

Introduction

Cases of Alzheimer's disease have been increasing numerously over the years. In 1992, 4.078 million cases rose to 9.837 million in almost two decades. 57 million people (2019) with Alzheimer's are predicted to increase to 152 million people by 2050 with 10 million new cases each year. Across multiple studies, a common risk factor of Alzheimer's was hypertension. According to a systematic review, 68% of the population showed a candid relationship between ADNC and BP. Alzheimer's also has a different effect on geographic locales. Interestingly, possibly because of improved care, the life expectancy of an Alzheimer's patient in HICs is higher. For example, the prevalence 7.3% has been steady since 2013 in Western Europe. However the longevity is lower in LMICs possibly because of insufficient or inaccessible healthcare. Furthermore, across multiple studies, the gender ratio for Alzheimer's is higher for women and more prevalent in ages 65 or above or in some rare cases, between the ages of 40-50yrs.

Objectives

The objectives of the study:

- Find the the effects of hypertension on Alzheimer's disease.
- Compare the effects of hypertension on Alzheimer's between rural women and urban women populations.

Methods

To support the hypothesis, the study used a 1992-2022 dataset from the Health and Retirement Study. The data was filtered for variables related to the study: Alzheimer's hypertension, demographics (rural and urban), gender, age, ethnicity, education level and employment status. All statistical tests were run using Python within Jupyter Notebook and Anaconda. Following summary statistics, data cleaning and converting the data from wide to long format, the final sample size consisted of 656,878 observations. Using the statsmodels package, linear regressions were performed to evaluate the effects of hypertension on Alzheimer's as a whole and in specific demographic subsets such as rural women, urban women, individuals 65+. Finally the five regression models were combined into a single standardized regression table and using the matplotlib and seaborn libraries, a heatmap was created to visualize the demographic disparities.

Results

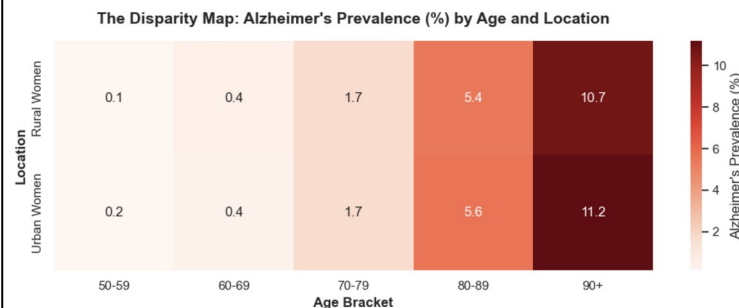
Figure 1 : A combined regression table of : Hypertension outcome, Alzheimer's (whole population) outcome, Alzheimer's (rural women population) outcome, Alzheimer's (urban women population) outcome and Alzheimer's (65+) outcome

COMBINED LINEAR PROBABILITY MODELS (OLS) - HYPERTENSION AND ALZHEIMER'S					
	Model 1: HTN (All)	Model 2: ALZ (All)	Model 3: ALZ (Rural Wom)	Model 4: ALZ (Urban Wom)	Model 5: ALZ (Age 65+)
Intercept	-0.034*** (0.008)	-0.089*** (0.004)	-0.110*** (0.009)	-0.099*** (0.006)	-0.192*** (0.009)
Hypertension (Yes=1)		-0.005*** (0.001)	-0.009*** (0.002)	-0.006*** (0.001)	-0.009*** (0.002)
Rural (Yes=1)	0.020*** (0.002)	0.001 (0.001)			0.001 (0.002)
Female (Yes=1)	-0.003 (0.002)	0.002*** (0.001)			0.003* (0.001)
Age (Years)	0.007*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.003*** (0.000)
Hispanic (Yes=1)	0.041*** (0.004)	0.003** (0.001)	-0.004 (0.005)	0.006*** (0.002)	0.007** (0.003)
Race: Black	0.207*** (0.003)	0.008*** (0.001)	0.013*** (0.004)	0.009*** (0.001)	0.017*** (0.002)
Race: Other	0.046*** (0.004)	0.001 (0.001)	0.005 (0.005)	0.002 (0.002)	-0.000 (0.003)
Education: GED	0.014*** (0.005)	-0.012*** (0.002)	0.007 (0.006)	-0.018*** (0.003)	-0.018*** (0.004)
Education: High School	-0.001 (0.003)	-0.013*** (0.002)	-0.009** (0.004)	-0.018*** (0.002)	-0.019*** (0.003)
Education: Some College	-0.008** (0.003)	-0.014*** (0.001)	-0.010** (0.004)	-0.019*** (0.002)	-0.021*** (0.003)
Education: College and Above	-0.050*** (0.003)	-0.016*** (0.001)	-0.014*** (0.004)	-0.017*** (0.002)	-0.023*** (0.002)
Labor: Working Part-Time	-0.016*** (0.005)	-0.002*** (0.000)	-0.004*** (0.001)	-0.002** (0.001)	-0.006*** (0.001)
Labor: Unemployed	0.051*** (0.008)	-0.001** (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.005*** (0.001)
Labor: Partly Retired	0.057*** (0.005)	-0.015*** (0.001)	-0.019*** (0.002)	-0.018*** (0.001)	-0.007*** (0.001)
Labor: Fully Retired	0.122*** (0.003)	-0.001 (0.001)	-0.006*** (0.002)	-0.005*** (0.001)	0.007*** (0.001)
Labor: Disabled	0.185*** (0.006)	0.021*** (0.003)	0.034*** (0.010)	0.019*** (0.004)	0.083*** (0.014)
Labor: Not in Labor Force	0.053*** (0.004)	0.000 (0.002)	-0.007* (0.004)	-0.001 (0.002)	0.000 (0.004)
R-squared	0.085	0.029	0.034	0.036	0.031
R-squared Adj.	0.085	0.029	0.033	0.036	0.031
Observations	222616	104007	15996	45130	54224
R-squared	0.085	0.029	0.034	0.036	0.031

Standard errors in parentheses.
* p<.1, ** p<.05, ***p<.01

Results

Figure 2 :



Conclusion

The initial hypothesis for this study was that hypertension would exert a higher effect on Alzheimer's specifically in rural women populations compared to urban women populations. However, the unexpected findings revealed the opposite. A possible explanation for this urban vulnerability is work-related stress. The regression data showed that the negative coefficient in employment was weaker for urban women compared to rural women. This research can continue and investigate occupational stress to understand why this disparity exists and what kind of confounding variables affect the current understanding. Although this study was limited by multiple confounding variables, unknown and missing data identifying the population demographic that is highly affected by hypertension and Alzheimer's is crucial to providing healthcare resources and interventions to populations that need them most.

References

