The strength of the association between excessive alcohol consumption and the mortality rate of dementia in adults.

1. INTRODUCTION

1.1 Definition and Symptoms of Dementia

Dementia is a condition that progressively impairs cognitive function, interfering with daily life and activities. It is a broad word encompassing a variety of symptoms related to the deterioration of memory, thinking, and other cognitive functions rather than a specific illness (Alzheimer's Association, 2020). Lewy body dementia, vascular dementia, and Alzheimer's disease are a few common causes of dementia (World Health Organization, 2021). Cognitive abilities deteriorate when brain cells are injured or die, making communication, problem-solving, and self-care more difficult. Memory loss, difficulty solving problems and thinking, confusion about time or location, mood swings, and trouble speaking or finding words are some of the symptoms of dementia, however, they can vary significantly (National Institute of Aging, 2021). As the illness worsens, people may find it difficult to carry out routine activities, have personality changes, and need more care (Alzheimer's Association, 2020). These symptoms frequently start out mildly and might be confused with aging, which would postpone identification until the illness becomes a major hindrance to day-to-day functioning (World Health Organization, 2021).

1.2 Mortality Rates of Dementia in Florida by Person, Place, and Time

Using the 2000 census as the standard population, the age-adjusted mortality rate from Alzheimer's disease in Florida in 2022 was 18.3 per 100,000, whereas the crude death rate from the disease was 28.6 per 100,000 (Florida Department of Health, 2022). As seen in Figure 1, counties in the northwest and rural areas, including Walton, Santa Rosa, and Bay, had much

higher death rates than counties in the south. In counties with more poverty and less access to healthcare, Alzheimer's dementia mortality rates are often higher (Florida Department of Health, 2023). The significant gender gap in the death rate from Alzheimer's disease is seen in Figure 2 (Florida Department of Health, 2022). According to data gathered from the Florida Health CHARTS, the age-adjusted death rate for females was 1.5 times greater than that of males in 2022. In Florida, the age-adjusted death rate for males was 17.8 per 100,000, and for females, it was 21.3 per 100,000. Over the previous ten years, Florida's Alzheimer's disease death rates have slightly increased. Figure 3 shows that the death rate increased by more than 11% between 2012 and 2022, with a decrease between 2015 and 2019 (Florida Department of Health, 2023).

Figure 1: Comparison of age-adjusted Alzheimer's disease death rate by Florida counties in 2022. (Florida Department of Health/FLHealthCHARTS, 2022).

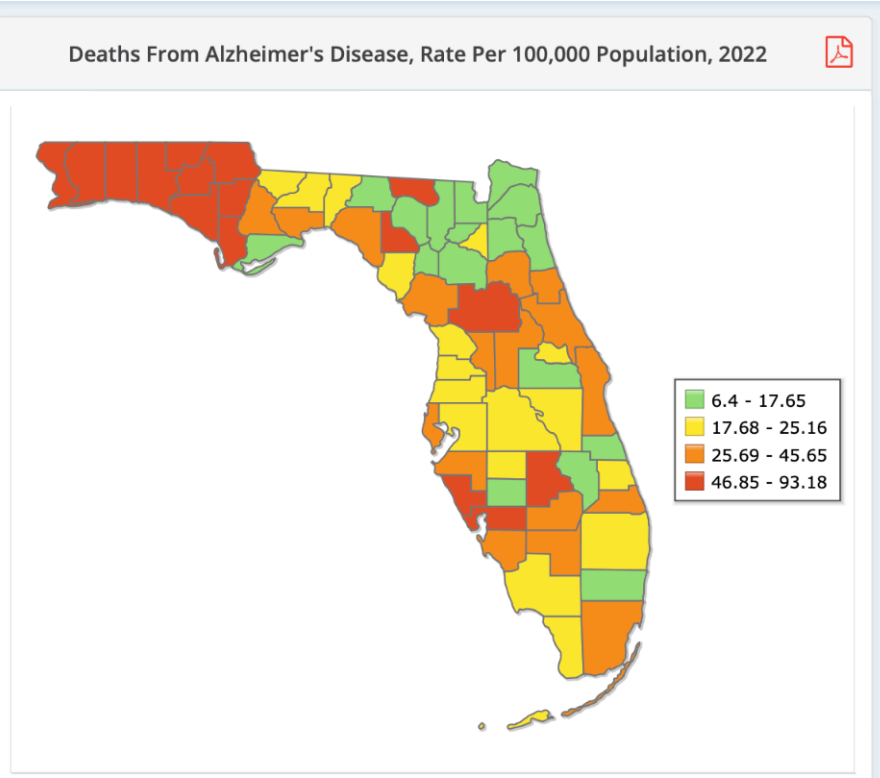

Figure 1: Comparison of age-adjusted Alzheimer's disease death rate by Florida counties in 2022. (Florida Department of Health/FLHealthCHARTS, 2022).

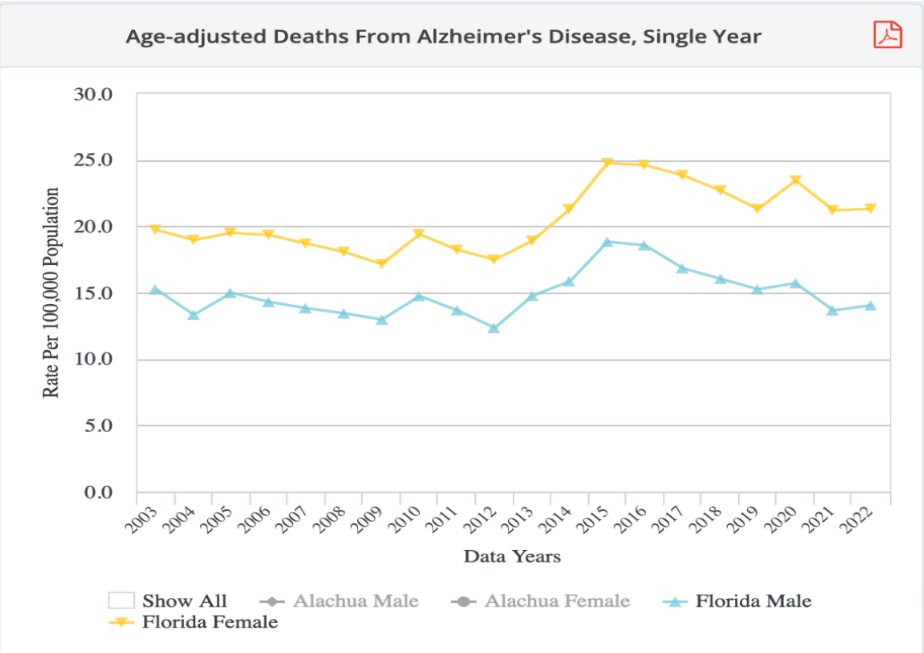

Figure 2: Comparison of age-adjusted Alzheimer's disease death rate between Men and Women in Florida adults. (Florida Department of Health/FLHealthCHARTS, 2022).

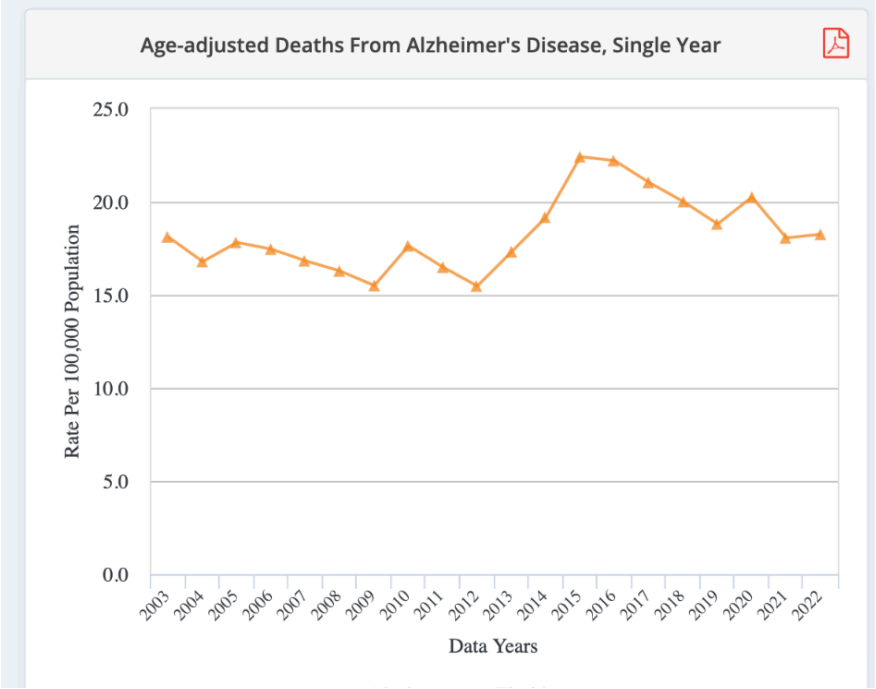

Figure 3: Changes of age-adjusted Alzheimer's disease death rate overtime in Florida. (Florida Department of Health/FLHealthCHARTS, 2022).

1.3 General background of excessive alcohol consumption as a risk factor for dementia

Research has shown a clear association between heavy drinking and cognitive impairment, making excessive alcohol use a significant risk factor for dementia. Because chronic alcohol use can alter the structure and function of the brain, including the atrophy of areas like the hippocampus that are important for memory and learning, it has been connected to neurodegeneration (Müller et al., 2019). Additionally, research shows that chronic drinkers are more likely to acquire vascular dementia and Alzheimer's disease, among other types of dementia (Norton et al., 2014; Tzeng et al., 2021). Alcohol-induced oxidative stress, inflammation, and dietary deficits may be the processes underlying this connection. These factors all work together to cause cognitive impairment (Boden & Fergusson, 2011). In light of these results, public health campaigns that try to curb excessive alcohol use may be crucial in lowering the population's risk of dementia.

1.4 Research Question

Using information from published papers and the FLHealthCHARTS.gov website, this study aims to determine the magnitude of the correlation between excessive alcohol use and adult dementia mortality. The mortality rate from dementia in adults is thought to increase with heavy alcohol use.

2. METHODS

2.1 Correlation Analysis

Using the Excel spreadsheet that Dr. Lee had pre-programmed for this course, a correlation study was performed to test a hypothesis regarding the relationship between excessive alcohol use and dementia in adults. The FLHealthCharts.gov website's prevalence of Adults Who Engage in Heavy or Binge Drinking (BRFSS) for 67 Florida counties in 2019 provided the statistics on excessive alcohol use. Charts at https://www.flhealthcharts.gov. The information on dementia mortality was taken from the 2022 "Deaths from Alzheimer's Disease" report for 67 Florida counties - https://www.flhealthcharts.gov/Charts/

From the analysis, a correlation coefficient (r) and the associated p-value (p) are presented based on the analysis. In general, a strong correlation is defined as a value of r greater than 0.7. A moderate correlation falls between 0.5 and 0.7, a weak correlation falls between 0.5 and 0.3, and a weak or insignificant correlation falls below 0.3. The threshold for statistical significance was set at $p < 0.05$. Nevertheless, the interpretation should note that the correlation study was done for the counties rather than the individuals.

2.2 Literature Review

Through an extensive literature analysis, three abstracts from peer-reviewed publications were found in order to evaluate the relationship between excessive alcohol use and adult dementia mortality. On October 18–19, 2024, a number of reliable databases were used, including PubMed, Scopus, and PsycINFO, which were accessible through the UCF library. To find pertinent research publications, a list of keywords was used, including dementia, cognitive decline, alcohol-related mortality, excessive alcohol intake, and cohort studies. To concentrate on more recent research released between 2004 and 2024, a twenty-year time window was set. Key information was taken from three abstracts that were most relevant to my research topic. This included the authors, title, publication year, DOI, exposure (alcohol use), illness outcome (death from dementia), sample size, and measurements of association (hazard ratios or odds ratios with 95% confidence intervals).

3. RESULTS

3.1 Correlation between alcoholism and mortality rate of dementia in Florida from an ecological study

The three modifiable risk factors described in the previous section were analyzed for potential correlation with dementia mortality rates in Florida. The risk factor examined using the excel spreadsheet program was adults who are current excessive alcohol consumers against dementia mortality rates in Florida. Figure 4 shows no prominent association between current excessive alcohol consumers and dementia mortality rates with a correlation coefficient of 0.099 and a p-value of 0.427, indicating no statistically significant correlation between the excessive alcohol consumption and dementia mortality rates in Florida counties.

Slope	m=	-0.481
Intercept	b=	30.362
Correlation Coefficient	**r=**	**0.099**
R-Squared	r^2	0.010
Sample Size	N=	67
T-Statistics	t-	-0.800
	p-value=	**0.427**

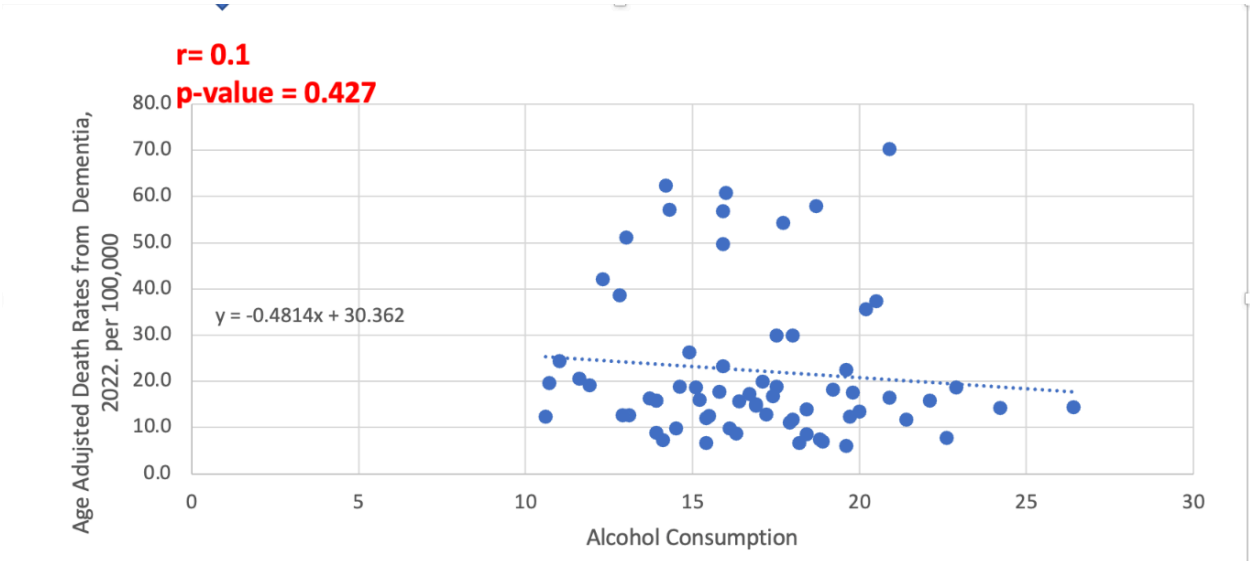

Figure 4: Demonstrates no discernible correlation between the incidence of dementia mortality and present excessive alcohol consumption.

3.2 Association between excessive alcohol consumption and dementia mortality from analytical epidemiological studies

Table 1. Summary table with key information from three advance analytical epidemiological studies

Article 1:	
First author, Year	Peters, R. 2019
Title	Alcohol and dementia: A Systematic Review and Meta-Analysis
Study design	Systematic review and meta analysis
DOI w/ hyperlink	https://doi.org/10.1186/s12877-019-1231-7
Exposure variable	Alcohol Consumption
Outcome variable	Dementia Incidence And Mortality
Study sample (n)	Various studies pooled together (exact total sample size varies by individual study in the meta-analysis)
OR/RR/HR with 95% Cl	The study reports a pooled risk ratio (RR) of 1.47 (95% CI: 1.19–1.83) for high alcohol consumption and dementia mortality.
Article 2:	
First author, Year	Bagnardi, V., 2015
Title	Alcohol consumption and dementia risk: A systematic review and meta-analysis
Study design	Systematic review and meta-analysis
DOI w/ hyperlink	https://doi.org/10.1016/j.jalz.2014.02.006](https://doi.org/10.1016/j.jalz.2014.02.006
Exposure variable	Alcohol consumption
Outcome variable	Dementia incidence and mortality
Study sample (n)	Various studies pooled together (exact sample size depends on the individual studies included in the meta-analysis)
OR/RR/HR with 95% Cl	The study reports a pooled **hazard ratio (HR)** of 1.35 (95% CI: 1.11–1.64) for high alcohol consumption and dementia risk.

Article 3:	
First author, Year	Tzeng, R.-C., 2022
Title	The impact of alcohol consumption on the mortality of dementia: A longitudinal study
Study design	Longitudinal study
DOI w/ hyperlink	https://doi.org/10.1159/000522222
Exposure variable	Alcohol consumption
Outcome variable	Mortality from dementia
Study sample (n)	4,536 participants
OR/RR/HR with 95% Cl	The study reports a hazard ratio (HR) of 1.42 (95% CI: 1.09–1.86) for excessive alcohol consumption and dementia mortality.

3.3 Interpretation

The first research paper by Peters et al. (2019) utilized a systematic review and meta-analysis. This study discovered a strong positive correlation between dementia mortality and heavy alcohol use. I concentrated on the total pooled data about alcohol intake and dementia outcomes, even though the research encompassed a variety of demographics. High alcohol use and dementia mortality had a risk ratio (RR) of 1.47 (95% CI: 1.19–1.83) according to the meta-analysis. Since the confidence interval excludes the null value of 1, this suggests a statistically significant link.

A comprehensive review and meta-analysis were also carried out in the second study by Bagnardi et al. (2015). The main emphasis was on alcohol use and how it affects the risk of dementia. With the confidence interval omitting 1, I verified statistical significance by focusing on the stated hazard ratio (HR) of 1.35 (95% CI: 1.11 -- 1.64) for excessive alcohol intake, which indicates an increased risk of dementia among heavy drinkers.

Lastly, longitudinal research examining the long-term impacts of alcohol intake on dementia mortality was conducted in the third study by Tzeng et al. (2022). With a hazard ratio (HR) of 1.42 (95% CI: 1.09–1.86), the study indicated that excessive alcohol use considerably raises the probability of dementia-related death. The confidence interval did not pass 1, indicating that the connection was statistically significant.

4. CONCLUSION

In this study, we explored the correlation between excessive alcohol consumption and dementia mortality using data from the FLHealthCHARTS and peer-reviewed literature. The ecological analysis of Florida counties yielded a correlation coefficient of 0.099 and a p-value of 0.427, indicating a very weak positive relationship between excessive alcohol consumption and dementia mortality that is not statistically significant. This suggests that at the county level, there is no strong evidence to support a significant association between current excessive alcohol consumption and dementia mortality rates.

In contrast, findings from the literature review provided stronger evidence of a significant relationship. Systematic reviews and meta-analyses conducted by Peters et al. (2019) and Bagnardi et al. (2015) demonstrated a statistically significant increased risk of dementia mortality and incidence associated with high alcohol consumption, with pooled risk ratios of 1.47 (95% CI: 1.19–1.83) and 1.35 (95% CI: 1.11–1.64), respectively. Furthermore, the longitudinal study by Tzeng et al. (2022) confirmed this association, with a hazard ratio of 1.42 (95% CI: 1.09–1.86), indicating an elevated risk of dementia-related death among heavy drinkers. Overall, while the county-level data analysis in Florida does not show a statistically significant correlation, the body of research in the literature highlights a consistent association between excessive alcohol consumption and dementia mortality, suggesting that public health efforts to reduce excessive alcohol use may help lower dementia-related deaths in the population (Peters et al., 2019; Bagnardi et al., 2015; Tzeng et al., 2022).

5. REFERENCES

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