2 and 82.9 years. Over the past ten years life expectancy was highest in 2017 at 83.2 years, before falling to 81.9 years in 2018, and rising again to 83.1 years in 2019. Life expectancy fell to the lowest recorded level in 2020 at 81.3 years.

Generally, the overall age-adjusted death rate (AADR) mirrored life expectancy. The AADR stayed stable between 2011 and 2015 but has seen more variability in recent years. It increased to the highest recorded level in 2020 (630.4/100K). The years of potential life lost ($YPLL_{65}$) rate also tracked closely with life expectancy. The $YPLL_{65}$ rate varied slightly between 2011 and 2016 before dipping to the lowest level in 2017 at 2,059 person years per 100,000 individuals under 65 years of age. The rate has been increasing since, peaking in 2020 at 2,933 person years per 100,000 individuals under 65 years of age. This means more young people (under 65 years) are dying.

Figure 1. Age-Adjusted Death Rate and Years of Potential Life $Lost_{65}$: Olmsted County 2011-2020



Leading Causes of Death

Between 2011 and 2015, the ten leading causes of death accounted for 72.0% of deaths for Olmsted County residents. Cancer and heart disease were the first and second leading causes of death. These two causes of death resulted in 44.1% of all deaths. Completing the ten leading causes of death between 2011 and 2015 were accidents (third), CLRD (fourth), stroke (fifth), Alzheimer's (sixth), I&P (seventh), diabetes (eighth), suicide (ninth), and Parkinson's (tenth). These eight causes together accounted for 27.9% of deaths.

Between 2016 and 2020, the ten leading causes of death accounted for 72.9% of deaths for Olmsted County residents. Heart disease and cancer switched rank order but remain the top leading causes of death, accounting for 44.4% of all deaths. Completing the ten leading causes of death between 2016 and 2020 were Alzheimer's (third), Accidents (fourth), CLRD (tied fifth), stroke (tied fifth), Parkinson's (seventh), Diabetes (eighth), suicide (ninth), and CLD (tied tenth). These eight causes accounted for 28.5% of deaths. COVID-19, a new condition in 2020, was tied for tenth in 2016-2020.

The leading causes of death in 2016-2020 mainly remained the same as in 2011-2015. The rank order changed for all causes except stroke and CLD. The percentage of deaths with the largest changes were Alzheimer's (+3.5%), accidents (-1.6%), heart disease (+1.3%), and cancer (-1.1%). The only exceptions were:

- I&P, which was ranked seventh in 2011-2015 but fell out of the top 10 in 2016-2020.
- CLD, which was not ranked in 2011-2015 but tied for tenth in 2016-2020.
- COVID-19 was also tied for tenth in 2016-2020 but was not included in the ranking as it was not observed in 2011-2015.

Differences by Sex

Over the past ten years, 5,269 deaths for females and 5,226 deaths for males have been recorded. There were 644 female deaths and 627 male deaths recorded among Olmsted County residents in 2020. Similar to overall trends, female life expectancy stayed consistent between 2011 and 2016, ranging from 84.6 years to 85.7 years. Male life expectancy was more varied, ranging from 79.0 to 80.9 years. Life expectancy was highest for females, 85.7 years, in 2013 and highest for males, 81.7 years, in 2017. Female life expectancy fell to the lowest recorded level in 2020 at 83.4 years. Male life expectancy also fell in 2020 to 79.2 years but was lowest in 2016.

The $YPLL_{65}$ rate for both populations fell between 2011 and 2013. The male $YPLL_{65}$ rate increased sharply in 2016 before dipping to the lowest level in 2017 at 2,706 person years per 100,000 individuals under 65 years of age. Females had a more gradual increase and decrease. The rate has been increasing since 2016, peaking in 2020 at 1,567 person years per 100,000 individuals under 65 years of age for females and 2,764 person years per 100,000 individuals under 65 years of age for males. This indicates that more males are dying at younger ages than females.

Table 1. Deaths and percent of total deaths for the 10 leading causes of death: Olmsted County 2011-2020

Cause of death (based on ICD-10)		2011-2015			2016-2020		
		Rank	Deaths	Percent	Rank	Deaths	Percent
All causes		---	4,823	100.0%	---	5,672	100.0%
Diseases of heart	(I00–I09, I11, I13, I20–I51)	2	1,048	21.7%	1	1,308	23.1%
Malignant neoplasms	(C00–C97)	1	1,080	22.4%	2	1,210	21.3%
Alzheimer disease	(G30)	6	190	3.9%	3	422	7.4%
Accidents (unintentional injuries)	(V01–X59, Y85–Y86)	3	376	7.8%	4	352	6.2%
Chronic lower respiratory diseases	(J40–J47)	4	258	5.3%	T5	251	4.4%
Cerebrovascular diseases	(I60–I69)	5	243	5.0%	T5	251	4.4%
Parkinson disease	(G20–G21)	10	60	1.2%	7	99	1.7%
Diabetes mellitus	(E10–E14)	8	71	1.5%	8	94	1.7%
Intentional self-harm (suicide)	(X60–X84, Y87.0)	9	70	1.5%	9	93	1.6%
Chronic liver disease and cirrhosis	(K70, K73–K74)	NR	48	1.0%	T10	56	1.0%

--- Category not applicable.

Rank is based on number of deaths. Percentage is based on total deaths for that year group.

COVID-19 (U07.1) was T10 in 2016-2020 but was excluded from this table due to not being present in 2011-2015.

Influenza and pneumonia (J09-J18) was ranked No. 7 in 2011-2015 with 78 deaths.

Source: Minnesota Center for Health Statistics

Figure 2. Age-Adjusted Death Rate, by Sex: Olmsted County 2011-2020

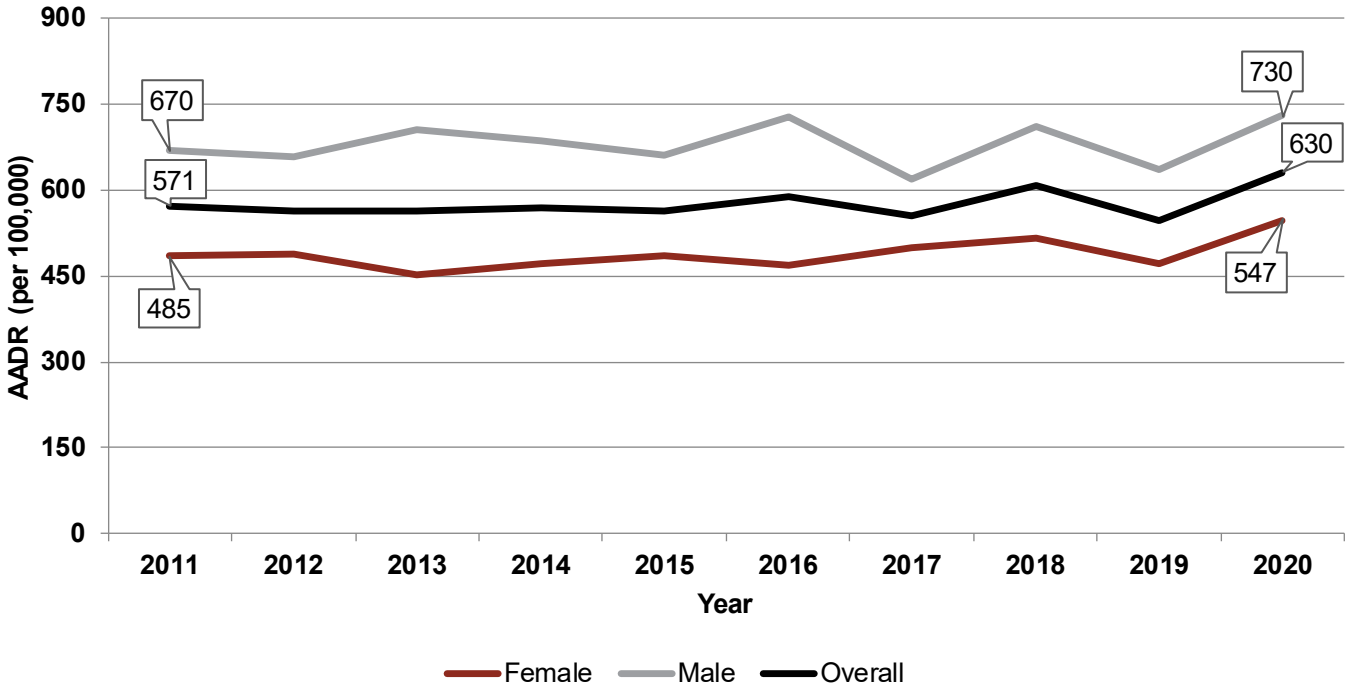


Figure 3. Years of Potential Life Lost$_{65}$ Rate, by Sex: Olmsted County 2011-2020

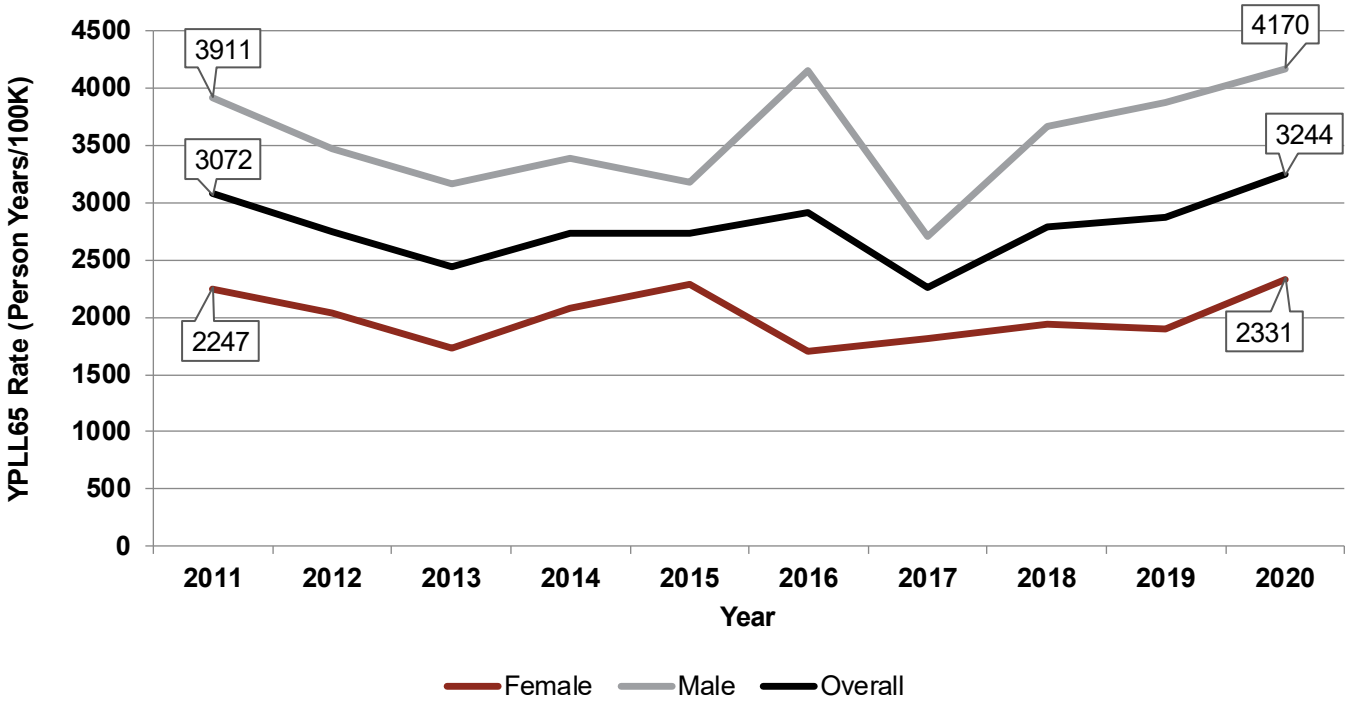
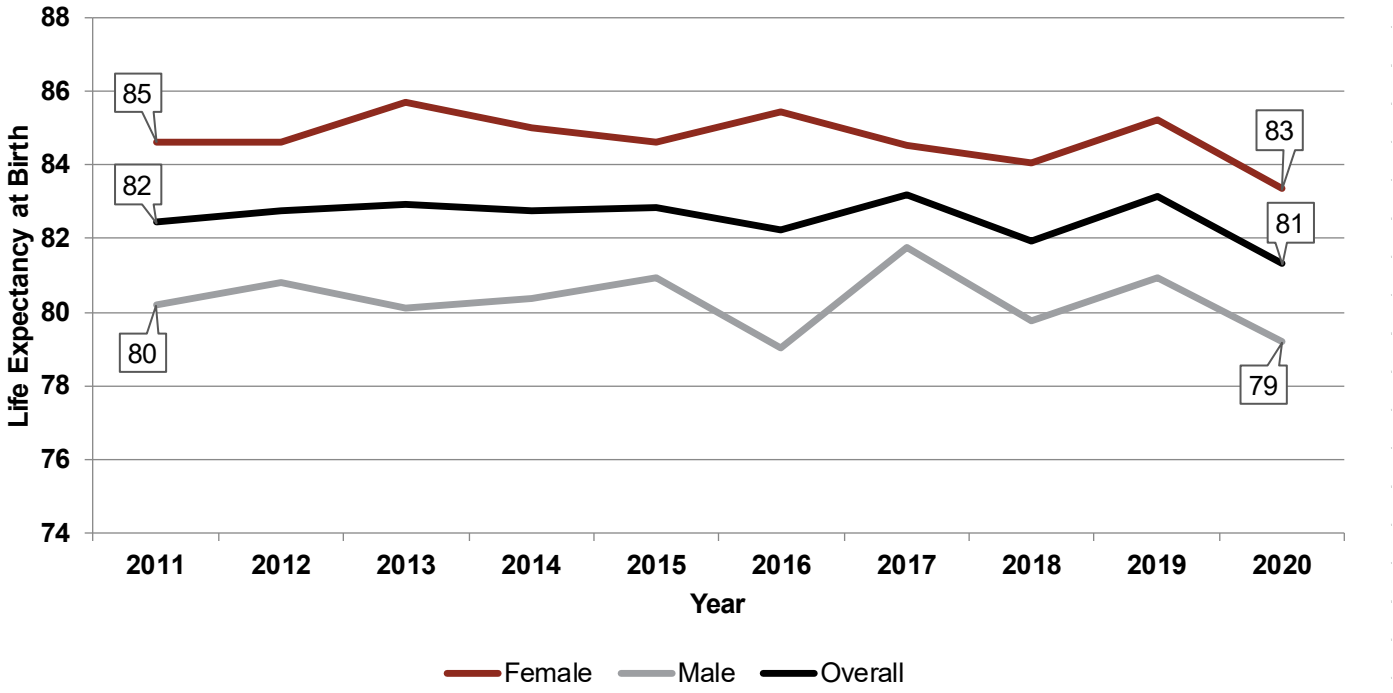


Figure 4. Life Expectancy at Birth, by Sex: Olmsted County 2011-2020



Cancer and heart disease were the top two causes of death between 2011 and 2015. For females, cancer accounted for 20.8% of deaths and heart disease accounted for 20.3%. For males, cancer accounted for 24.0% of deaths and heart disease accounted for 23.2%. Accidents and Alzheimer's were also ranked, third and sixth respectively.

Between 2016 and 2020, females and males shared the rank of the top two causes of death, heart disease and cancer. These two causes of death switched rank from 2011-2015. Heart disease accounted for 21.0% of deaths in females (+0.7%) and 25.2% in males (+2.0%). Cancer accounted for 20.0% of deaths in females (-0.8%) and 22.7% in males (-1.3%). Both populations also shared the tenth leading cause of death, CLD (0.8% in females and 1.1% in males), in 2016-2020. The percentage of deaths increased by 0.3% in females and decreased by 0.4% in males.

For both time frames, fatal accidents had a smaller impact among females when compared to males. In females, accidents were the third leading cause of death in 2011-2015 and the fourth leading cause of death in 2016-2020, resulting in 6.9% and 5.4% of deaths, respectively. In males, accidents were the third leading cause of death and accounted for 8.7% of deaths in 2011-2015 and 7.0% in 2016-2020. For both time frames, females had a higher burden of death from Alzheimer's. Alzheimer's was the sixth leading cause of death for both populations from 2011-2015. It rose to the third leading cause of death for females and the fifth leading cause of death for males in 2016-2020. The difference between the deaths in females and males for Alzheimer's disease was 2.7% in 2011-2015 and 6.7% in 2016-2020. For females, 10.8% of deaths were caused by Alzheimer's disease during 2016-2020.

Table 2. Deaths and percent of total deaths for the 10 leading causes of death: Olmsted County 2011-2020

Cause of death (based on ICD-10)		2011-2015			2016-2020		
		Rank	Deaths	Percent	Rank	Deaths	Percent
Female							
All causes		---	2,417	100.0%	---	2,852	100.0%
Diseases of heart	(I00–I09, I11, I13, I20–I51)	2	491	20.3%	1	598	21.0%
Malignant neoplasms	(C00–C97)	1	502	20.8%	2	569	20.0%
Alzheimer disease	(G30)	6	128	5.3%	3	307	10.8%
Accidents (unintentional injuries)	(V01–X59, Y85–Y86)	3	166	6.9%	4	154	5.4%
Cerebrovascular diseases	(I60–I69)	4	146	6.0%	5	153	5.4%
Chronic lower respiratory diseases	(J40–J47)	5	135	5.6%	6	126	4.4%
Parkinson disease	(G20–G21)	9	21	0.9%	7	41	1.4%
Diabetes mellitus	(E10–E14)	7	44	1.8%	8	40	1.4%
Intentional self-harm (suicide)	(X60–X84, Y87.0)	NR	13	0.5%	NR	18	0.6%
Chronic liver disease and cirrhosis	(K70, K73–K74)	NR	11	0.5%	10	24	0.8%
Influenza and pneumonia	(J09-J18)	8	36	1.5%	9	28	1.0%
In situ neoplasms	(D00–D48)	10	18	0.7%	NR	20	0.7%
Male							
All causes		---	2,406	100.0%	---	2,820	100.0%
Diseases of heart	(I00–I09, I11, I13, I20–I51)	2	557	23.2%	1	710	25.2%
Malignant neoplasms	(C00–C97)	1	578	24.0%	2	641	22.7%
Alzheimer disease	(G30)	6	62	2.6%	5	115	4.1%
Accidents (unintentional injuries)	(V01–X59, Y85–Y86)	3	210	8.7%	3	198	7.0%
Cerebrovascular diseases	(I60–I69)	5	97	4.0%	6	98	3.5%
Chronic lower respiratory diseases	(J40–J47)	4	123	5.1%	4	125	4.4%
Parkinson disease	(G20–G21)	8	39	1.6%	8	58	2.1%
Diabetes mellitus	(E10–E14)	NR	27	1.1%	9	54	1.9%
Intentional self-harm (suicide)	(X60–X84, Y87.0)	7	57	2.4%	7	75	2.7%
Chronic liver disease and cirrhosis	(K70, K73–K74)	10	37	1.5%	10	32	1.1%
Influenza and pneumonia	(J09–J18)	9	38	1.6%	NR	20	0.7%

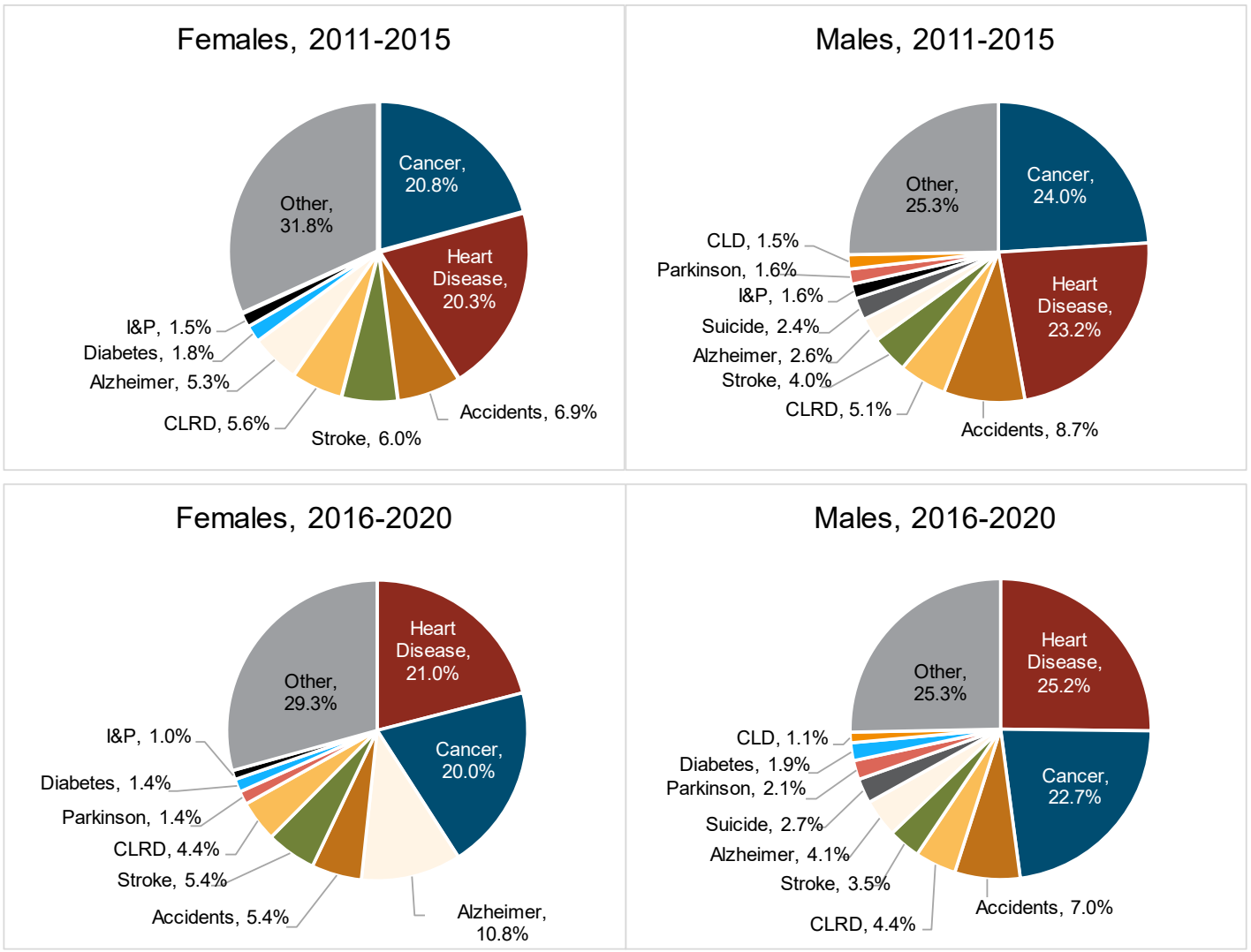
--- Category not applicable.

Rank is based on number of deaths. Percentage is based on total deaths for that year group.

COVID-19 (U07.1) was T10 in 2016-2020 but was excluded from this table due to not being present in 2011-2015.

Source: Minnesota Center for Health Statistics

Figure 5. Percent distribution of the 10 leading causes of death, by sex and year: Olmsted County



Note: Only causes of death with percentages greater than 1% are shown.

Differences by Age

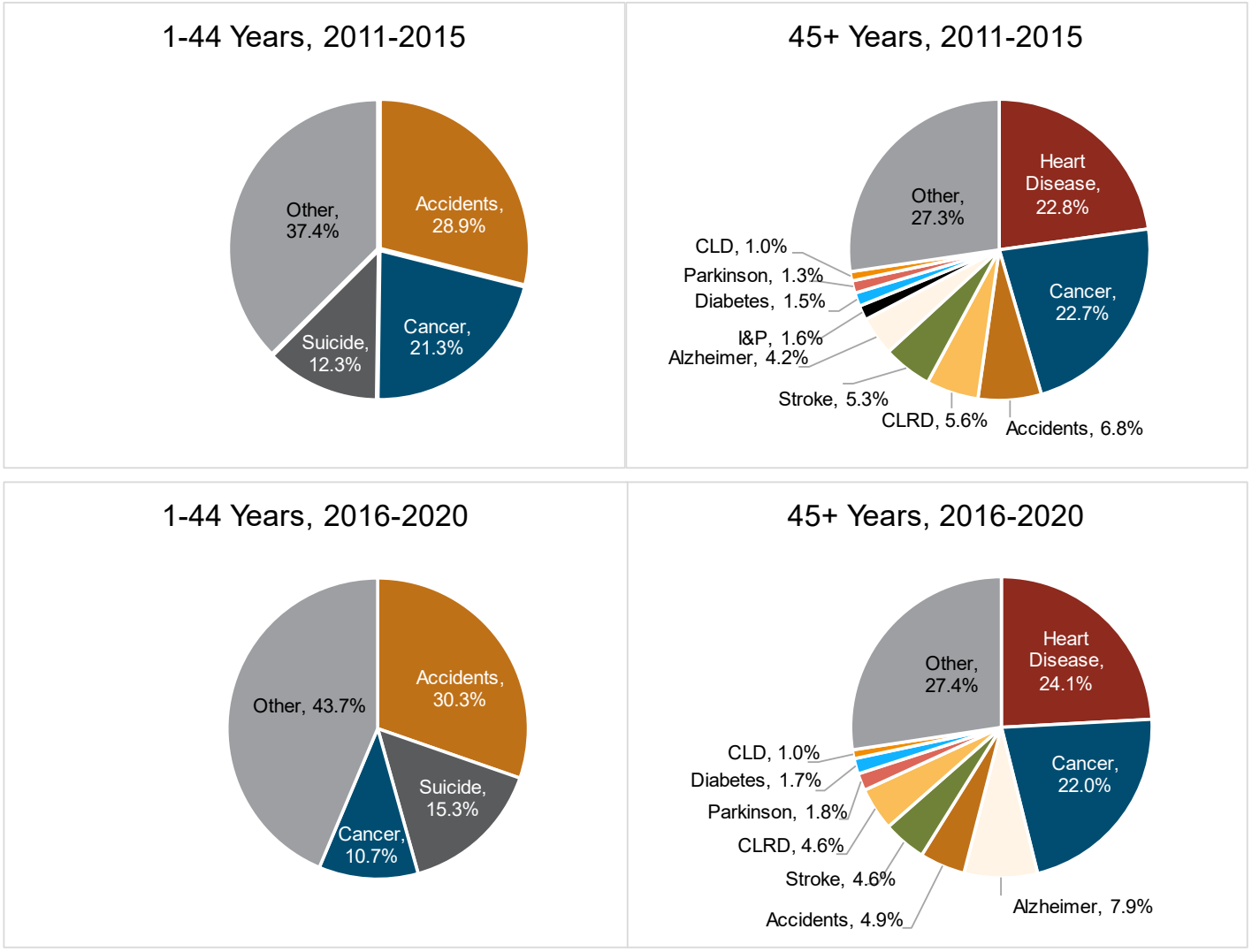
The vast majority of deaths in 2011-2015 and 2016-2020 occurred in older populations. The number of deaths in the less than 1 and 1-9-year-old age groups had one period with a suppressed value. For 10-24-year-olds, only one cause of death had more than 20 deaths. Deaths for these three age groups were combined for 2011-2015 and 2016-2020. Over the 2011-2020 period, 63 deaths were recorded in infants (less than 1 year old). Between these two time periods, a decrease in infant mortality was observed. The infant mortality rate decreased from 4.6 per 1,000 live births in 2011-2015 to 1.3 per 1,000 live births in 2016-2020. However, over the same 10-year period, 48 deaths were recorded in the 1-9-year-old age group. The leading causes of infant deaths were perinatal conditions (52.4% of all infant deaths) and congenital conditions (31.7% of all infant deaths). Together perinatal and congenital conditions resulted in 84.1% of all infant deaths.

An increase in childhood deaths was observed between 2011-2015 and 2016-2020. Among children aged 1-9-years-old, all death categories were suppressed. However, 29.2% of ACME codes were missing and the underlying cause of death could not be classified. Accidents were the leading cause of death for the 10-24 age group, resulting in 38.3% of deaths. The second leading cause of death was suicide which resulted in 17.4% of deaths.

The leading cause of death varied by age group. Generally, external causes resulted in more deaths for younger age groups. Among individuals aged 1-44, accidents (leading cause) and suicide (third leading cause) accounted for 41.2% of deaths in 2011-2015 and increased to 45.6% in 2016-2020. Cancer was the second leading cause of death. The proportion of cancer deaths was 21.3% from 2011-2015. The proportion of cancer deaths in this age group (1-44) halved between 2016-2020, falling to 10.7%. Cancer also fell to the third leading cause of death.

Chronic diseases were more common in older age groups. Among the over 45-years age group, eight of the top ten leading causes of death were chronic conditions. These eight resulted in 64.3% of deaths in 2011-2015 and 67.7% of deaths in 2016-2020. Like the 1–44-year age group, cancer was the second leading cause of death for 45+ in 2011-2015. Cancer deaths were similar at 22.7% for those over 45 years. The proportion of cancer deaths for the 45+ age group in 2016-2020 was similar to 2011-2015, falling slightly to 22.0%. External causes in individuals aged 45+ were less common. Accidents and suicide accounted for 7.8% of deaths in 2011-2015 and decreased to 5.8% in 2016-2020.

Figure 6. Percent distribution of the 10 leading causes of death, by age group and year: Olmsted County



Notes: Only causes of death with percentages greater than 1% are shown.
COVID-19 (U07.1) was No.9 for 45+ in 2016-2020 but was excluded from this graph due to not being present in 2011-2015.

Most deaths were observed among older populations. Between 2011-2015, 41.5% of deaths were among those aged 85+ years and 78.7% were among those aged 65+ years. The proportion of deaths among 85+ decreased to 40.3% in 2016-2020 but increased to 79.7% among 65+. This indicates more deaths were seen among adults 65-85 years. The leading causes of death were similar between both populations but different in rank order. Between 2011-2015, heart disease and cancer were the leading causes of death for those aged 65+ and 85+. However, the impact of these two diseases was greater in 65+ compared to 85+ (43.8% and 38.0%, respectively). More older adults died as a result of heart disease and cancer.

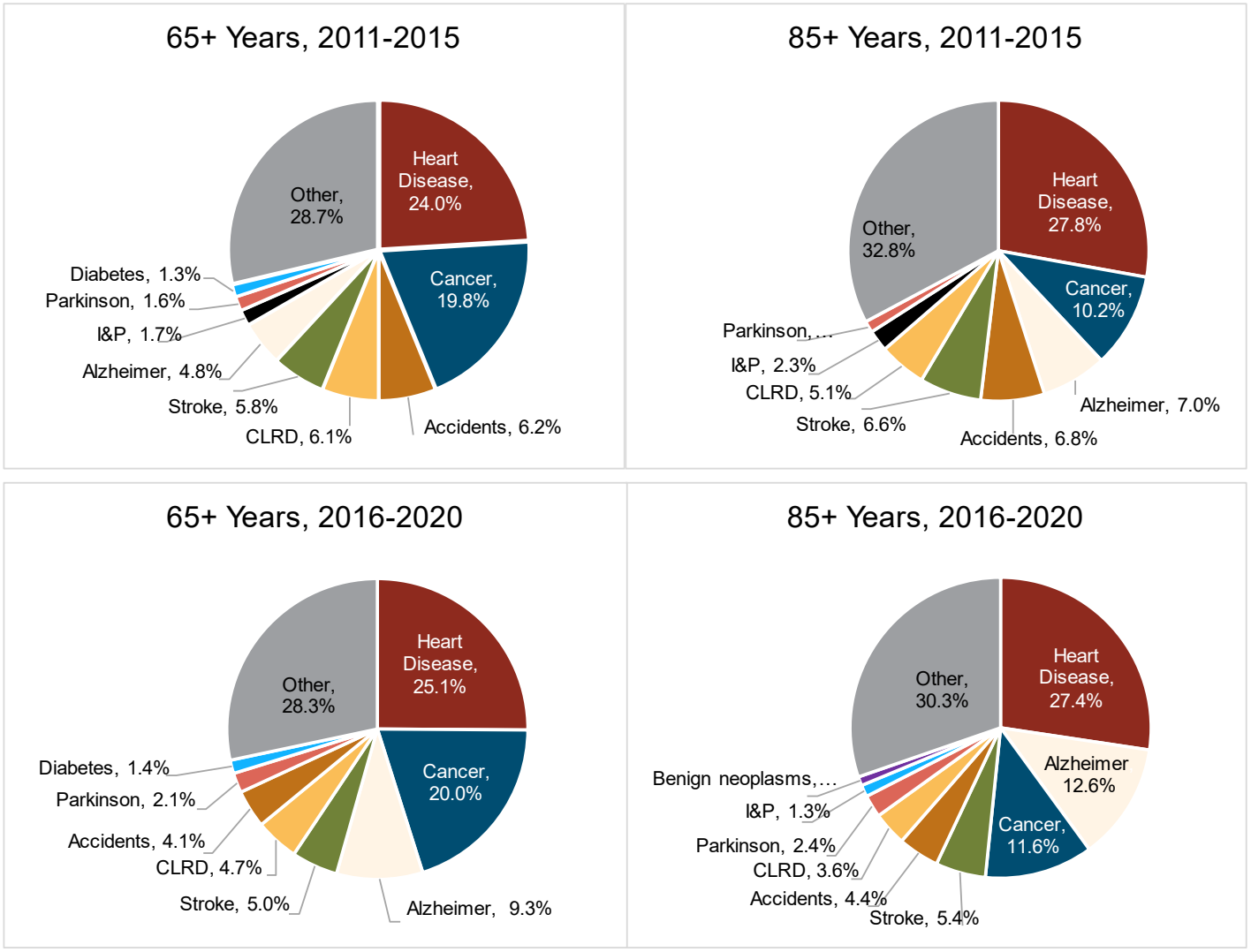
Completing the ten leading causes of death for 65+ between 2011 and 2015 were accidents (third), CLRD (fourth), stroke (fifth), Alzheimer's (sixth), I&P (seventh), Parkinson's (eighth), diabetes (ninth), and nephritis (tenth). These eight causes together accounted for 28.3% of deaths. For 85+, the remaining leading causes of death for 2011-2015 were Alzheimer's (third), accidents (fourth), stroke (fifth), CLRD (sixth), I&P (seventh), and Parkinson's (eighth). The 85+ age group only had eight causes of death with greater than twenty deaths.

Between 2016 and 2020, heart disease and cancer remained the top two leading causes of death for the 65+ age group. The impact of these two causes of death increased to 45.1%. Alzheimer's jumped from sixth to third,

with accidents decreasing from third to sixth. CLRD fell from fourth to fifth and I&P fell from seventh to tied for tenth. Stroke increased from fifth to fourth. Parkinson's and diabetes both rose one spot to seventh and eighth, respectively. Benign tumors were tied with I&P for the tenth leading cause of death. COVID-19 was the ninth leading cause of death for the 65+ and 85+ age groups. However, given it was a new condition for 2020 only, it was excluded from graphs and tables to make fairer comparisons for other causes of death.

Heart disease remained the leading cause of death for the 85+ age group in 2016-2020, but Alzheimer's replaced cancer as the second leading cause of death. Stroke and accidents switched rankings (now fourth and fifth, respectively). Similarly, Parkinson's and I&P also changed (now seventh and eighth, respectively). CLRD stayed at sixth and benign tumors finished out the top 10 causes of death.

Figure 7. Percent distribution of the 10 leading causes of death, by age group and year: Olmsted County



Notes: Only causes of death with percentages greater than 1% are shown.
COVID-19 (U07.1) was No.9 for 65+ and 85+ in 2016-2020 but was excluded from this graph due to not being present in 2011-2015.

Table 3. Deaths and percent of total deaths for the leading causes of death by age: Olmsted County

Cause of death (based on ICD-10)		2011-2015			2016-2020		
		Rank	Deaths	Percent	Rank	Deaths	Percent
<1 year							
All causes		---	50	100.0%		Suppressed	
Perinatal conditions	(P00–P96)	1	28	56.0%		Suppressed	
1-9 years							
All causes			Suppressed		---	40	100.0%
10-24 years							
All causes		---	49	100.0%	---	66	100.0%
Accidents (unintentional injuries)	(V01–X59, Y85–Y86)		Suppressed		1	26	39.4%
Intentional self-harm (suicide)	(X60–X84, Y87.0)		Suppressed			Suppressed	
25-44 years							
All causes		---	178	100.0%	---	194	100.0%
Accidents (unintentional injuries)	(V01–X59, Y85–Y86)	1	49	27.5%	1	61	31.4%
Intentional self-harm (suicide)	(X60–X84, Y87.0)	3	20	11.2%	2	35	18.0%
Malignant neoplasms	(C00–C97)	2	38	21.3%	3	22	11.3%
45-64 years							
All causes		---	744	100.0%	---	841	100.0%
Malignant neoplasms	(C00–C97)	1	279	37.5%	1	273	32.5%
Diseases of heart	(I00–I09, I11, I13, I20–I51)	2	122	16.4%	2	160	19.0%
Accidents (unintentional injuries)	(V01–X59, Y85–Y86)	3	74	9.9%	3	77	9.2%
Chronic lower respiratory diseases	(J40–J47)	6	23	3.1%	4	37	4.4%
Intentional self-harm (suicide)	(X60–X84, Y87.0)	4	30	4.0%	5	36	4.3%
Chronic liver disease and cirrhosis	(K70, K73–K74)	5	26	3.5%	6	28	3.3%
Diabetes mellitus	(E10–E14)		Suppressed		7	24	2.9%
Cerebrovascular diseases	(I60–I69)	7	20	2.7%	8	24	2.9%

Differences by Race and Ethnicity

The number of deaths varied greatly between racial groups. Between 2011 and 2015, roughly 95% of deaths were white, non-Hispanic; 2% were Black, non-Hispanic; 2% were Asian/Pacific Islander, non-Hispanic; and 1% were Hispanic, any race The proportions of deaths by race changed slightly between 2016-2020, with white, non-Hispanic falling to roughly 93%. Deaths among Black, non-Hispanic rose to 3%; Asian/Pacific Islander, non-Hispanic rose to 2.5%; and Hispanic, any race stayed at 1%. The same trends were seen regardless of sex. American Indian/Alaska Native was <1% for both time frames and excluded from race/ethnicity analysis. Given the small populations, additional analysis was not conducted by race, but as white, non-Hispanic and non-white.

Table 4. Percentage of Deaths by Race: Olmsted County 2011-2020

	2011-2015	2016-2020	% Change
White, non-Hispanic	95%	93%	-2%
Black, non-Hispanic	2%	3%	+1%
Asian, non-Hispanic	2%	2.50%	+0.5%
American Indian/Alaska Native	<1%	<1%	---
Hispanic, any race	1%	1%	0%
Non-White	5%	7%	+2%

SMR was used in place of AADR for race. The number of deaths in non-white populations were small. SMR is used in place of AADR to make fairer comparisons when numbers are small. SMR varied by race and sex, but significant disparities were observed. When an SMR is over 100, there are more deaths than expected. When an SMR is under 100, there are fewer deaths than expected. For the Black population, SMR varied by year but was higher than 100 for 6 of 10 years. SMR for the Black population has increased since 2016, jumping to the highest level of 174 in 2020 (74% more deaths than are expected). Black females had the greatest SMR of any group in 2020 at 224 (124% more deaths than are expected). Between 2011 and 2020, the Asian population had an SMR that was under 100 every year. The Hispanic population SMR varied but was under 100 for 8 of 10 years.

$YPLL_{65}$ rate also varied between racial groups.

- For the white population, the $YPLL_{65}$ rate ranged from 2,102 to 3,018 person years per 100,000 white individuals under 65 years of age. The $YPLL_{65}$ rate was 3,018 in 2011 and 2,639 in 2020.
- For the Black population, the $YPLL_{65}$ rate ranged from 2,685 to 8,170 person years per 100,000 Black individuals under 65 years of age. The $YPLL_{65}$ rate was 3,350 in 2011 and 8,170 in 2020.
- For the Asian population, the $YPLL_{65}$ rate ranged from 1,400 to 3,265 person years per 100,000 Asian individuals under 65 years of age. The $YPLL_{65}$ rate was 3,265 in 2011 and 2,754 in 2020.
- For the Hispanic population, the $YPLL_{65}$ rate ranged from 856 to 3,547 person years per 100,000 Hispanic individuals under 65 years of age. The $YPLL_{65}$ rate was 3,547 in 2011 and 2,411 in 2020.

Figure 8. Standardized Mortality Ratio, by Race: Olmsted County 2011-2020

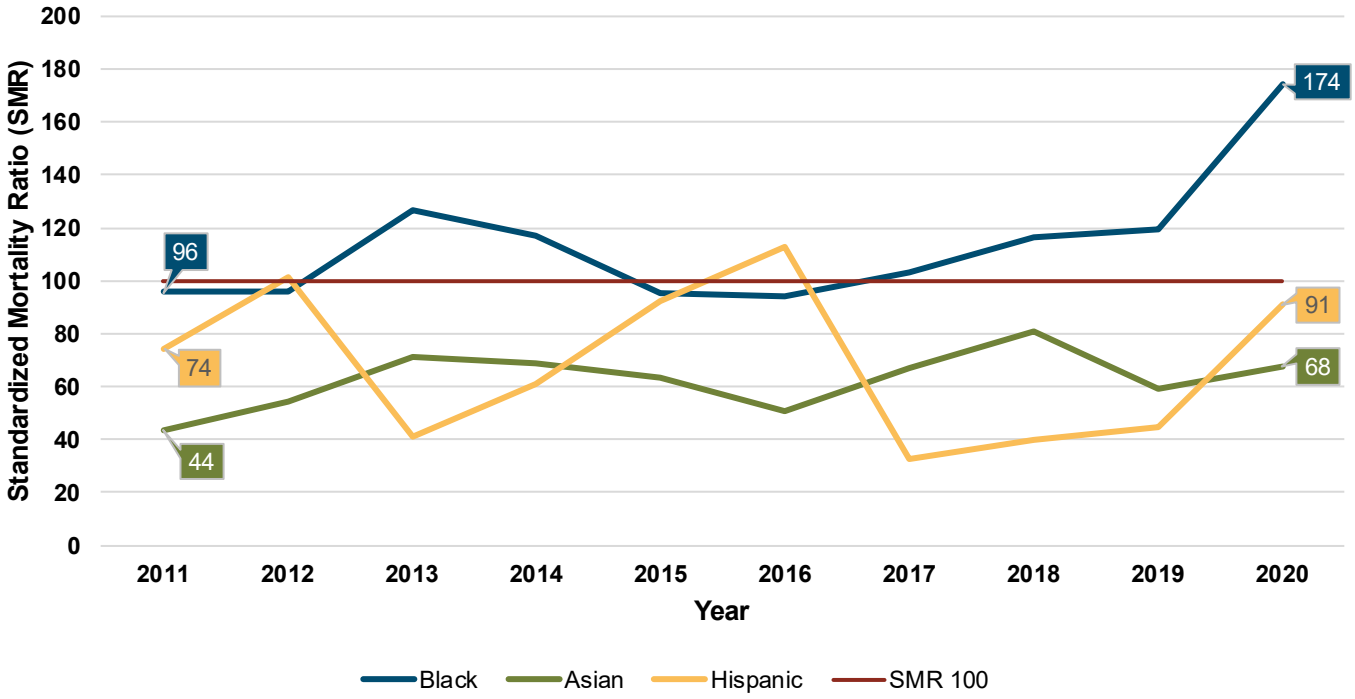


Figure 9. Years of Potential Life Lost Rate, by Race: Olmsted County 2011-2020

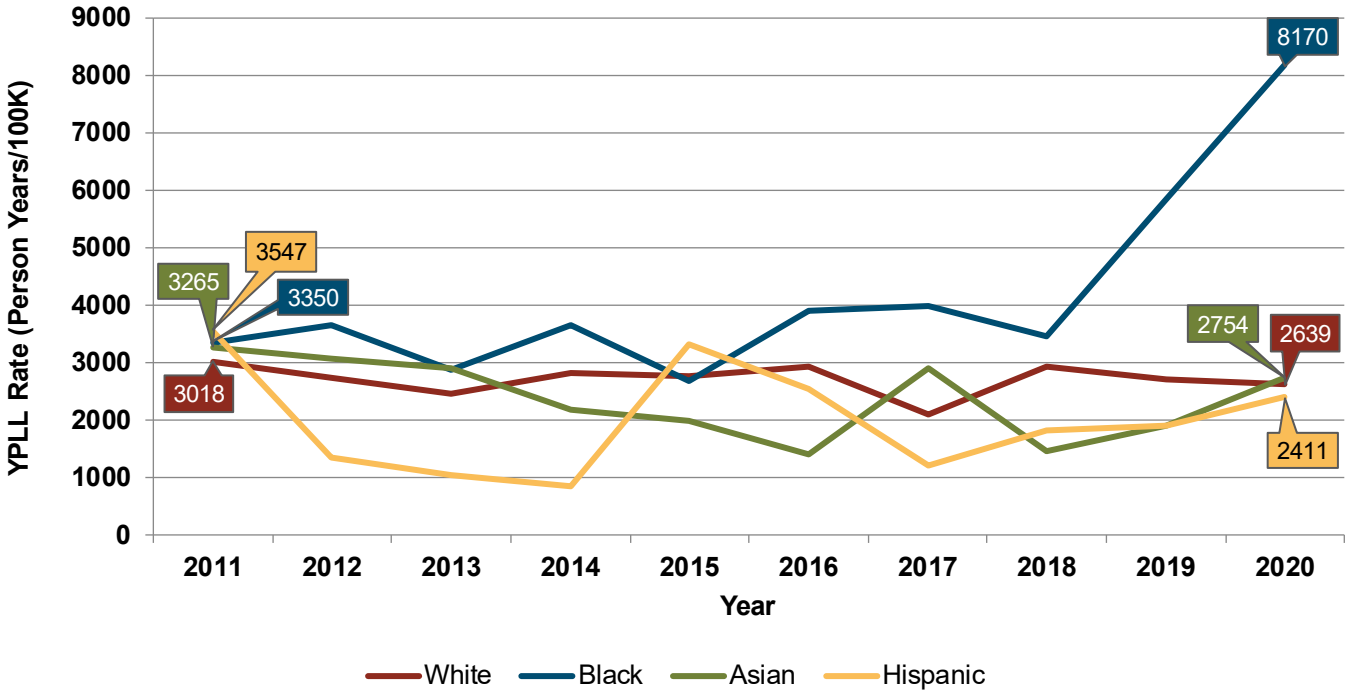


Table 5. Deaths and rates by sex and race: Olmsted County 2011-2020

		Both Sexes			Female			Male		
Race	Year	Number	CDR[1]	AADR[2]	Number	CDR[1]	AADR[2]	Number	CDR[1]	AADR[2]
Overall										
	2011-2015	4,823	648.8	565.8	2,417	636.4	475.8	2,406	661.8	674.8
	2016-2020	5,672	725.1	586.0	2,852	712.1	500.6	2,820	738.7	685.4
White										
	2011-2015	4,585	741.8	574.2	2,319	728.0	483.0	2,266	756.5	685.5
	2016-2020	5,297	838.5	591.4	2,692	825.9	505.2	2,605	852.0	693.3
Black										
	2011-2015	94	217.2	447.7	29	139.9	249.5	65	288.3	634.1
	2016-2020	164	297.0	579.0	70	254.6	501.5	94	339.0	666.3
Asian/PI										
	2011-2015	90	195.0	329.6	48	200.8	321.9	42	188.9	339.2
	2016-2020	137	256.8	394.1	63	228.1	355.1	74	287.7	438.2
Hispanic										
	2011-2015	47	138.7	385.8	Suppressed			Suppressed		
	2016-2020	61	154.1	349.4	20	109.2	239.9	41	192.7	445.0
Non-White										
	2011-2015	*231*	*187.3*	*378.5*	*95*	*157.5*	*298.6*	*136*	*215.9*	*463.6*
	2016-2020	*362*	*244.3*	*446.6*	*153*	*208.4*	*377.1*	*209*	*279.7*	*516.5*

[1] Crude Death Rate

[2] Age-Adjusted Death Rate

Numbers for American Indian/Alaska Native were <20 and suppressed for race-specific analysis but included for non-White analysis.

Table excludes 8 deaths with unknown race. Unknown was excluded from race-specific analysis.

Source: Minnesota Center for Health Statistics

Between 2011-2015 cancer and heart disease were the top two causes of death for white, non-Hispanic individuals. Cancer accounted for 22.3% and heart disease accounted for 21.9% of deaths, respectively. Completing the 10 leading causes of death for 2011-2015 were accidents (third), CLRD (fourth), stroke (fifth), Alzheimer's (sixth), I&P (seventh), suicide (eighth), diabetes (ninth), and Parkinson's (tenth).

Between 2016 and 2020, heart disease and cancer remained the top two leading causes of death for white, non-Hispanic but switched rank order. Alzheimer's increased from sixth to third. Accidents, CLRD, and stroke all decreased by one spot (fourth, fifth, and sixth – respectively). Parkinson's increased to seventh and suicide and diabetes stayed the same (eighth and ninth, respectively). I&P fell out of the top 10 to be replaced by CLD (tenth).

For non-white deaths, only three causes of death were >20 in 2011-2015. The leading causes of death in 2011-2015 were cancer (first), heart disease (second), and accidents (third). These three accounted for 54.1% of deaths. The rank order did not change for 2016-2020, which accounted for 52.5% of deaths.

Cause-Specific: Malignant Neoplasms (Cancer)

Cancer was the leading cause of death in 2011-2015 and the second leading cause of death in 2016-2020. Cancer resulted in 1,080 and 1,210 deaths, respectively. The greatest impact was observed in older age groups. Between 2011 and 2015, 69.5% of cancer deaths were among 65+ and 95.4% were among 45+. Between 2016 and 2020, the proportion increased to 74.8% among 65+ and 97.4% among 45+. The cause specific AADR was 130.5 per 100,000 in 2011-2015 and fell slightly to 126.9 per 100,000 in 2016-2020. While the number of cancer deaths increased, the proportion decreased. Combined with an increase in population, this would help explain the decrease in rates.

The leading forms of cancer between 2011 and 2015 were lung cancer (20.8%); blood, bone, and lymph tissue cancers (12.4%); colon cancer (9.3%); breast cancer (6.7%); and pancreatic cancer (6.6%). The five leading forms of cancer remained the same for 2016-2020, but rank order changed. Lung cancer and blood, bone, and lymph tissue cancers remained the leading two forms of cancer (19.8% and 11.9%, respectively). Pancreatic cancer jumped to the third leading form (8.8%), followed by breast cancer and colon cancer (both with 6.6%).

Between 2011 and 2015, the leading forms of cancer for females were lung cancer (20.1%); breast cancer (14.3%); blood, bone, and lymph tissue cancers (12.0%); colon cancer (9.2%); and pancreatic cancer (5.4%). The five leading forms of cancer remained the same in 2016-2020 for females, but rank order changed. Lung cancer; blood, bone, and lymph tissue cancers; and breast cancer remained the leading three forms of cancer (19.2%, 13.9%, and 10.5%, respectively). Pancreatic cancer (fourth, 7.9%) and colon cancer (fifth, 6.3%) followed.

Between 2011 and 2015, the leading forms of cancer for males were lung cancer (21.5%); blood, bone, and lymph tissue cancers (12.8%); colon cancer (9.3%); prostate cancer (9.0%); and pancreatic cancer (7.6%). The five leading forms of cancer remained the same in 2016-2020 for males, but rank order changed. Lung cancer and blood, bone, and lymph tissue cancers remained the leading two forms of cancer (20.3% and 13.1%, respectively). Prostate cancer (third, 9.7%) and pancreatic cancer (fourth, 8.1%) followed. The fifth most common form of fatal cancer in males was a tie between colon cancer and liver cancer (both 6.9%).

The female cause specific AADR was 110.1 per 100,000 in 2011-2015 and fell slightly to 107.3 per 100,000 in 2016-2020. The male cause specific AADR was 158.0 per 100,000 in 2011-2015 and fell slightly to 152.1 per 100,000 in 2016-2020. Apart from sex-specific cancers (including breast cancer), the largest differences in proportion of cancer deaths between females and males were esophageal cancer (-3.3% difference in 2011-2015, -4.9% difference in 2016-2020) and liver cancer (-2.8% difference in 2011-2015, -3.0% difference in 2016-2020). Females had a smaller proportion of tobacco linked cancers than men (48.2% compared to 60.0% in 2011-2015; 45.3% compared to 59.3% in 2016-2020).

Table 6. Deaths and percent of total deaths for the leading forms of cancer: Olmsted County 2011-2020

Cause of death (based on ICD-10)		2011-2015			2016-2020		
		Rank	Deaths	Percent	Rank	Deaths	Percent
Overall							
All forms of cancer	(C00–C97)	---	1,080	100.0%	---	1,210	100.0%
Lung	(C33–C34)		225	20.8%		239	19.8%
Blood, bone, and lymph tissues	(C81–C96)		134	12.4%		144	11.9%
Pancreatic	(C25)		71	6.6%		97	8.0%
Breast	(C50)		72	6.7%		80	6.6%
Colon	(C18–C21)		100	9.3%		80	6.6%
Liver	(C22)		44	4.1%		66	5.5%
Prostate	(C61)		52	4.8%		62	5.1%
Brain	(C70–C72)		36	3.3%		45	3.7%
Esophageal	(C15)		34	3.1%		36	3.0%
Ovarian	(C56)		25	2.3%		26	2.1%
Female							
All forms of cancer	(C00–C97)	---	502	100.0%	---	569	100.0%
Lung	(C33–C34)	1	101	20.1%	1	109	19.2%
Breast	(C50)	2	72	14.3%	2	79	13.9%
Blood, bone, and lymph tissue	(C81–C96)	3	60	12.0%	3	60	10.5%
Pancreatic	(C25)	5	27	5.4%	4	45	7.9%
Colon	(C18–C21)	4	46	9.2%	5	36	6.3%
Male							
All forms	(C00–C97)	---	578	100.0%	---	641	100.0%
Lung	(C33–C34)	1	124	21.5%	1	130	20.3%
Blood, bone, and lymph tissue	(C81–C96)	2	74	12.8%	2	84	13.1%
Prostate	(C61)	4	52	9.0%	3	62	9.7%
Pancreatic	(C25)	5	44	7.6%	4	54	8.4%
Colon	(C18–C21)	3	54	9.3%	T5	44	6.9%
Liver		NR	31	5.4%	T5	44	6.9%

--- Category not applicable.

Breast cancer (C50) is seen in both females & males but mostly affects females, ovarian cancer (C56) is only seen in females, & prostate cancer (C61) is only seen in males.

Source: Minnesota Center for Health Statistics

Cause-Specific: Diseases of Heart

Heart disease was the second leading cause of death in 2011-2015 and the leading cause of death in 2016-2020. Heart disease resulted in 1,048 and 1,308 deaths, respectively. The most significant impact of heart disease occurred in older age groups. Between 2011 and 2015, 87.0% of deaths were among 65+ and 98.7% were among 45+. Between 2016 and 2020, the proportion decreased slightly to 86.7% among 65+ and increased slightly to 98.9% among 45+. The cause-specific AADR was 119.3 per 100,000 in 2011-2015 and rose to 132.2 per 100,000 in 2016-2020.

Most cases of fatal diseases of heart resulted from of CHD. Between 2011 and 2015, 62.6% of diseases of heart deaths were a result of CHD. The proportion of deaths decreased to 56.3% in 2016-2020. Most heart disease deaths occurred in white, non-Hispanic individuals. Groupings were too small to analyze by race and ethnicity. Differences were observed for heart disease in females and males. Females had a small impact related to heart disease. The female cause-specific AADR was 89.1 per 100,000 in 2011-2015 and rose slightly to 100.7 per 100,000 individuals in 2016-2020. The male cause-specific AADR was 156.6 per 100,000 individuals in 2011-2015 and rose to 171.9 per 100,000 in 2016-2020.

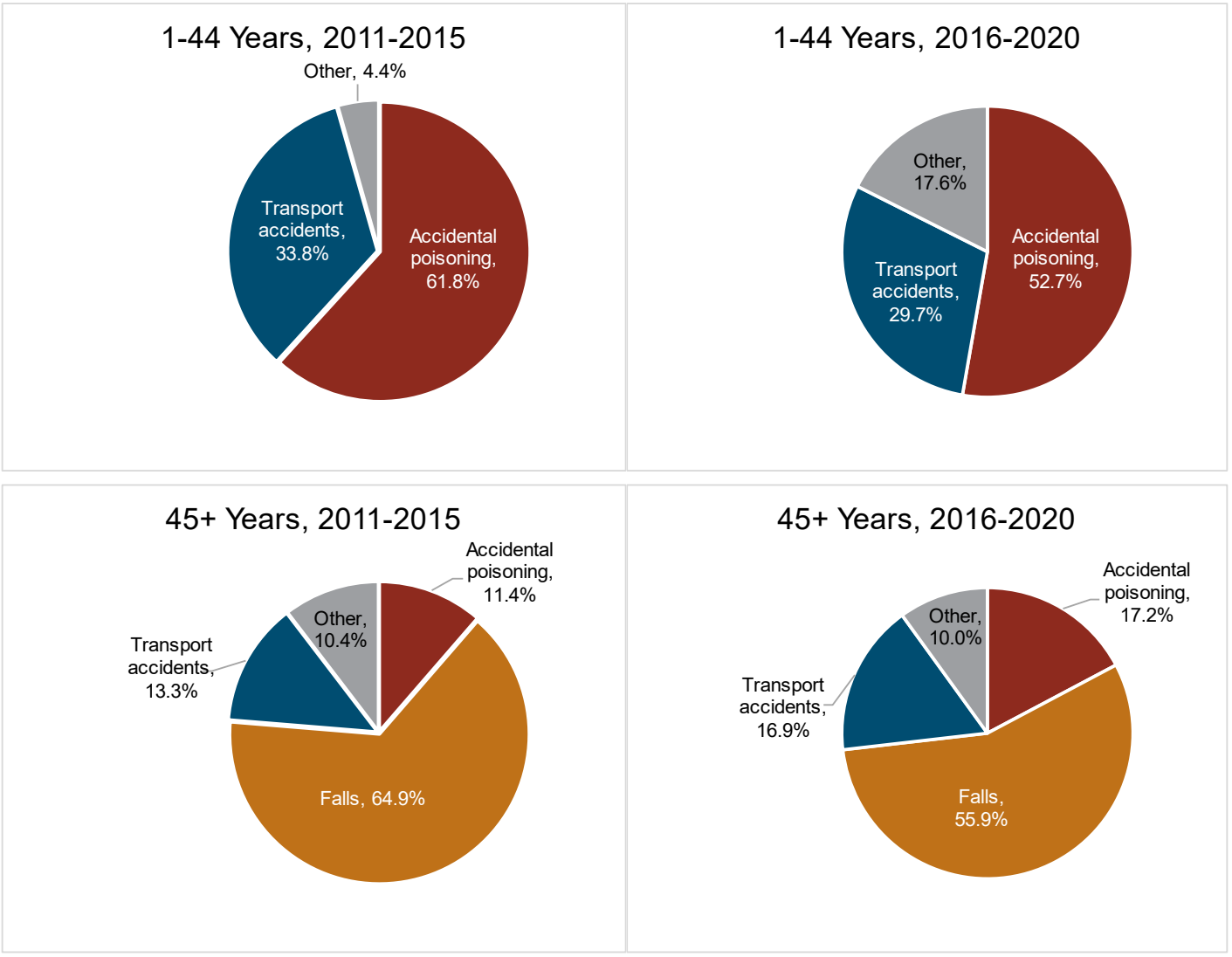
The impact of CHD was also lower in females compared to men. Between 2011 and 2015, 57.0% of female heart disease death was related to CHD compared to 67.5% in males. In 2016-2020, females dropped to 46.2% and males dropped to 64.9%. Females had a higher impact of rheumatic fever, HTN heart disease, and heart failure for both periods.

Cause-Specific: Preventable Deaths (Accidents, Suicide, Overdose)

The leading cause of death for individuals under 45 years of age were accidents in 2011-2015 and from 2016-2020. For individuals aged 45+, accidents were the third and fourth leading cause of death, respectively. Accidents had a lower impact on females than males in both 2011-2015 and 2016-2020. Females accounted for 44.2% of fatal accidents in 2011-2015 and 43.8% in 2016-2020. The female cause-specific AADR rate was 33.1 per 100,000 individuals in 2011-2015 and decreased slightly to 30.5 per 100,000 individuals in 2016-2020. The male cause-specific AADR was 59.1 per 100,000 individuals in 2011-2015 and decreased to 49.8 per 100,000 individuals in 2016-2020.

Differences in cause of accident were not observed by sex. Between 2011 and 2015, 61.8% of accidents in individuals under age 45 were accidental poisonings and 33.8% were transport accidents. Both causes decreased, to 52.8% and 29.7%, respectively, between 2016 and 2020. Among individuals aged over 45 years, the leading cause of fatal accidents were falls (64.9%). Transport accidents and accidental poisonings followed (13.3% and 11.4%, respectively). Between 2016 and 2020, falls remained the leading cause of injury. However, the proportion of deaths decreased to 55.9%. Accidental poisonings and transport accidents increased, with poisonings rising to 17.2% and transport accidents rising to 16.9%.

Figure 10. Percent distribution of accidental death, by age group and year: Olmsted County



The impact of suicide is more significant among individuals under 45 years of age. Suicide was the third leading cause of death for this age group between 2011 and 2015. Suicide increased to the second leading cause of death between 2016 and 2020. It was also among the ten leading causes of death in males for both periods. Values were suppressed in females for both 2011-2015 and 2016-2020, so suicides are described for 2011-2020. Between 2011 and 2020, 163 intentional self-harm (suicide) deaths were recorded. The impact of suicides was lower among females, who recorded 19.0% of deaths compared to 81.0% in males. For age, the most significant impact occurred in the middle-aged groups (25-64 years old). A total of 55.2% of suicides were among this age group, 31.3% were in individuals 15-34 years old, and 13.5% were in individuals over 65. Suicides increased from 70 in 2011-2015 to 93 in 2016-2020. Generally, women died of suicide more frequently with non-aggressive methods and men died of suicide more frequently with aggressive methods. Between 2011 and 2020, 48.4% of suicides in females were by an aggressive method compared to 90.2% in males.

Overdose deaths are not considered independent of other death categories. Deaths recorded as accidents, suicides, homicides, or unknown intent could all be counted. There were 72 fatal overdoses between 2011 and 2015. The occurrence to 98 in 2016-2020. The impact of overdoses was lower in females than males, with 38.9% and 41.8% of overdose deaths observed in 2011-2015 and 2016-2020, respectively.

Conclusion

A change in all death indicators occurred between 2019 and 2020. The changed include a decrease in life expectancy and an increase in CMR, AADR, and $YPLL_{65}$ rates. An increase in all-cause mortality occurred. This increase is likely due to an aging population. The difference in deaths was greater than the number of COVID-19 deaths. Therefore, the increase in deaths cannot be attributed to COVID-19 alone. However, the number of individuals who recovered from COVID-19 and died due to post-COVID syndrome or worsening medical conditions is unknown.

On a population level, differences in mortality are a result of social factors, not biological or genetic. Social determinants of health largely contribute to disparities between demographic groups.

For most causes of death, the impact was lower in females than males, which is also observed with mortality indicators. The 2020 AADR was 547.3 per 100,000 females and 729.8 per 100,000 males. The $YPLL_{65}$ rate was also lower in females, 2,331 per 100,000 females under 65 years compared to 4,170 per 100,000 males under 65 years. This likely means more males are dying at younger ages and more females are dying at older ages.

Females had higher life expectancy for every year analyzed. Life expectancy averaged 4.4 years greater in females compared to males. The two leading causes of death were the same for both populations. For the remaining leading causes of death, females had a greater proportion of deaths due to chronic conditions. Males had a greater proportion of deaths due to external causes.

As expected, most deaths occurred in older ages. Younger age groups had a higher proportion of deaths due to external causes and older age groups had a higher proportion of deaths due to chronic conditions. Deaths in younger age groups were less common and had to be aggregated between 2011-2020, making analysis difficult. Trends in younger age groups could not be observed.

Most deaths occurred in white, non-Hispanic individuals. The small number of deaths in non-white populations made analysis difficult, as groups with less than 20 events were suppressed. This was especially true of the American Indian/Alaska Native population. There were only a few deaths in the entire dataset. While still important, they were not included in race/ethnicity analysis. To offset other small groupings, more years were grouped. However, trends are more difficult to observe. In the data that was analyzed, clear racial disparities exist, especially in the Black population. The 2020 SMR was 174, indicating 74% more deaths than expected. The 2020 $YPLL_{65}$ rate was also over twice as high as any other racial group.

Mortality data is an essential measure of community health, and overall mortality indicators can effectively measure changes by year. However, Olmsted County is primarily white, non-Hispanic. Most deaths occurred in that population, so overall mortality indicators do not tell the whole story. The health of Olmsted County has declined recently, especially in diverse populations. The SMR indicates this. Identifying populations and leading causes of mortality can help educate and promote health in the community.

Action Plan

Olmsted County Public Health Services will share this report with the community on its website. Additional ways of presenting data, such as an interactive dashboard, will be considered for future publications. Trends in mortality will be shared and discussed with internal and external partners. Examples of partners include the Health Promotion team, Adult and Family Services, Child and Family Services, Sherriff's office, Medical Examiner's office, Mayo Clinic, Olmsted Medical Center, and United Way. Some data in this report is used for the Community Health Needs Assessment.

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