Biostatistics 651 Project

Associations with Clinically Diagnosed Dementia Rating

Introduction: According to the World Health Organization, around 55 million people currently have dementia with projections of 139 million in 2050. Dementia affects a person's cognitive function, including memory, thinking, orientation, comprehension, and judgment. This disease mostly affects the older population, but it is not a normal part of aging. We know that dementia is caused by several diseases or disorders, including Alzheimer's disease, Lewy Body dementia, and frontotemporal disorders, but it is important to assess risk factors for these diseases or disorders. Studies show that regular exercise, not smoking, balanced diet, and several other healthy physical habits can help reduce the risk of dementia. Studies also show that mental health factors can affect the risk of dementia. The objective of this project is to conduct a statistical analysis investigating the association between cognitive impairment or dementia (outcome) and self-reported depression (main variable of interest).

Links to info:
https://www.who.int/news-room/fact-sheets/detail/dementia
https://www.alzheimers.org.uk/about-dementia/risk-factors-and-prevention/is-dementia-hereditary

Data: The data were collected by the National Alzheimer's Consulting Center (NACC) and formed into the Minimum Data Set (MDS). The MDS consists of retroactively retrieved data for patients followed by NACC. Several types of variables were recorded, including demographics, cognitive status, and clinical diagnosis. We have selected a few variables from the dataset to include in our analysis. We have also simplified the dataset so that variables have good balance among the possible categories. For example, we have combined individuals who have self-reported race that did not have large enough proportions for analysis, such as people who identified as Black, American Indian or Alaskan Native, Asian or Pacific Islander, and other races. Please note that conclusions should not be made about cognitive differences between races, but instead potential social determinants associated with race. Racial distribution of the data may not match the US racial distribution.

Our outcome is clinical dementia rating (CDR), and our main variable of interest is self-reported depression (DEP). CDR is a score from 0 to 3, and measures the level of cognitive impairment. We limit our analysis to individuals with a CDR of 0, 0.5, or 1, which are, respectively, individuals with no cognitive impairment, mild cognitive impairment (MCI), and dementia. CDR is compiled from the variables, CLINDEM and NOTDEMCI. CLINDEM only categorizes individuals into a binary distribution of dementia, while NOTDEMCI adds individuals who have MCI. DEP is a binary factor indicating if, yes, individuals reported depression, or not. Please refer to the MDS documents for more information.

Other variables will be important in our model so that we can adjust for other possible factors. These variables include age, sex, dementia status of relatives, marriage status, and education. These variables will be explained further below (and in the MDS data dictionary). Again, it is important to note that race and education may not directly affect dementia diagnosis, but due to societal factors in the US these two variables may encompass other effects. It is also important to note that these data were collected using a self-reported binary representations of sex. Although current studies move away from this binary representation, it is nonetheless included because research shows brain health may differ by sex. For these variables, and all other covariates, it is important to consider why there may be an effect and what the variable envelopes outside of the measured value. For example, marriage status is not truly associated with dementia, but the mental exercise involved in conversations between a married couple may help reduce risk of dementia.

Further descriptions of the NACC datasets can be found here:
https://naccdata.org/data-collection/forms-documentation/mds

Variables:
For some of the following variables, we have edited the format, so we have updated some of the variable descriptions and values. We edited certain variables to ease the analysis process. However, you are welcome to look at the MDS data dictionary (part of project resources) for more information about variables.

Variable name	Description	Values
NACCID	Patient/NACC ID – Patient identification number so that subjects can be distinguishable	Factor Example: NACC004518
CDR	Clinical dementia rating – Did the subject meet clinical criteria for dementia or MCI at their most recent evaluation for dementia?	Ordinal factor: 0 (no cognitive impairment), 0.5 (mild-cognitive impairment), 1 (dementia)
DEP	Depression – Did the subject have depression at the most recent evaluation?	Factor: Yes, No
FEVALAGE	First evaluation age – Age in years at initial NIA-funded Alzheimer's Disease Center evaluation	Numeric: 45 - 107
SEX	Sex – Subject's sex	Factor: Male, Female
RACE	Race – Subject's race	Factor: White, Non-white
RLDEM	Relative with dementia – Were any first-degree relatives (parents, siblings, or children of subject) reported to have had dementia?	Factor: Yes, No
MARISTAT	Marital status – Most recent marital status	Factor: Married, Widowed, Divorced, Separated, Never married
EDUC	Education – Number of years of regular school completed	Numeric: 0-36 Generally: 8 = Elementary School 12 = High School 16 = College 18 = Masters 20 = Doctorate