Original Research Article

A comparativeAnalysis of Mortality in the United Statesfrom1980 and2019

ABSTRACT

Objectives: The study aims to compareand analyze the mortality patternsof two different years (1980 and 2019)with unique peculiarities in the United Statesbyapplying basic (Inferential and descriptive) statistical tools to elucidate the findings in simple terms.

Methods: We conducted a retrospective, comparative, and observational data analysis on leading causes of death in the United States by age, race, and gender in 1980 and 2019. The data in this report are based on information from all death certificates filed in the 50 states and the District of Columbia. The causes of death are ranked by age and number of deaths, andclassified by the International Classification of Diseases, 10th Revision (ICD–10). (Cause-of-death statistics are based on the underlying cause of death).

SPSS (statistical package for social sciences) version 29 Software in Excel sheet was used to analyze the datasets. Descriptive and inferential (parametric and non-parametric) analyses were used. The statistically significant relationships and assumptions were made using chi-square/t-test, variance,Pearson's correlation, and Fischer's exact tests with the significance level set at $p \leq 0.05$. The analysis and determination of the level of agreement between the initial diagnosis and findings from the new analysis were done.

Results: The total number of deaths recorded in the United States in 2019 was about 2,854,838, with a mortality rate of 869.7 per 100,000 population, while the total number of deaths in 1980 was 1,989,841. In the adult population, the five major causes of death were heart disease, cancer, accidents, respiratory diseases, and cerebrovascular diseases. There were more deaths in 2019 than in 1980, and the mean age was 15-24 for both years. The common cause of death in 1980from birth till the age of 24 remains higher. The highest mortality rates for age 45-65 remained cardiovascular disease in both 1980 and 2019. The Pearson correlation has a positive linear trend ($r = 0.947$, $p < 0.01$). There is a strong positive correlation between the number of deaths attributed to all causes for males and females, indicated by the coefficient is significant ($p < 0.001$). The variability in the number of deaths is higher among males (74.4855) than females. Male deaths are higher, with female is barely over 40% of total deaths.There is an upward trend

of deaths in both years, with an expected increase of 1.01 deaths in 2019 and ahiv Coefficient of Determination (R^2 value) of 0.897.

Conclusions: There is higher Mortality in 2019 than in 1980, this cuts across the most common cause of death despite a lower rate of death. The decrease in mortality rate over two decades is likely associated with advancement in health care provision despite the increase in population growth. There was a significant reduction in deaths due to unintentional injuries among individuals aged 15-24 in 2019, with an increase in deaths from mental illness and suicidesand a strong positive trend and correlation between the number of deaths in 1980 and 2019.

Keywords: Mortality, Racial and ethnic differences, Sex differences, vital statistics.

INTRODUCTION

Global life expectancy at birth varies based on several variables; particularly gender, race, and genetic factors. Data from 1980 to 2015 shows that life expectancy at birth (years) is 59.6(male)and 63.7(female), and total death in millions is 45.2[23.5 (male) and 21.6(Female)].[1]

Global gains in life expectancy were generally gradual but steady, although catastrophic events, including the genocides in Rwanda and the Democratic Republic of Congo, terrorism and political crises in the Middle East and Africa, famines in North Koreans, and escalating Mortality due to HIV/AIDS, had worldwide effects on longevity. Slower gains were achieved for life expectancy at 50 years, or the average number of additional years of life, a 50-year-old can anticipate at a given point in time [1] [2].

The mortality rate is essential in determining any population's public health and wellbeing. It portrays the number of deaths in a population over a specific period, so understanding mortality patterns is essential because they provide incredible insights into the overall health status and healthcare systems of different populations. This research aims to conduct a comparative analysis of Mortality in the United States in 1980 and 2019. The study of mortality trends is essential for several reasons. Firstly, it is often used as a metric to assess how effective the healthcare systemand to determine whether an improvement or decline in the healthcare system is feasible or not. Secondly, ithelps to unveil disparities in health outcomes across different populations.Hence, it can help guide healthcare providers and researchers on possible solutions to public health challenges. Thirdly, it helps to identify areas where the United States excels or lags behind global averages, thereby providing opportunities for learning from international best practices and addressing global health challenges collaboratively.

The research is expected to provide valuable insights into the pattern of mortality trends and associations with various variables, while comparing two years that are two decades apart with similar and overlapping peculiarities. and different interventions despite population growth and variations.The keyfactors and differences in theyears and mortality changes are identified, and their implications are discussed using statistical tools. The study aims to provide substantial information to assist with evidence-based policymaking and strategies to improve population health outcomes. In addition, the comparative nature of the study couldprovide a basis for highlighting strengths and weaknesses in public healthcare policies and strategies across many nations.It facilitates the cross-exchange of knowledge and best practices across different healthcare systems nationwide and internationally.

MATERIALS AND METHODS

Research Design

This study adopts a quantitative research design to investigate the relationship between various factors. To achieve the research objectives, it employs both descriptive and inferential statistical analyses.

Statistical analysis was done with Excel software.Excel offers various chart types and formatting options for visually appealing graphs and charts. It makes it easy to generate histograms, scatter plots, bar charts, line graphs, and pivot tables to visualize data trends, patterns, and relationships. Descriptive statistics will be computed to summarize the characteristics of the variables under study, including measures of central tendency, dispersion, and frequency distributions. The statistical tools used for the descriptive statistics are SPSS, Excel, and Python programming language (NumPy and Pandas library).

The following Inferential Statisticswere adopted:

i. Regression analysis using SPSS to examine the relationship between the dependent variable and independent variables. This analysis helped to identify significant predictors and their impact.

ii. Parametric tests, such as t-tests or ANOVA were employed to compare means across different groups or conditions, assuming normal distribution and homogeneity of variances.

iii. Non-parametric tests, such as the Mann-Whitney U test or the Kruskal-Wallis test were used to see whether data meet the assumptions of parametric tests or not.

iv. Regression analysis assumptions, including normality, linearity, homoscedasticity, and independence of residuals, used to assess graphical methods and statistical tests.

v. A chi-square test analyzes the association between categorical variables and assesses the goodness-of-fit of observed data to expected frequencies.

This comprehensive methodology ensures that the data were collected and analyzed using appropriate statistical techniques to draw meaningful conclusions in line with the research objectives.

Data strategy, collection, and analysis

Starting with 1980 data, the rules changed for selecting Chronic lower respiratory diseases (CLRD) and Pneumonia as the underlying cause of death, increasing the number of deaths for CLRD and decreasing the number of deaths for Pneumonia [3]. Therefore, trend data for these two causes of death should be interpreted with caution. For more information, see Sources and Definitions, Comparability ratio. From 1998 to 1999, the cause-of-death title for Chronic obstructive pulmonary diseases (COPD) in the International Classification of Diseases, Ninth Revision (ICD–9) was renamed Chronic lower respiratory diseases (CLRD) in ICD–10.[3]

Starting with 2011 data, the rules changed for selecting Renal failure as the underlying cause of death, affecting the number of deaths in the Nephritis, nephrotic syndrome, and nephrosis and Diabetes categories. These changes directly affect deaths with mention of Renal failure and other associated conditions, such as Diabetes mellitus with renal complications. [3] The result showed a decrease in the number of deaths due to Nephritis, nephrotic syndrome, and nephrosis and an increase in the number of deaths for Diabetes mellitus. Therefore, data trend for these two causes of death should be interpreted with caution. SPSS, which stands for Statistical Package for the Social Sciences is a powerful software tool used for statistical analysis and data management. Originally developed by IBM, SPSS provides a user-friendly interface that allows researchers and analysts to perform a wide range of statistical analyses, from basic descriptive statistics to advanced modeling techniques. After defining the variable view, the data is then inputted into the data view. The next step is to perform a descriptive statistic using our SPSS. This statistical tool was used to perform these analytics in the variable view of each column.

RESULTS AND INTERPRETATION

The Mortality in 1980 and 2019 shares a similar pattern in variable statistical variation in terms of outcome, and the increased population growth from 1980 as compared to 2019 should be a factor to be considered in the interpretation of the results. The ten most common causes of death vary in relation to age categorization. Stratifications (categorization) based on age are greater than 1,1-4, 5-14, 15-24, 25-44, 45-65, and above 65. The graphical distributions based on these age categorizations further match the

most common causes of death. Then, "year (1980) versus year (2019)" comparisons were made, and data was analyzed appropriately with annotations [see Fig 1-9 and Table 1-4]. Descriptive analysis revealed a mean age of 15-24, sharing the median order and multiple modes with variable age distribution (Table 1).

In infancy, the most common cause of death is congenital anomaly for both years, followed by sudden infant death syndrome (SIDs), but unintentional injuries are the most common by the age of 1-4. Then, congenital anomaly, malignancy, and suicide are next to the previous and SIDs in both years [Fig 1-2]. There were generally more deaths in 2019 than in 1980, but in 1980, the common cause of death from birth till the age of 24 remained higher.With unintentional injuries, malignancy, congenital anomaly, homicide, and suicide took the lead [Fig 1-4]. Death from unintentional injuries is significantly high from the age of 1 to 44 and distantly followed by malignancy [Fig 2-7]. In contrast to many age categories,15 - 24 showed a higher rate of homicide and suicide than malignancy as the second most common cause of death, and the pattern is the same for both years [Fig 4].

Heart disease and malignant are the most common cause of death after the age of 44 [Fig 6-9]. The highest mortality rates for ages 45-65 are cardiovascular disease and were nearly the same in 1980 and 2019. Most other causes, including cerebrovascular diseases (stroke), Pneumonia, influenza, chronic obstructive pulmonary diseases, diabetes mellitus, unintentional injuries, nephritis/nephrotic syndrome/and nephrosis, and chronic liver disease and cirrhosis have seen an increase in the number of deaths in 2019 in the group older than 65[Fig 9].

The Pearson correlation analysis indicates a strong positive linear trend ($r = 0.947$, $p < 0.01$) between the number of fatalities in 1980 and 2019(Table 2). There is a strong positive correlation between the number of deaths attributed to all causes for males and females, indicated by the Pearson correlation coefficient of 0.996. The p-value for the correlation coefficient is significant ($p < 0.001$) (Table 3). The variability in the number of deaths is higher among males (74.4855) than females. Male deaths are higher, and female is barely over 40% of total deaths (Table 4). There is an upward trend of death in both years (1980 and 2019), suggesting that for every increase in the number of deaths in 1980 (x); there is an expected increase of 1.01 deaths in 2019 (y). The Coefficient of Determination (R^2 value) of 0.897 indicates that approximately 89.7% of the variance in the number of deaths in 2019 can be explained by its linear relationship with the number of deaths in 1980(Fig. 9).

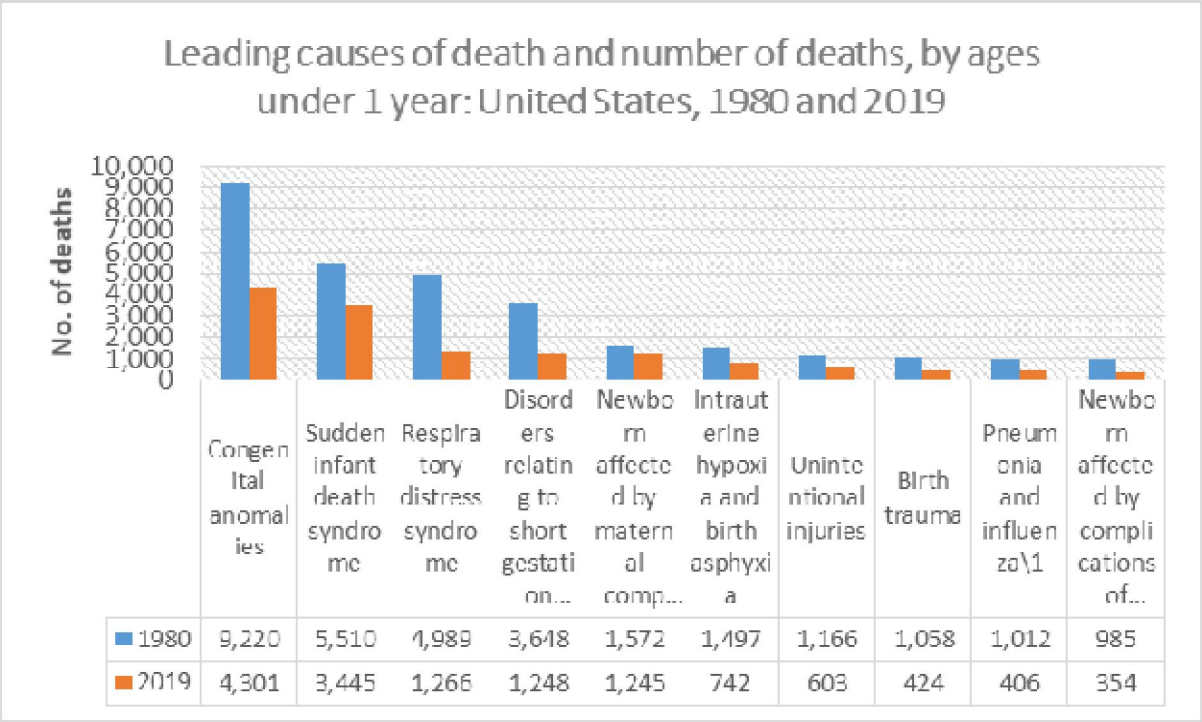

Fig 1: The chart above illustrates the leading causes of death for children under one year in the United States for the years 1980 and 2019.

Error bars? Expand the graph, words will not come out as a fractionated figure.

I. Congenital Anomalies: In both years, congenital anomalies were the leading cause of death among infants. However, there was a significant reduction in the number of deaths due to congenital anomalies from 9,220 in 1980 to 4,301 in 2019.

II. Sudden Infant Death Syndrome (SIDS): SIDS was the second leading cause of death in 1980, but its prevalence decreased to 3,445 deaths in 2019.

III. Respiratory Distress Syndrome: Deaths related to respiratory distress syndrome also declined over the years, from 4,989 in 1980 to 1,266 in 2019.

IV. Other Causes: The chart includes additional causes, such as disorders related to short gestation, maternal complications, intrauterine hypoxia, unintentional injuries, birth trauma, Pneumonia, and influenza. The number of deaths from all these causes decreased between 1980 and 2019.

In summary, infant survival rates have improved considerably over the years, with a substantial reduction in infant mortality due to various causes. Advances in medical care, preventive measures, and awareness campaigns have contributed to this positive trend.

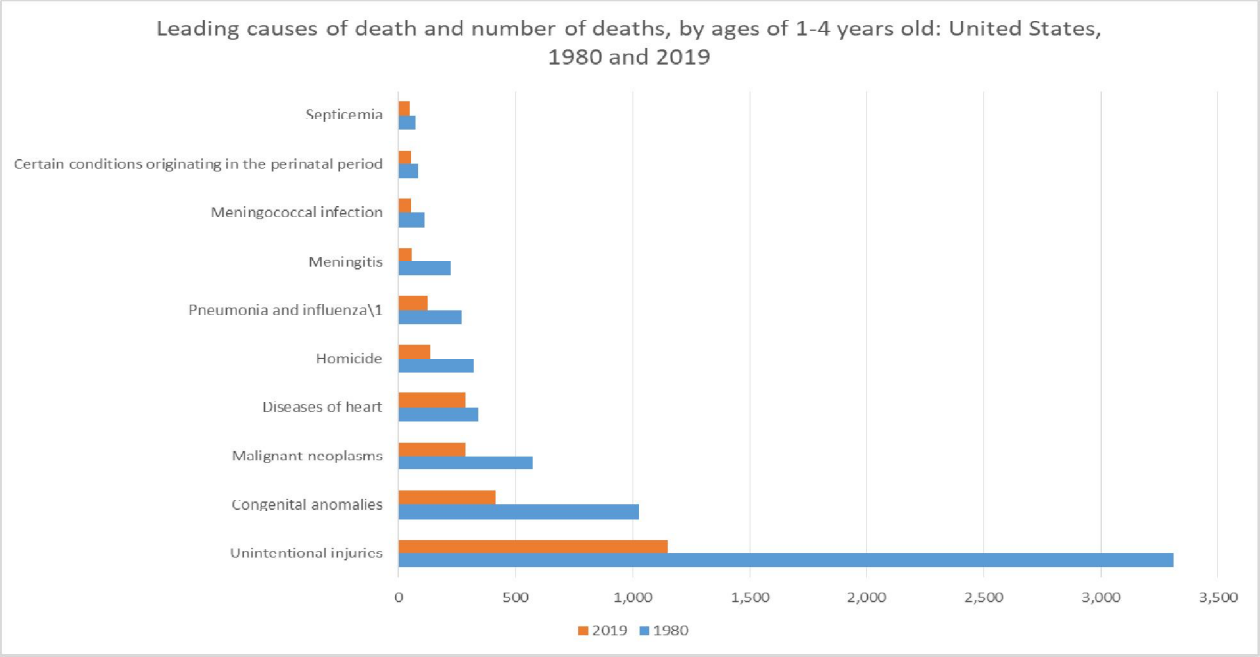

Fig 2: The chart titled "Leading causes of death and number of deaths, by ages of 1-4 years old in the United States [compares data from two different years, 1980 and 2019].

Error bars? Expand the graph, words will not come out as a fractionated figure.

I. Unintentional Injuries: In both 1980 and 2019, unintentional injuries were the leading cause of death for children aged 1-4 years old. However, there has been a significant reduction in the number of deaths due to unintentional injuries over this period.

II. Other Causes: Diseases like septicemia, certain conditions originating in the perinatal period, meningococcal infection, meningitis, Pneumonia and influenza, homicide, diseases of the heart, malignant neoplasms (cancers), and congenital anomalies also contributed to child mortality. Notably, the number of deaths from all these causes declined from 1980 to 2019.

The overall trend is positive, with fewer children dying from various causes in 2019 compared to 1980. Unintentional injuries, although still the leading cause, have substantially reduced numbers. Diseases like septicemia and certain perinatal conditions have also decreased significantly.

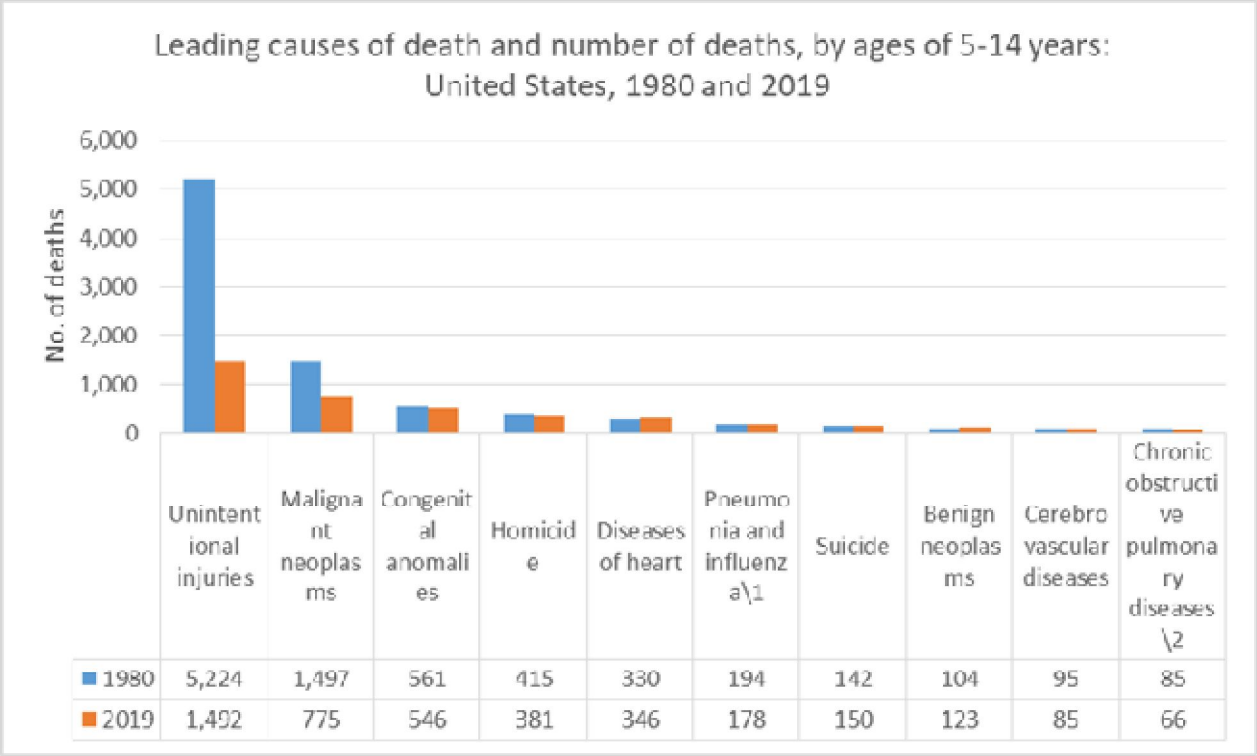

Fig 3: The chart is titled "Leading causes of death and number of deaths, by ages of 5-14 years: United States, 1980 and 2019". It compares the number of deaths in the United States for children aged 5-14 years due to various causes in the years 1980 and 2019.

I. **Unintentional Injuries**: This was the leading cause of death in 1980, with 5,224 deaths. However, there has been a significant reduction in deaths due to unintentional injuries by 2019, with the number dropping to 1,492. This suggests improvements in safety measures over the years.

II. **Malignant Neoplasms**: The number of deaths due to malignant neoplasms (cancer) has also decreased from 1,497 in 1980 to 775 in 2019, indicating advancements in healthcare and cancer treatments.

III. **Other Causes**: Deaths due to other causes such as congenital anomalies, homicide, diseases of the heart, Pneumonia, and influenza, suicide, benign neoplasms, cerebrovascular diseases, and chronic obstructive pulmonary diseases have either slightly decreased or remained relatively stable.

The chart shows a positive trend in reducing child mortality rates in the United States from 1980 to 2019, particularly in the areas of unintentional injuries and malignant neoplasms. This could be

attributed to improved safety measures, healthcare, and disease treatments. However, it also highlights areas where further improvements could be made.

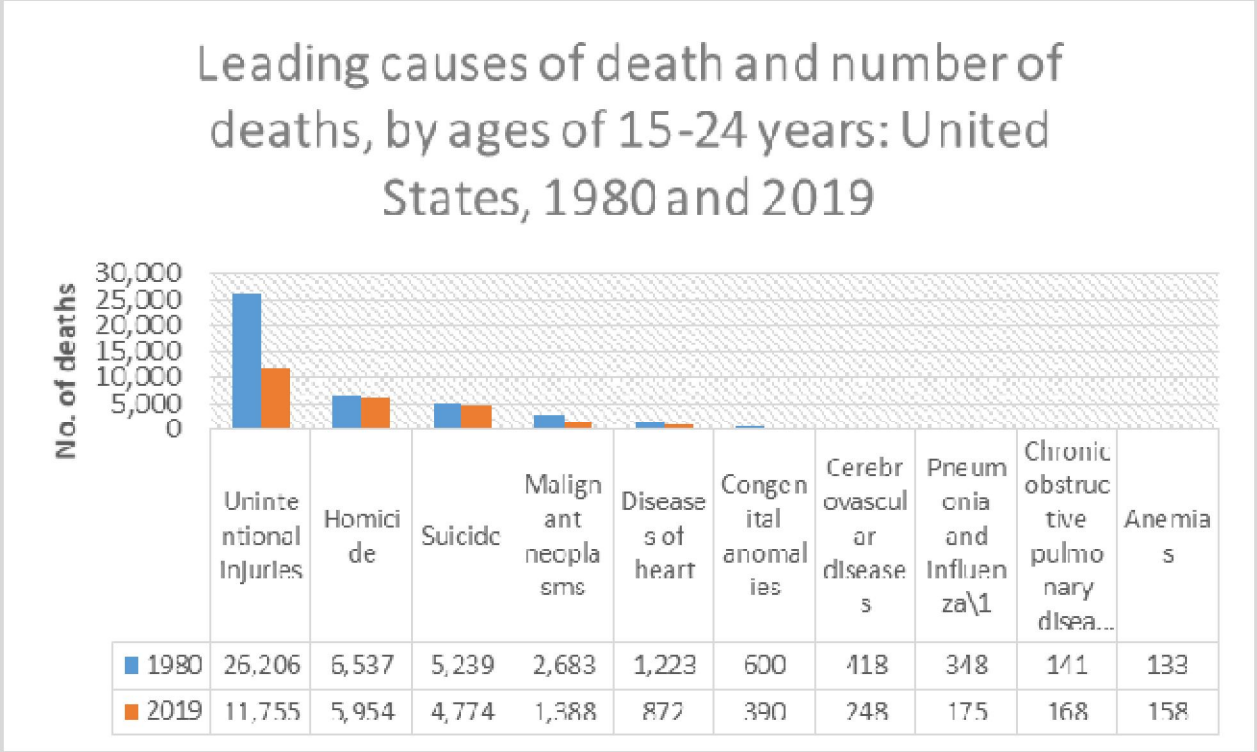

Fig 4: The chart is titled "Leading causes of death and number of deaths, by ages of 15-24 years: United States, 1980 and 2019." It compares the number of deaths in the United States for children aged 5-14 years due to various causes in the years 1980 and 2019.Error bars? Expand the graph, words will not come out as a fractionated figure.

I. **Unintentional Injuries:** This was the leading cause of death in both years. However, the number of deaths due to unintentional injuries significantly decreased from over 25,000 in 1980 to below 15,000 in 2019.

II. **Suicide:** The number of deaths due to suicide increased from over 5,000 in 1980 to 8,000 in 2019.

III. **Other Causes:** The graph also shows data for other causes of death, including homicide, malignant neoplasms, diseases of the heart, congenital anomalies, cerebrovascular diseases, Pneumonia and influenza, chronic obstructive pulmonary disease (COPD), and anemias.

In summary, there has been a significant reduction in deaths due to unintentional injuries among individuals aged 15-24 in the United States from 1980 to 2019, and there has been a slight increase in deaths due to suicide. This suggests that while progress has been made in preventing unintentional injuries, more attention may need to be given to mental health and suicide prevention in this age group. Please note that this is an interpretation based on the data presented in the graph, and additional context may be necessary for a more comprehensive understanding.

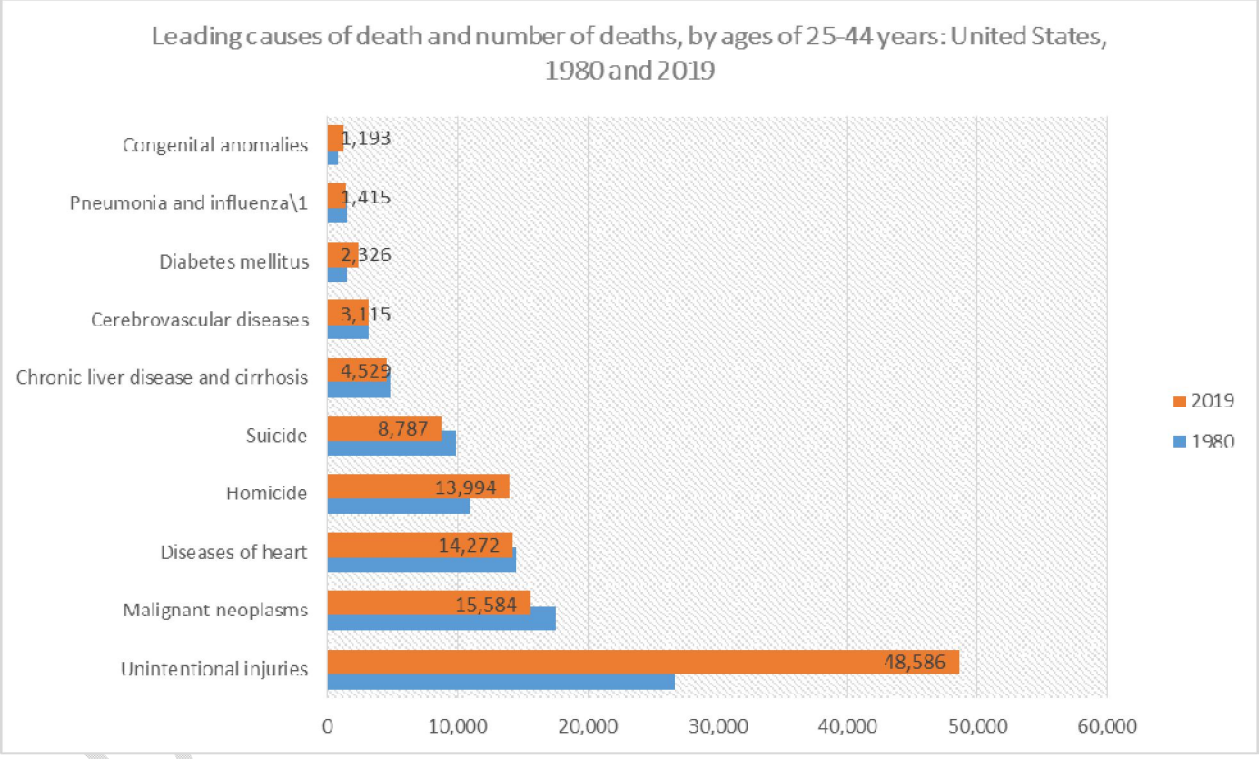

Fig 5: The chart is titled "Leading causes of death and number of deaths, by ages of 25-44 years: United States, 1980 and 2019." It compares the number of deaths in the United States for children aged 5-14 years due to various causes in the years 1980 and 2019".

I. Unintentional Injuries: This cause of death has seen a significant increase from 15,584 in 1980 to 48,586 in 2019.

II. Suicide: The number of deaths due to suicide has also increased from 4,529 in 1980 to 8,787 in 2019.

III. Homicide: Interestingly, the number of deaths due to homicide has decreased from 13,994 in 1980 to about half that number in 2019.

The chart visually represents how the leading causes of death have changed over nearly four decades, highlighting shifts in public health challenges. For example, the significant increase in deaths due to unintentional injuries could be attributed to various factors, such as changes in transportation safety and drug overdose rates. Similarly, the decrease in homicides might reflect changes in crime rates and law enforcement strategies.

The rise in deaths due to unintentional injuries and suicide indicates areas where more focused efforts may be needed. Conversely, the decrease in deaths due to homicide suggests some progress in violence prevention over the past few decades.

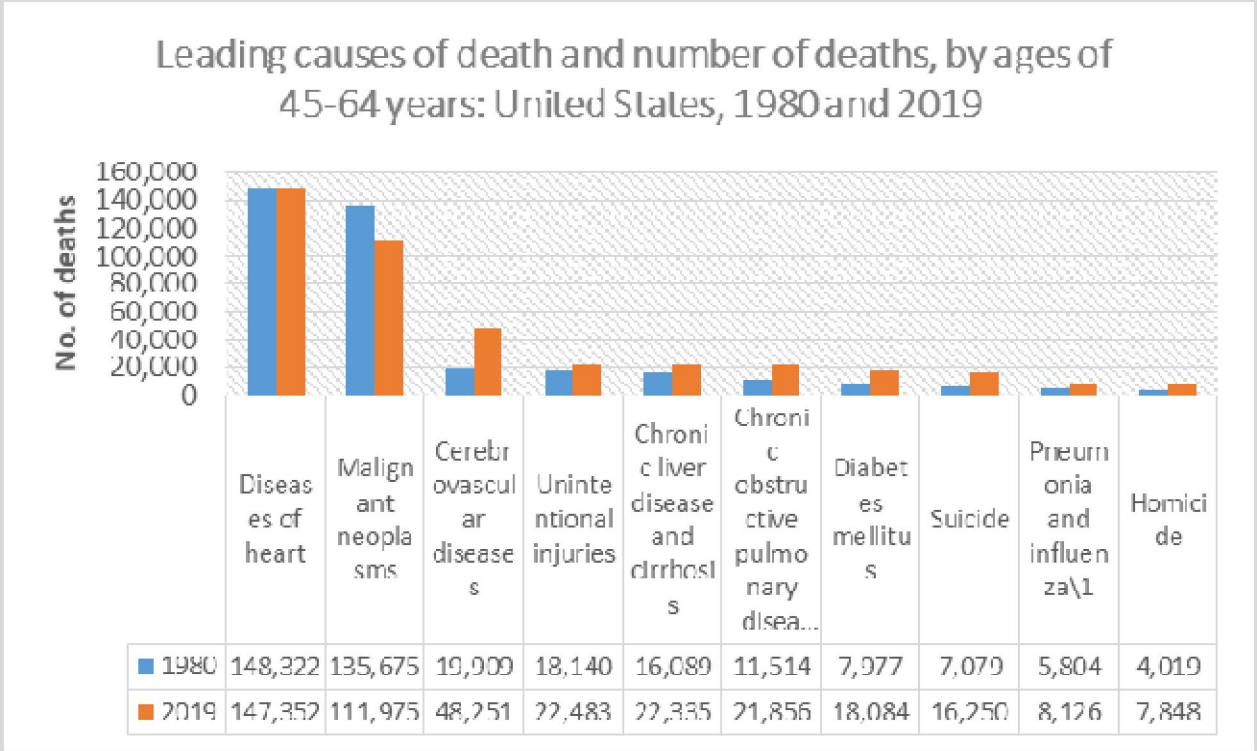

Fig 6: The chart above is a bar chart that compares the leading causes of death for individuals aged 45-64 in the United States between 1980 and 2019.

I. Diseases of the Heart: This was the leading cause of death in both years, but the number of deaths slightly decreased from 1980 to 2019.

II. Malignant Neoplasms (Cancer): The number of deaths due to cancer has significantly increased.

III. Cerebrovascular Diseases: The number of deaths due to these diseases decreased.

IV. Unintentional Injuries: There was a notable increase in deaths due to unintentional injuries.

V. Chronic Liver Disease and Cirrhosis: The number of deaths due to these diseases increased.

VI. Chronic Obstructive Pulmonary Disease (COPD): The number of deaths almost doubled.

VII. Diabetes Mellitus: The number of deaths more than doubled.

VIII. Suicide: The suicide rate has more than doubled.

IX. Pneumonia and Influenza: The number of deaths slightly decreased.

X. Homicide: The homicide rate almost doubled.

In conclusion, while some causes of death have seen a decrease (such as diseases of the heart and cerebrovascular diseases), others have seen a significant increase (such as malignant neoplasms, unintentional injuries, COPD, diabetes mellitus, suicide, and homicide).

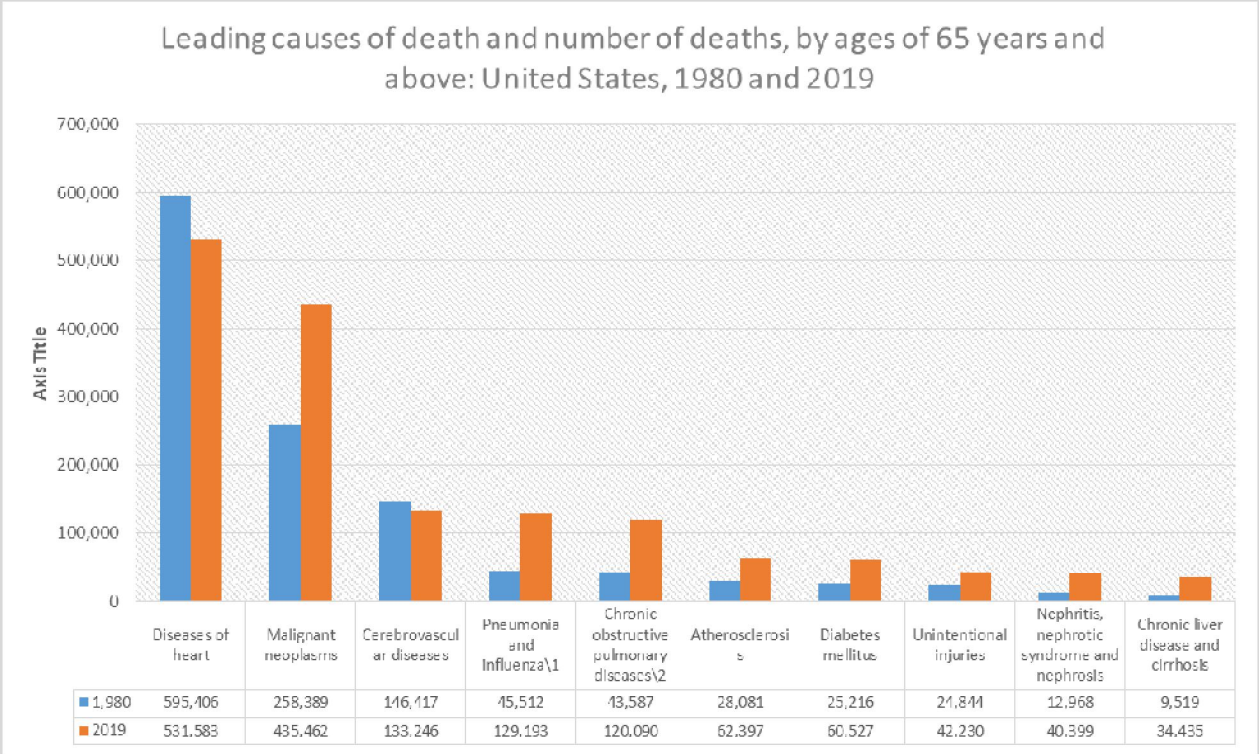

Fig 7: The chart compares the leading causes of death among individuals aged 65 and above in the United States between 1980 and 2019. Where is the error bar? The chart titles should be in Times New Roman.

I. **Diseases of the Heart:** This remains the leading cause of death in both years, but there is a significant increase in the number of deaths from 1980 to 2019.

II. **Malignant Neoplasms (Cancer):** The number of deaths due to cancer has also increased, but not as drastically as heart diseases.

III. **Atherosclerosis:** Interestingly, the number of deaths due to atherosclerosis has significantly decreased.

IV. **Other Causes:** Most other causes, including cerebrovascular diseases (stroke), Pneumonia and influenza, chronic obstructive pulmonary diseases, diabetes mellitus, unintentional injuries, nephritis/nephrotic syndrome/and nephrosis, and chronic liver disease and cirrhosis, have seen an increase in the number of deaths.

In conclusion, while some progress has been made in reducing deaths from specific causes like atherosclerosis, the overall trend shows an increase in the number of deaths due to most of these leading causes. This could be due to various factors, including changes in population size, age distribution, and

advancements in medical diagnosis and reporting. It underscores the importance of continued efforts in healthcare to combat these leading causes of death.

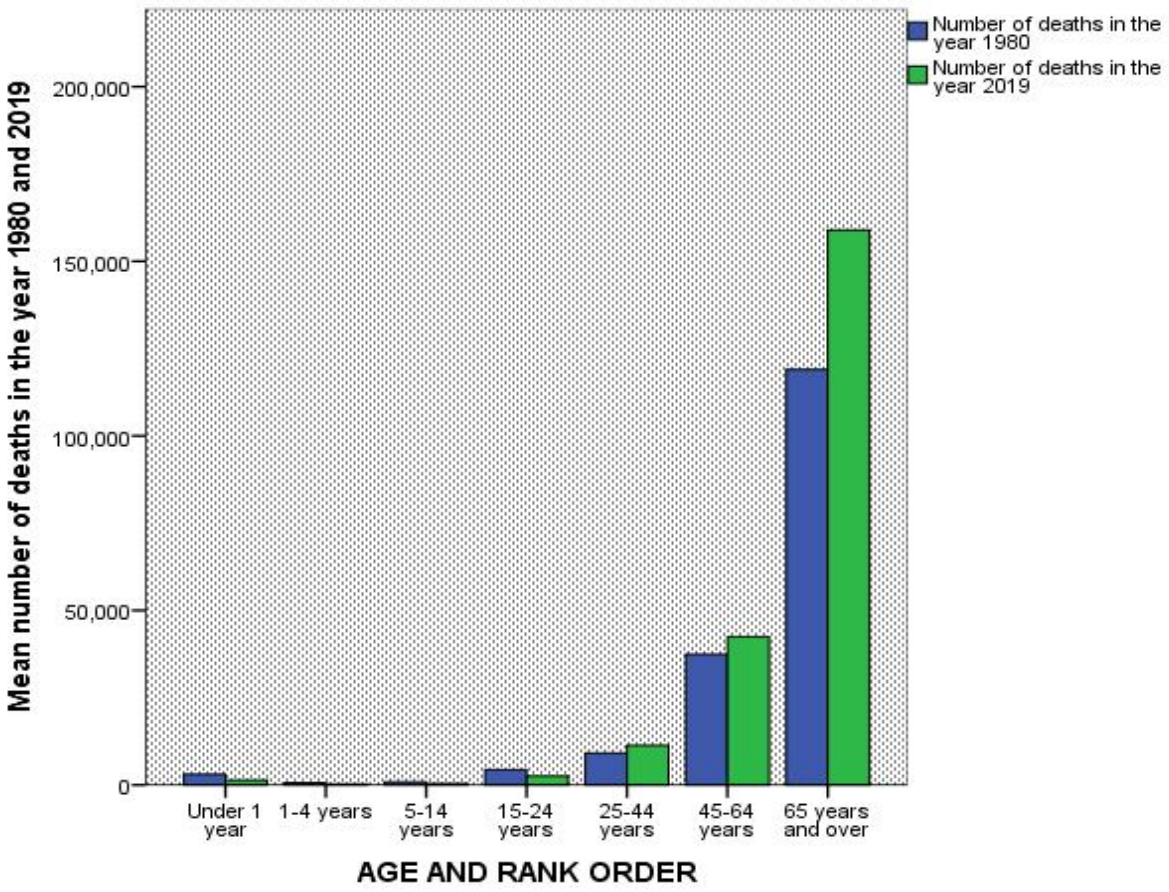

Fig 8: This image is a bar graph comparing the mean number of deaths across different age groups between 1980 and 2019.Where is the error bar? The chart titles should be in Times New Roman.

The image shared a graph comparing the mean deaths between 1980 and 2019 across different age groups. Here are some key observations:

I. **Under** one year: A slight increase in the mean number of deaths in 2019 compared to 1980.

II. **1-4 years:** The mean number of deaths in 2019 is slightly higher than in 1980.

III. **5-14 years:** The mean number of deaths in 2019 is slightly higher than in 1980.

IV. **15-24 years:** The mean number of deaths in 2019 is slightly higher than in 1980.

V. **25-44 years:** The mean number of deaths in 2019 is significantly higher than in 1980.

VI. **45-64 years:** The mean number of deaths in 2019 is significantly higher than in 1980.

VII. **65 years and over:** The mean number of deaths in 2019 is significantly higher than in 1980, with the most noticeable increase observed in this category.

The mean number of deaths across all age groups in the United States has increased from 1980 to 2019, with the most significant increase observed in the "65 years and over" category. This could be due to various factors, including changes in population size, advances in medical technology, changes in lifestyle and health behaviors, and more. Please note that this is an interpretation based on the data presented in the graph, and additional context may be necessary for a more comprehensive understanding.

Table 1:

Summary of descriptive statistical finding

Statistics							
		AGE AND RANK ORDER	Causes of death	Number of deaths in the year 1980	Number of deaths in the year 2019	Causes_of_death_2019 > 1 & Causes_of_death > 1 (FILTER)	Causes of death in the year 2019
N	Valid	70	70	70	70	70	70
	Missing	0	0	0	0	0	0
Mean		4.00	14.69	24927.70	31065.44	1.00	20.20
Median		4.00	13.00	3233.50	1401.50	1.00	19.00
Mode		1[a]	8[a]	1497	49[a]	1	8
Std. Deviation		2.014	8.075	80724.366	85788.632	.000	9.106
Variance		4.058	65.204	6516423307.981	7359689406.743	.000	82.916
Kurtosis		-1.253	-.628	37.633	23.144		-1.107
Std. Error of Kurtosis		.566	.566	.566	.566	.566	.566
Sum		280	1028	1744939	2174581	70	1414
a. Multiple modes exist. The smallest value is shown							

Age and Rank Order (Years):

- **Mean:** The mean age and rank order is 4.00, corresponding to the age group of 15–24 years.
- **Median:** The median age and rank order is also 4.00, indicating that the middle value of the data falls within the 15–24 years age group.
- **Mode:** The mode is 1[a], which suggests that they have equal S modes or perhaps multiple modes.
- **Standard Deviation:** The standard deviation is 2.013, indicating that the age distribution has relatively low variability around the mean.

The dataset's mean and median age of individuals is approximately 15-24 years. The mode indicates that there are multiple modes, i.e., equal frequencies. The negative kurtosis value suggests a distribution with lighter tails than a normal distribution, indicating fewer extreme values.

Table 2: Correlations (Year)

		Number of deaths in the year 1980	Number of deaths in the year 2019
Number of deaths in the year 1980	Pearson Correlation	1	.947**
	Sig. (2-tailed)		.000
	N	70	70
Number of deaths in the year 2019	Pearson Correlation	.947**	1
	Sig. (2-tailed)	.000	
	N	70	70

**. Correlation is significant at the 0.01 level (2-tailed).

By using Pearson's to describe the relationship between two variables. Its results range between -1 and +1; 0 indicates no relationship, while values greater than 0.5 indicate a strong correlation, and results lower than 0.5 indicate a low correlation. The Pearson correlation analysis indicates a strong positive linear trend ($r = 0.947$, $p < 0.01$) between the fatalities in 1980 and 2019. This indicates that whether the

number of fatalities in 1980 rises or decreases, the number of deaths in 2019 will follow accordingly. The statistical significance of the correlation shows that it is unlikely to be due to chance alone.

Table 3:

Correlation (Gender)

Correlations			
		All causes (Male)	All causes (Female)
Pearson Correlation	All causes (Male)	1.000	.996
	All causes (Female)	.996	1.000
Sig. (1-tailed)	All causes (Male)	.	.000
	All causes (Female)	.000	.
N	All causes (Male)	20	20
	All causes (Female)	20	20

I. **Pearson Correlation**: There is a strong positive correlation between the number of deaths attributed to all causes for males and females, indicated by the Pearson correlation coefficient of 0.996. This suggests that as the number of deaths increases for males, there is a corresponding increase in the number of deaths for females, and vice versa.

II. **Significance (1-tailed)**: The p-value for the correlation coefficient is significant ($p < 0.001$), indicating that the observed correlation is unlikely to have occurred by chance.

III. **Sample Size (N)**: The correlation analysis is based on 20 male and female observations.

The descriptive statistics reveal that, on average, males have more deaths attributed to all causes than females, with more significant variability in the number of deaths among males. Additionally, the strong positive correlation coefficient suggests a consistent pattern between the number of deaths for males and females across different causes. This information provides valuable insights into mortality patterns and may inform further research or public health interventions to address disparities in mortality rates between genders.

Table 4: Regression analysis

Descriptive Statistics			
	Mean	Std. Deviation	N
All causes (Male)	930.440	74.4855	20
All causes (Female)	662.225	44.4044	20

I. Mean: The number of deaths attributed to all causes is higher for males (930.440) than for females (662.225).
II. Standard Deviation: The variability in the number of deaths is higher among males (74.4855) than females (44.4044).
III. Both datasets consist of 20 observations each.

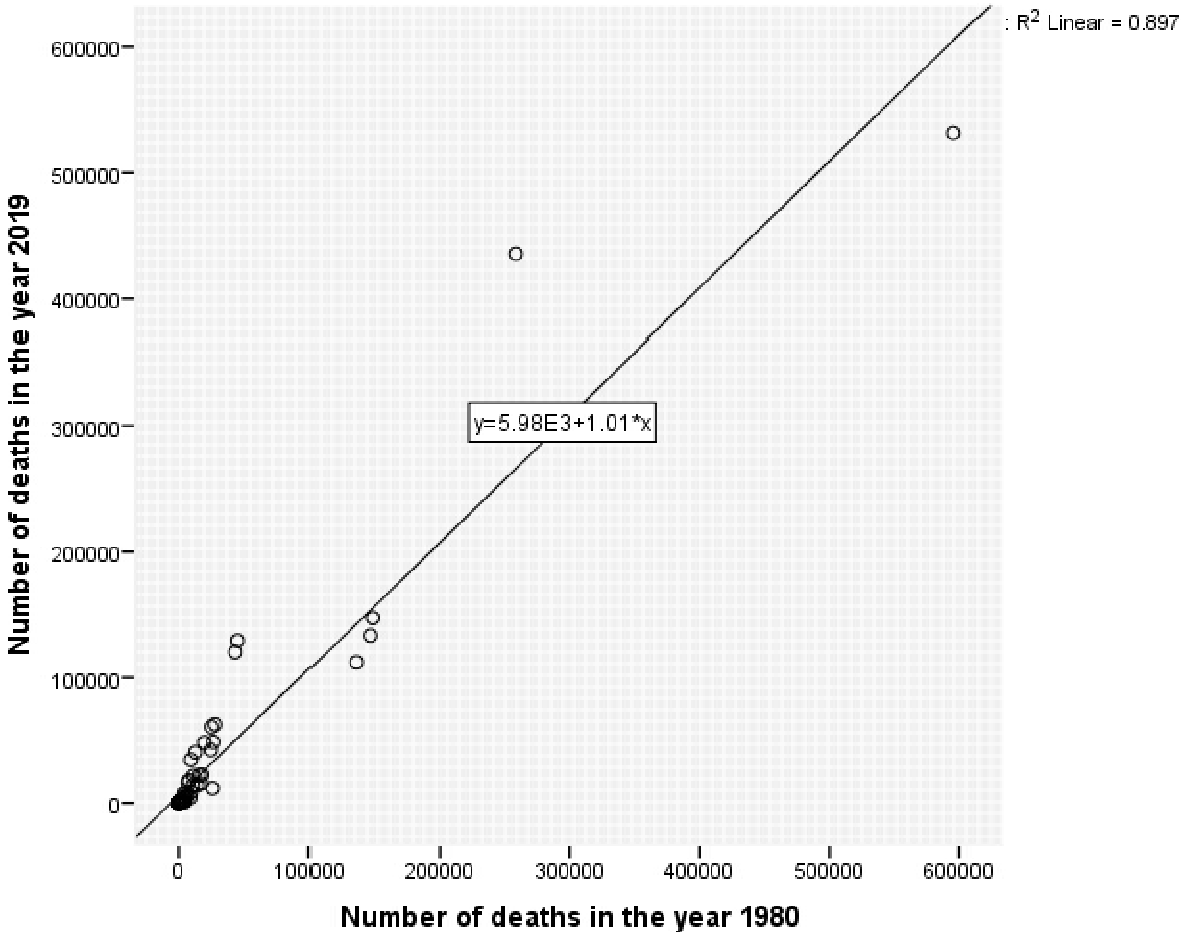

Fig 9: The scatter plot depicts a relationship between the number of deaths in 1980 and 2019.Change the labels in Times New Roman.Keep the Y value on the side of the graph.

The scatter plot depicts a relationship between the number of deaths between 1980 and 2019. Specifically showing:

I. Strong Positive Correlation: The scatter plot shows a strong positive correlation between the deaths in 1980 and 2019. This is evident from the upward trend of the data points and the line of best fit, indicating that as the number of deaths in 1980 increases, so does the number of deaths in 2019.

II. Regression Equation: The regression equation displayed on the chart (y = 5.98E3 + 1.01x) provides a mathematical representation of this relationship. It suggests that for every increase in the number of deaths in 1980 (x), there is an expected increase of 1.01 deaths in 2019 (y), with an intercept of 5.98E3.

Coefficient of Determination (R^2): The R^2 value of 0.897 indicates that approximately 89.7% of the variance in the number of deaths in 2019 can be explained by its linear relationship with the number of deaths in 1980. This suggests that the regression model fits the data well and effectively captures the association between the two variables.

DISCUSSION

Life expectancy for the U.S. population in 2019 was 78.8 years, an increase of 0.1 years from the previous year. The age-adjusted death rate decreased in 2019 by 1.2% in the previous year. In 2019, the ten leading causes of death (heart disease, cancer, unintentional injuries, chronic lower respiratory diseases, stroke, Alzheimer's disease, diabetes, kidney disease, influenza and Pneumonia, and suicide) remained almost the same in adulthood as in 1980 [2][4][5]. Congenital disease, unintentionalinjuries, homicide, and suicide are the leading causes of death before the age of 45 in 1980 and 2019, with a higher incidence in 1980.Kidney diseasebecame the ninth leading cause in 2019 and was not directly among the first ten leading causes in 1980. The ten leading causes of death accounted for 73.4% of all deaths in the United States in 2019[6]. In 2019, 2,854,838 resident deaths were registered in the United States, almost a million more than in 1980(1,989,841 deaths). The age-adjusted death rate for the total population decreased by 1.2%, and life expectancy at birth increased by 0.1 years [2][4].

Age-adjusted death rates decreased for seven leading causes and increased for one. Life expectancy at birth increased by 0.1 years from 78.7 years in 2018 to 78.8 in 2019, mainly because of decreases in Mortality from cancer, chronic lower respiratory diseases, influenza and Pneumonia, suicide, and stroke. In 2019, a total of 20,921 deaths occurred in children under one year, which wasfewer infant deaths than in 1980. The IMR decreased for 1 (low birth weight) of the ten leading causes of infant death and increased for 2 (unintentional injuries and necrotizing enterocolitis of newborns).

The analysis of mortality trends over the past few decades in the United States reveals both progress and areas for continued focus:

1. **Improvements in Survival**: We have seen significant improvements in infant survival rates, with fewer babies dying from conditions like congenital anomalies and sudden infant death syndrome (SIDS). This shows that medical care for babies has gotten better.

2. **Positive Trends in Child Health**: Overall, fewer children are dying from various causes like accidents and diseases compared to years ago. This suggests that efforts to keep kids safe and healthy have been working.

3. **Concerns for Young Adults**: Unfortunately, there has been a rise in deaths among young adults, especially from things like suicide. This highlights the need for better mental health and wellbeing support, especially for young people.

4. **Mixed Picture for Middle-Aged and Older Adults**: While some diseases like heart disease have become less deadly, others like cancer and diabetes have become more common causes of death. This tells us that we still have work to do in managing chronic diseases as people get older.

5. **Looking Forward**: Overall, there has been progress in saving lives, but we still have challenges to overcome. By focusing on prevention, better healthcare access, and support for mental health, we can continue to improve the health and wellbeing of people of all ages in the United States.

In summary, the examination of mortality rates across several decades highlights achievements and ongoing difficulties in public health. Even if the rates of newborn and child Mortality have decreased, it is still critical to address the alarming increase in the fatalities of young people, especially those caused by suicide. The inconsistent patterns shown in middle-aged and older persons further highlight the continuous requirement for all-encompassing approaches to prevent chronic illnesses and advance general wellbeing in all age groups. To significantly improve people's health outcomes in the U.S., ongoing initiatives in prevention, better access to healthcare, and mental health assistance are essential.

CONCLUSION

There were more deaths in 2019 than in 1980, and the mean age was 15-24 for both years. The common cause of death in 1980 from birth to the age of 24 remains higher, with unintentional injuries, malignancy, congenital anomaly, homicide, and suicide taking the lead. In infancy, the most common cause of death is congenital anomaly for both years, followed by sudden infant death syndrome (SIDs), but unintentional injuries are the most common by age 1-4. 15 -24 years show a higher rate of homicide and suicide than malignancy as the second most common cause of death, and the pattern is the same for both years. The highest mortality rates for ages 45-65 remained cardiovascular disease.

The Pearson correlation has a positive linear trend ($r = 0.947$, $p < 0.01$). There is a strong positive correlation between the number of deaths attributed to all causes for males and females, indicated by the coefficient is significant ($p < 0.001$). The variability in the number of deaths is higher among males (74.4855) than females. Male deaths are higher, and female is barely over 40% of total deaths. There is an upward trend in deaths in both years, with an expected increase of 1.01 deaths in 2019 and a Coefficient of Determination (R^2 value) of 0.897.

Data Availability Statement and Source

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation. NOTE: For cause-of-death codes based on ICD–9 in 1980 and ICD–10 in 2019, see Sources and Definitions, Cause of death; Cause-of-death ranking; International Classification of Diseases (ICD).

SOURCE: National Center for Health Statistics, National Vital Statistics System; Vital Statistics of the United States, 1980. Volume II—Mortality, part A. 1985; public-use 2018 Mortality File; and Xu JQ, Murphy SL, Kochanek KD, Arias E. Deaths: Final data for 2019. National Vital Statistics Reports; vol 70 no 8. Hyattsville, MD: National Center for Health Statistics. 2021. Available from: https://www.cdc.gov/nchs/data/nvsr/nvsr70/nvsr70-08-508.pdf. See Sources and Definitions, National Vital Statistics System (NVS

Table LCODAge. Leading causes of death and number of deaths by age: United States, 1980 and 2019

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Reviewer's advice

1. **Write the whole paper in past participle form and in passive voice.**
2. **Delete sentences that I highlighted in red.**
3. **Correct the yellow highlighted areas.**
4. **Add more references.**
5. **Expand the table/charts so that all the words stay intact.**