



# The Effects of Retrospective Household Income on Neurocognitive Disorders: Results from Project Frontier Data



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## Retrospective Household Income as an Index of SES

The relationship between health status and socioeconomic status (SES) has been well known. Having a disease or illness is not only a medical or biological process but also a social outcome [1-4]. SES can be measured by several variables such as education, income, and occupation. For instance, an individual is more likely to use brain function, which inhibits to develop neurocognitive disorder, when a person has more education and/or higher occupational status [5-8]. Several studies reported a negative correlation between SES and cognitive disorders, whereby the higher the SES, the lower the chance of being diagnosed with a cognitive disorder [7,9,10]. This paper utilized household income as an SES index. Household or individual income is not thoroughly investigated in terms of their relationship with neurocognitive disorders [10,11]. Income may not be directly connected to brain use, yet it has significant relationship with lifestyle, health insurance and health cost coverage, all of which have a documented impact on health status [10,12].

## Frontier Study

We utilized the data from the FRONTIER study (Facing Rural Obstacles to healthcare Now through Intervention, Education, and Research) to investigate this relationship. The FRONTIER study is an epidemiological study to explore the natural course of chronic disease development and its impact on longitudinal cognitive, physical, social, and interpersonal functioning in a multi-ethnic adult sample from rural communities of West Texas [13]. Anyone in the area who are 40 or above participated in this study and they were followed over time to test for changes in physical, mental, and cognitive health and the factors that may influence those changes [14]. This study is a community-based participatory research program in rural west Texas and 41% of the sample is Hispanic.

## Effect of Income Trajectories on Neurocognitive Disorders

A total of 406 cases those had retrospective household income information were selected for this study: 30% of samples had a neurocognitive disorder, mean age was 61 years old (SD 12.47,

range 40-96), two thirds were females, 41% were Hispanics, and 37% had college education. About two thirds were married, 4% were never married, and 29% were divorced/widowed/separated. Approximately 28% had diabetes, and 21% had depression. Income was measured retrospectively, from age 20s to 60s: Almost half of cases had an upward trend for household income over time, 18% of cases had stable income, and 29% of cases had a downward trend for income (see Table 1). Logistic regression was employed to classify either the presence or absence of a neurocognitive disorder. Results found the overall model fitted well and most variables were significant in expected ways. The household income trajectory, the main focus of this study, supported the hypothesis partially. Individuals with stable household income were 102% more likely to have a neurocognitive disorder than individuals with an upward trend for household income trend, suggesting that an upward trend for income was protective. A downward income trend, however, did not significantly lead to greater risk of developing a neurocognitive disorder (see Table 2).

**Table 1:** Descriptive Statistics (N = 406).

Variable	%	Std. Dev.	Min	Max
Neurocognitive Disorder	29.56	0.46	0	1
Age	60.82	12.47	40	96
Female	66.26	0.47	0	1
Hispanic	40.64	0.49	0	1
College Education	36.45	0.48	0	1
<b>Marital Status</b>				
Married	67	0.47	0	1
Never Married	4.43	0.21	0	1
Divorced/Widowed/Separated	28.57	0.45	0	1
<b>Health Conditions</b>				
Diabetes	28.33	0.45	0	1
Depression	21.43	0.41	0	1

Household Income Trajectory				
Upward	53.45	0.5	0	1
Stable	17.73	0.38	0	1
Downward	28.82	0.45	0	1

**Table 2:** The Results of Logistic Regression Model (n = 406).

Variable	Coef.	Odds Ratio	[95% CI]	
Age	0.07	1.07*	1.04	1.09
Female	-0.43	0.65	0.38	1.12
Hispanic	-0.51	0.6	0.32	1.13
College Education	-0.66	0.52**	0.29	0.94
Marital Status				
Never Married	-1.49	0.23	0.03	1.88
Divorced/Widowed/Separated	0.49	1.63	0.94	2.83
Health Conditions				
Diabetes	0.96	2.62*	1.53	4.49
Depression	1.59	4.91*	2.61	9.22
Household Income Trajectory				
Stable	0.7	2.02**	1.01	4.04
Downward	-0.22	0.81	0.45	1.46
Constant	-5.25	0.01*	0	0.03
LR X2	109.6*			
Pseudo R2	0.22			

### Need for Further Study

This study estimates the effect of the income trajectories on neurocognitive disorders for a rural sample with a large number of Hispanics. Given the aging of our population and lengthening life expectancy [15, 16] the prevalence of neurocognitive disorders such as dementia continues to increase, particularly for Hispanics [17-19] and constitutes an important public health issue. The study categorized the income trajectory in three ways and found that upward income trajectory indeed played a protective role, yet the downward trend variable did not at first show any significant associations. When we separated the respondents of the downward variable into retired and non-retired ones, we found that respondents with downward income trends and non-retired individuals were more likely to have a neurocognitive disorder. Despite this supportive evidence, it is necessary to note that the sample was small, only 48 cases. The results indicate that income decline for retirees does not correlate with a neurocognitive disorder, as most individuals experience household income decline after retirement [20,21]. Further study is required to determine this association. Finally, our results should be interpreted cautiously and replication is required due to non-representative sampling and small sample size as described above.

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