

Social Determinants Associated with Unplanned Hospitalization Expenditures among Adults with Dementia

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Key findings: **1. Unplanned hospital (UH) expenditures among adults with dementia totaled \$710.5 million in 2022**, 22.1% of their total hospital expenditures. **2. Social determinants of health (SDOH) were associated with expenditures among all adults with dementia**. Having Medicaid coverage and living in the most disadvantaged areas, versus least disadvantaged areas, were associated with higher expenditures. Living in non-metropolitan areas, versus metropolitan areas, was associated with lower expenditures. **3. Associations between SDOH and UH expenditures varied by race and ethnicity.** The associations were greater among American Indian & Alaska Native, Black, and Hispanic adults, compared to their White counterparts.

Methods

Background: Unplanned hospitalizations (UH) include potentially preventable hospitalizations (PPH) and unplanned readmissions. Limited information is available on UH expenditures among **adults with Alzheimer’s disease and related dementias (ADRD).**

Objective: Estimate associations between social determinants of health (SDOH) and 2022 UH expenditures among adults with ADRD.

Data sources: CMS Medicare Beneficiary Summary Files (MBSF) and Medicare inpatient file (MedPAR).¹ Area-level SDOH data on social disadvantage & metropolitan status were from the Robert Graham Center’s Social Deprivation Index² & 2020 Rural-Urban Commuting Codes (RUCC),³ respectively.

Study population: Adults aged 68+ years with ADRD in 2022.

Measures:

- Demographic, health coverage & health status data from MBSF.
- Unplanned hospitalizations (UH)** & expenditures identified using national algorithms and MedPAR data. They include potentially preventable hospitalizations (PPH)⁴ and unplanned hospital readmissions.⁵

- Social Determinant of Health (SDOH)**
Individual: Medicaid and Medicare Part D coverage data used to represent adults’ economic status & financial access to services. Medicaid is an indicator of low household income.

- Area-level:** Area-level SDOH data linked with MBSF data using MBSF zip code data.
Social disadvantage. The Social Deprivation Index is a composite measure derived from 2015-2019 American Community Survey data on 7 demographic characteristics (e.g., income, education, housing).
Metropolitan status. RUCC codes identified metropolitan & non-metropolitan areas.

Analysis: Associations between SDOH with UH expenditures were estimated using multivariable two-part regression models, using logistic regression to model the probability of having any expenditures & generalized linear model with a gamma distribution & log link function to model expenditures.

Study Population

Table 1. Characteristics of adults aged 68+ years with Alzheimer’s disease and related dementias.						
Race & ethnicity	All Adults ¹	AI/AN	Asian/Pacific Islander	Black	Hispanic	White
Study population (N or row %)	249,786	5%	3%	8%	6%	78%
Characteristics (column %)	%	%	%	%	%	%
Age groups						
68-74	15.5%	20.3%	13.1%	22.8%	16.2%	14.1%
75-84	39.3%	43.3%	36.1%	38.9%	39.7%	39.2%
85-94	37.1%	31.6%	40.7%	31.1%	36.7%	38.2%
95+	8.1%	4.8%	10.2%	7.2%	7.4%	8.4%
Female	62.2%	63.4%	64.3%	62.4%	64.2%	62.1%
Health						
Pre-existing conditions						
Acute myocardial infarction	7.4%	9.8%	6.2%	8.0%	7.5%	7.3%
Atrial fibrillation	29.8%	23.7%	20.7%	22.6%	23.6%	31.9%
Cancer	20.6%	15.9%	14.6%	20.6%	15.2%	21.6%
Chronic kidney disease w/ ESRD	39.8%	39.7%	43.9%	50.1%	42.3%	38.5%
COPD	30.3%	34.2%	25.9%	28.5%	29.7%	30.6%
Diabetes	42.7%	52.0%	58.9%	58.9%	60.9%	38.5%
Heart failure	32.8%	32.9%	28.9%	37.9%	34.4%	32.4%
Hypertension	90.7%	90.8%	92.7%	95.3%	92.1%	90.1%
Ischemic heart disease	44.2%	41.1%	41.1%	44.0%	46.3%	44.4%
Stroke/TIA	36.4%	33.7%	33.6%	43.3%	37.0%	36.0%
Depression	56.4%	53.4%	43.9%	50.4%	59.3%	57.6%
Other behavioral health disorders	55.9%	49.7%	38.9%	49.9%	56.2%	57.6%
Substance use disorders	26.6%	39.1%	16.0%	30.7%	23.6%	26.2%
Time since ADRD identified²						
Newly diagnosed (DX year 2022)	21.9%	21.3%	19.9%	18.6%	19.5%	22.5%
1-3 years (first DX year 2019-2021)	43.7%	43.9%	40.9%	41.8%	42.5%	44.0%
4+ years (first DX year 2016-2018)	34.4%	34.8%	39.2%	39.6%	39.0%	33.4%
Death in 2022	22.0%	22.3%	16.1%	21.4%	19.0%	22.6%
Social determinants of health						
Individual: Health coverages						
No Medicaid, with Part D coverage	46.4%	22.7%	22.9%	26.6%	20.8%	52.6%
No Medicaid, no Part D coverage	23.6%	28.7%	12.0%	23.1%	14.9%	24.5%
Medicaid ³	30.0%	48.6%	65.1%	50.3%	64.3%	23.0%
Area-level: Social disadvantage⁴						
1st quartile (least disadvantaged)	22.6%	7.1%	18.4%	9.3%	9.4%	25.9%
2nd quartile	22.8%	14.2%	21.2%	12.7%	14.3%	25.0%
3rd quartile	24.9%	24.2%	21.3%	19.7%	20.8%	26.0%
4th quartile (most disadvantaged)	29.6%	54.5%	39.2%	58.3%	55.6%	23.1%
Area-level: Metropolitan status⁵						
Metropolitan	76.4%	40.7%	96.2%	86.5%	88.8%	75.6%
Non-Metropolitan	23.6%	59.3%	3.8%	13.5%	11.2%	24.5%

AI/AN: American Indian and Alaska Native, ¹Of all adults, 1.7% had race & ethnicity as other or unknown. ***Time* since ADRD identified** was based on when adults were identified as having ADRD in the Medicare data. **Medicaid coverage** includes adults with & without Part D coverage (<0.5% of adults with Medicaid coverage did not have Part D coverage). **Social disadvantage** was assessed using the social deprivation index (SDI). Higher SDI scores indicate greater social disadvantage, defined by Quartile 1 (<21), Quartile 2 (21-41), Quartile 3 (42-65), & Quartile 4 (>65). **Metropolitan** & non-metropolitan areas were identified using codes equal to 1-3 & 4-10, respectively.

Results

- During 2022, **13.0% of adults with ADRD had 1 or more unplanned hospitalizations (UH).**
- Average UH expenditures per adult were \$2,618.**
- UH expenditures accounted for 22.1% of all hospital expenditures for adults with ADRD.**
- Rates of UH and expenditures varied by race and ethnicity. (Figures 1 & 2)
- The marginal effect (ME) associated with being enrolled in Medicaid with expenditures was \$559 among all adults with ADRD, controlling for race & ethnicity, age, sex, & health status. That is adults enrolled in Medicaid had, on average, \$559 higher expenditures.
- Living in most disadvantaged areas, compared to least disadvantaged areas, was associated with higher expenditures (ME=\$1,048).
- Living in non-metropolitan areas, compared to metropolitan areas, was associated with lower expenditures (ME=−\$2,496).
- Associations between SDOH with UH expenditures varied by race and ethnicity. (Table 2)

Unplanned Hospital Utilization & Expenditures by Race & Ethnicity in 2022

Figure 1. Percentage of adults with 1+ unplanned hospitalizations

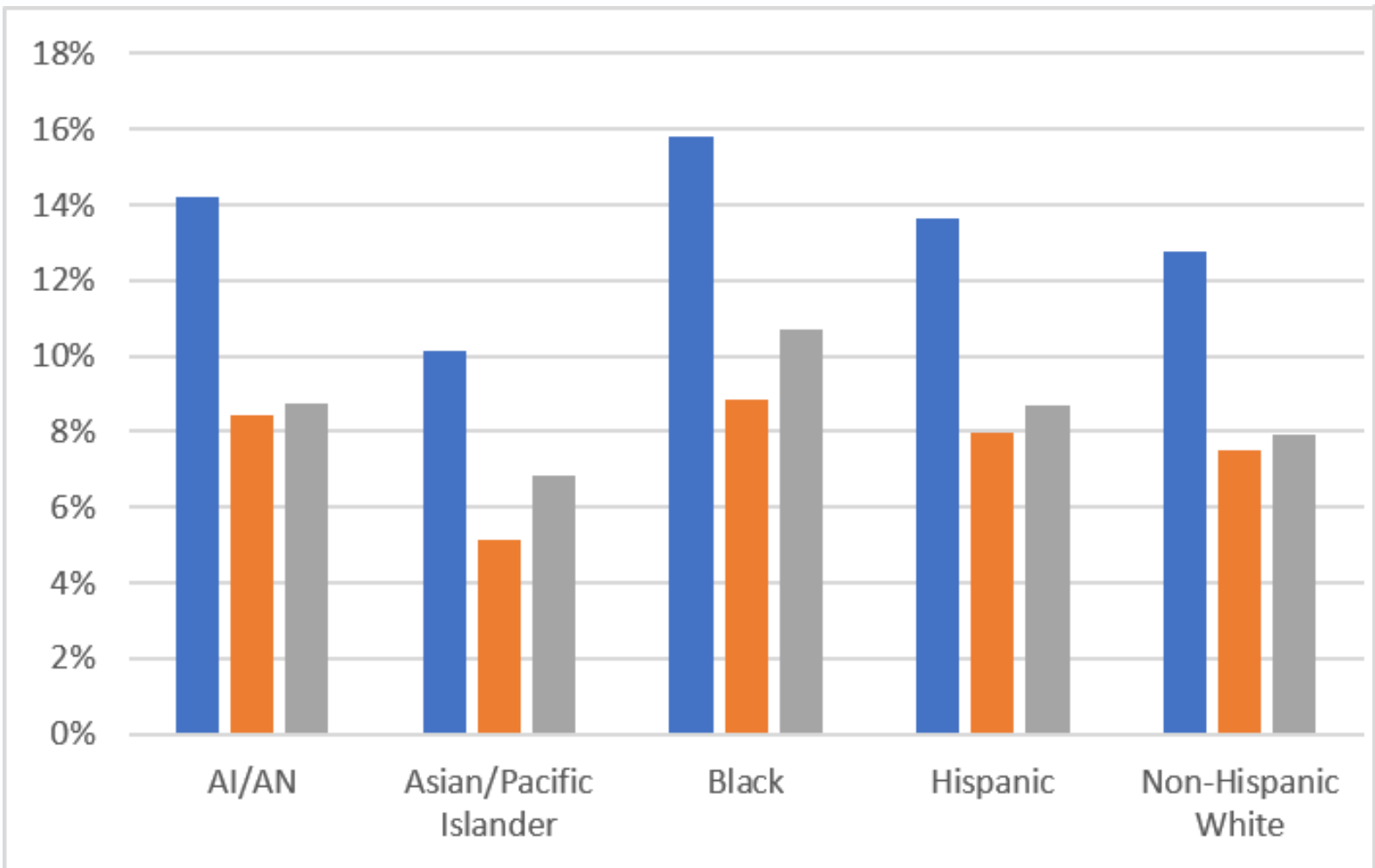
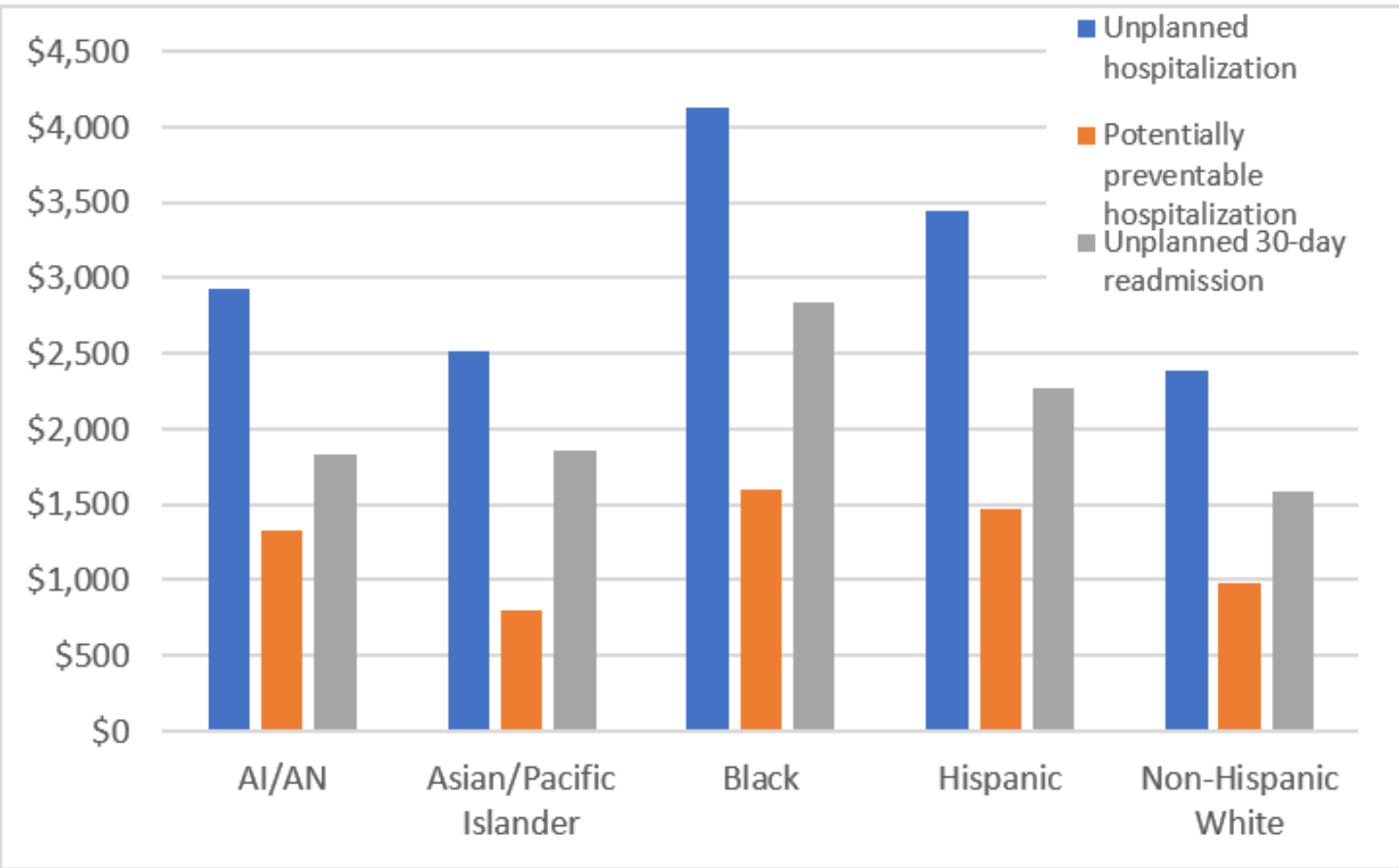


Figure 2. Average expenditures per adult



Multivariable Results: Associations between Social Determinants & Unplanned Hospital Expenditures

Table 2. Associations between SDOH and unplanned hospitalization expenditures. Adjusted marginal effects. 2022.

	AI/AN	Asian/Pacific Islander	Black	Hispanic	White
Social determinants of health	ME (CI)	ME (CI)	ME (CI)	ME (CI)	ME (CI)
Individual: Health coverages					
No Medicaid, with Part D coverage	-	-	-	-	-
No Medicaid, no Part D coverage	250 (-219, 718)	142 (-671, 956)	-552* (-1,027, -77)	-157 (-754, 439)	-196*** (-285, -107)
Medicaid	716** (251, 1,181)	5 (-625, 635)	786** (306, 1,266)	779** (298, 1,260)	112* (4, 220)
Area-level: Social disadvantage					
1st quartile (least disadvantaged)	-	-	-	-	-
2nd quartile	199 (-679, 1,076)	184 (-495, 863)	90 (-637, 818)	527 (-287, 1,342)	43 (-65, 152)
3rd quartile	-57 (-858, 744)	128 (-595, 852)	310 (-380, 999)	74 (-618, 766)	11 (-96, 118)
4th quartile (most disadvantaged)	449 (-356, 1,254)	66 (-543, 675)	874** (269, 1,479)	790* (127, 1,452)	228*** (113, 342)
Area-level: Metropolitan status					
Metropolitan	-	-	-	-	-
Non-Metropolitan	-293 (-697, 111)	461 (-757, 1,679)	-1,555*** (-2,011, -1,100)	-1,034*** (-1,525, -543)	-519*** (-603, -435)

* p<.05, ** p<.01, *** p<.001

The adjusted marginal effects (ME) and 95% confidence intervals (CI) were estimated using multivariable regressions controlling for age, sex, and health status (pre-existing conditions, time since ADRD identified, death in 2022).

Limitations

The race and ethnicity measure in the Medicare data likely misses individuals who self-identify as AI/AN and any other racial group or Hispanic. Adults with ADRD were identified using diagnostic codes that under identify adults with dementia. Data for adults enrolled in Medicare Advantage programs were not included.

Conclusions

SDOH are strongly associated with UH expenditures among adults with ADRD, with notable racial/ethnic disparities. These findings may inform the design of tailored ADRD interventions, which could reduce UH.

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References

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- Social Disadvantage:** <https://www.graham-center.org/evidence-based-research/featured-work/social-deprivation-index>
- Rural-Urban Codes:** <https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes>
- Potentially preventable hospitalizations:** AHRQ, https://qualityindicators.ahrq.gov/measures/pqi_resources
- Unplanned hospital readmissions:** CMS, <https://qualitynet.cms.gov/inpatient/measures/readmission/methodology>