

Economic impact of depression among Medicare beneficiaries (age ≥65 years) with Alzheimer’s disease and related dementia (ADRD) in the United States (US)

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Objective

To assess the impact of depression on healthcare services and prescribed medicine expenditures among Medicare patients (age ≥ 65 years) with ADRD in the US

Method

- The analysis population (Medicare beneficiaries with ADRD; N= 1,158) was derived from the Medical Expenditure Panel survey’s (MEPS) medical conditions and full year consolidated data files pooled from 2016 to 2020.
- Observations with zero expenditures were removed from the analysis population.
- To adjust for skewness of residuals, outcome variables were log transformed before analysis.
- All analysis were conducted in SAS On Demand, academic version.

Result

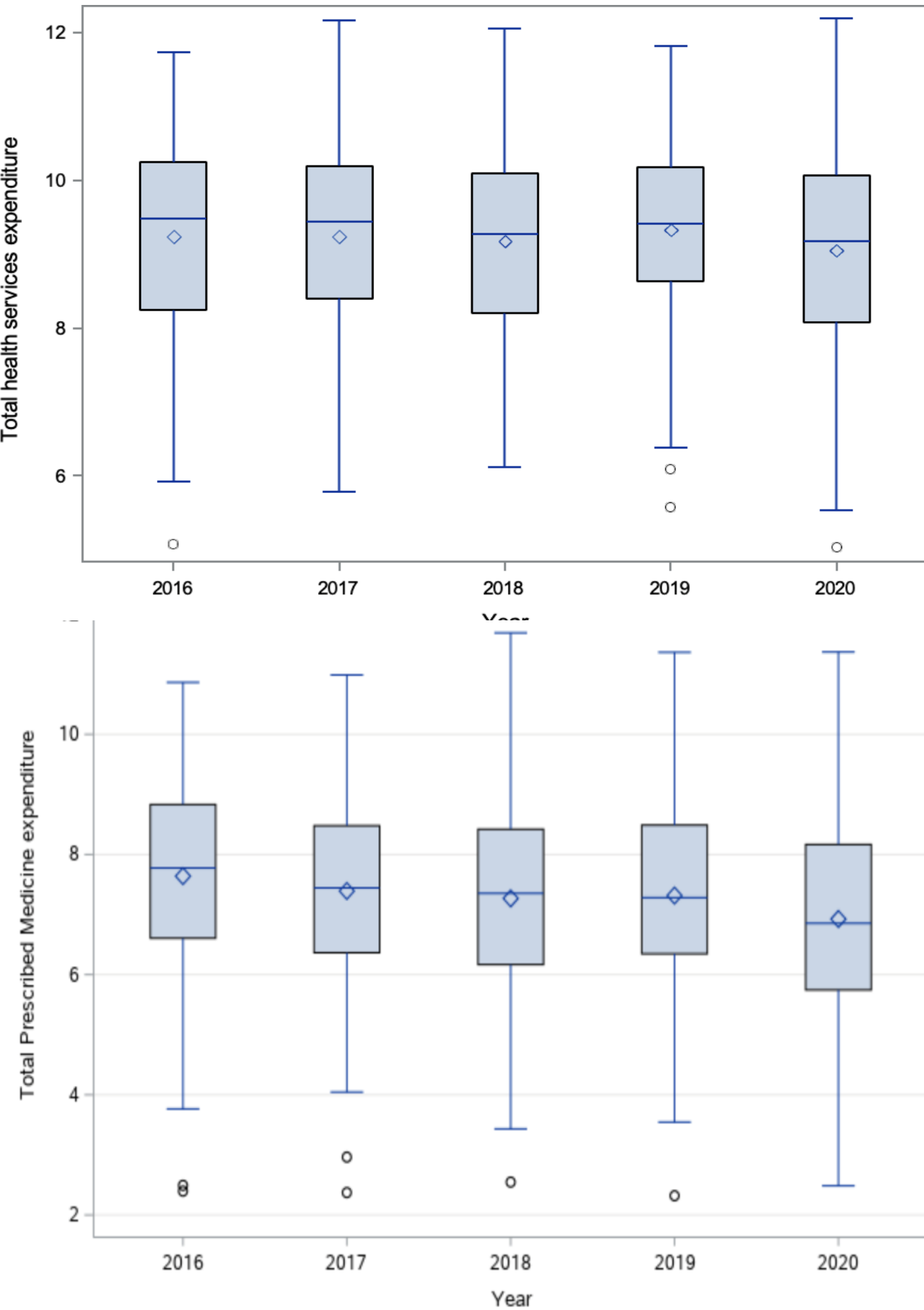


Figure 1. Boxplots of expenditures across years 2016 to 2020

Preliminary analysis (figure 1) showed there was no obvious difference in the outcome variables across the target years. Hence, data was pooled across the years (2016 to 2020) to form our analysis population.

Table 1: Expenditures across depression status and covariates

	N (%)	Total healthcare services expenditure (\$)		Total prescribed medicine expenditure (\$)	
		Mean	StdDev	Mean	StdDev
All	1,158	19,954	25,166	4,369	8,333
DEPRESSION					
No	864 (75)	19,372	25,873	4,018	8,773
Yes	294 (25)	21,664	22,918	5,402	6,787
SEX					
Male	451 (39)	20,718	24,918	4,351	7,187
Female	707 (61)	19,466	25,328	4,381	8,992
AGE					
65-69	133 (11)	22,516	29,787	6,377	12,571
70-74	163 (14)	18,588	23,391	4,320	7,124
75-79	212 (18)	18,617	23,388	3,559	4,592
80 and above	650 (56)	20,208	25,134	4,235	8,429
RACE_ETHNICITY					
White nonhispanics	764 (66)	20,126	24,431	4,398	9,090
Black nonhispanics	149 (13)	19,094	26,078	4,249	6,379
Asia/NH/PI nonhispanic	47 (4)	23,210	31,537	5,450	8,765
Hispanics	177 (15)	20,059	26,664	4,432	6,488
Other	21 (2)	11,618	13,647	1,216	1,656
INSURANCE STATUS					
Medicare only	385 (33)	16,317	21,237	3,929	7,632
Medicare + private	448 (39)	19,913	24,651	4,618	10,020
Medicare + Public	325 (28)	24,318	29,221	4,548	6,327
EDUCATION LEVEL					
> high school	343 (30)	22,396	27,421	4,665	6,839
High school	432 (37)	18,624	24,241	3,892	7,342
< high school	300 (26)	19,979	24,360	4,688	10,475
Other degree	83 (7)	16,692	22,417	4,480	9,961
EMPLOYMENT					
Employed	54 (5)	17,715	19,684	7,164	15,451
Not employed	1104(95)	20,063	25,406	4,233	7,808
MARITAL STATUS					
Never Married	66 (6)	19,567	23,464	3,348	4,982
Divorced/Separated	175 (15)	22,267	30,113	4,888	9,500
Married	481 (42)	18,629	23,332	4,387	8,009
Widowed	436 (38)	20,546	25,186	4,296	8,592
REGION					
Northeast	201 (17)	22,408	27,279	3,549	4,941
Midwest	250(220)	19,026	22,832	4,403	8,672
South	414 (36)	17,868	21,510	4,204	6,467
West	293 (25)	22,009	29,758	5,137	11,577

NH Native Hawaiian; PI Pacific Islanders

Table 1: continued

- Univariate analyses (Table 1) examined the association between the outcome variables and independent variables using two sample t-test for binary categorical variables and analysis of variance for multi-level categorical variables.
- For total healthcare service expenditures, there was a statistically significant difference (P<0.05) by depression diagnosis, insurance status and education level.
- For total prescribed medicine expenditures, there was a statistically significant difference (P<0.05) by depression, race_ethnicity and employment status.

Table 2. Multivariable analysis to examine the effects of covariates on the association between depression and expenditures

Total Healthcare Services expenditures								
Variables	Model 1		Model 2		Model 3		Model 4	
	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value
Depression	0.3209	0.0002	0.3320	0.0001	0.3021	0.0004	0.2796	0.0004
Gender			-0.0959	0.2162			-0.1183	0.1701
Age			-0.0073	0.8444			0.0178	0.8300
Race_Ethnicity			-0.0467	0.1443			-0.1008	0.0038
Region			-0.0288	0.4322			-0.0488	0.5035
Marital Status			0.0333	0.4657			0.0097	0.3281
Insurance Status					0.2185	<.0001	0.2026	<.0001
Employment					-0.0303	0.8647	-0.2411	0.8632
Education					-0.0320	0.4486	-0.0913	0.1163
AIC	557.62		562.16		540.31		537.25	

Total Prescribed Medicine expenditures								
	Model 1		Model 2		Model 3		Model 4	
	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value
Depression	0.6986	<.0001	0.6811	<.0001	0.6908	<.0001	0.6931	<.0001
Gender			-0.1545	0.1007			-0.1625	0.0846
Age			-0.0661	0.1428			-0.0684	0.1357
Race_Ethnicity			-0.0180	0.6432			-0.0507	0.2213
Region			-0.0131	0.7678			-0.0096	0.8295
Marital Status			0.0364	0.5109			0.0370	0.5054
Insurance Status					0.0811	0.1740	0.0939	0.1207
Employment Status					-0.0648	0.7657	0.0128	0.9539
Education					-0.0561	0.2778	0.0541	0.1489
AIC	1005.82		1010.21		1007.89		1010.61	

AIC: Akaike Information Criterion

Table 2: continued

- Multivariable analyses examined the effects of demographic (age, gender, race/ethnicity, marital status, region) and economic (education level, health insurance, and employment) covariates on depression using multi-linear regression (Table 2).
- The results don’t indicate any covariate confounding the relationship between depression and outcomes.
- The best fitting models based on AIC results are model 4 for total healthcare services expenditures and Model 1 for total prescribed medicine expenditures.

Discussion

- Although ADRD and depression are two common diseases in the elderlies. little is known about the economic impact of depression among older adults with ADRD.
- This study shows that depression has a statistically significant impact on both healthcare services and prescribed medicine expenditures for Medicare beneficiaries (age ≥ 65 years) with ADRD.
- This result holds even after adjusting for the effect of multiple covariates.
- These findings provide important considerations to clinicians and policymakers on the approaches to be employed in managing this category of patients considering the high economic burden prevalent among them.

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Acknowledgement

Special thanks to Dr Bonnie LaFleur for the wonderful mentorship throughout this research. Many thanks to Ibrahim Alfayoumi, Kristen Gregory, and Yunrong Shen for their valuable contributions.