

1. Individual socioeconomic disadvantage is consistently associated with ADRD risk across populations. Medicaid coverage in addition to Medicare was strongly associated with ADRD risk in both AI/AN and White Medicare beneficiaries, highlighting the critical role of socioeconomic vulnerability.

2. Neighborhood matters, but differently across populations. Neighborhood deprivation was independently associated with ADRD risk in White beneficiaries, while among AI/AN beneficiaries its impact was closely tied to individual disadvantage and population composition, including AI/AN residential concentration.

BACKGROUND

- Alzheimer’s disease and related dementias (ADRD) disproportionately affect American Indian and Alaska Native (AI/AN) communities, which has higher incidence and prevalence, and shorter survival than White adults.
- Longitudinal evidence on how social determinants of health (SDOH) shape incident ADRD risk in this population is scarce.
- Findings on neighborhood deprivation and rurality are mixed and rarely compared across racial groups.
- Neighborhood AI/AN residential concentration may influence cognitive health through cultural cohesion (an “ethnic density effect”) but has never been examined for ADRD.

OBJECTIVE

- Examine longitudinal associations of individual- and area-level SDOH (Medicaid enrollment, area social deprivation, rurality, and AI/AN residential concentration) with incident ADRD
- Compare these associations between AI/AN and White older adults.

METHODS

- Design & cohort**
- Retrospective cohort of fee-for-service (FFS) Medicare beneficiaries aged ≥65, free of ADRD at baseline (2016)
 - 100% AI/AN and 5% random sample of White beneficiaries
 - 102,007 AI/AN and 906,776 eligible beneficiaries were followed for incident ADRD through 2023 (mean 5.0–5.2 yrs).

- SDOH exposures**
- Individual:** Medicaid enrollment (proxy for low socioeconomic status (SES)).
 - Area-level (ZIP / ZIP Code Tabulation Area (ZCTA):**
 - Area Deprivation: Social Deprivation Index (SDI)
 - Non-metro residence (Rural-Urban Commuting Area Codes >3)
 - AI/AN residential concentration: % AI/AN residents among all residents per ZCTA.

- Outcome & covariates**
- Incident ADRD from Medicare claims (MBSF / CCW Chronic Conditions, ICD-10).
 - Covariates: age, sex, and count of 9 modifiable health factors (from 2024 Lancet Commission Report).

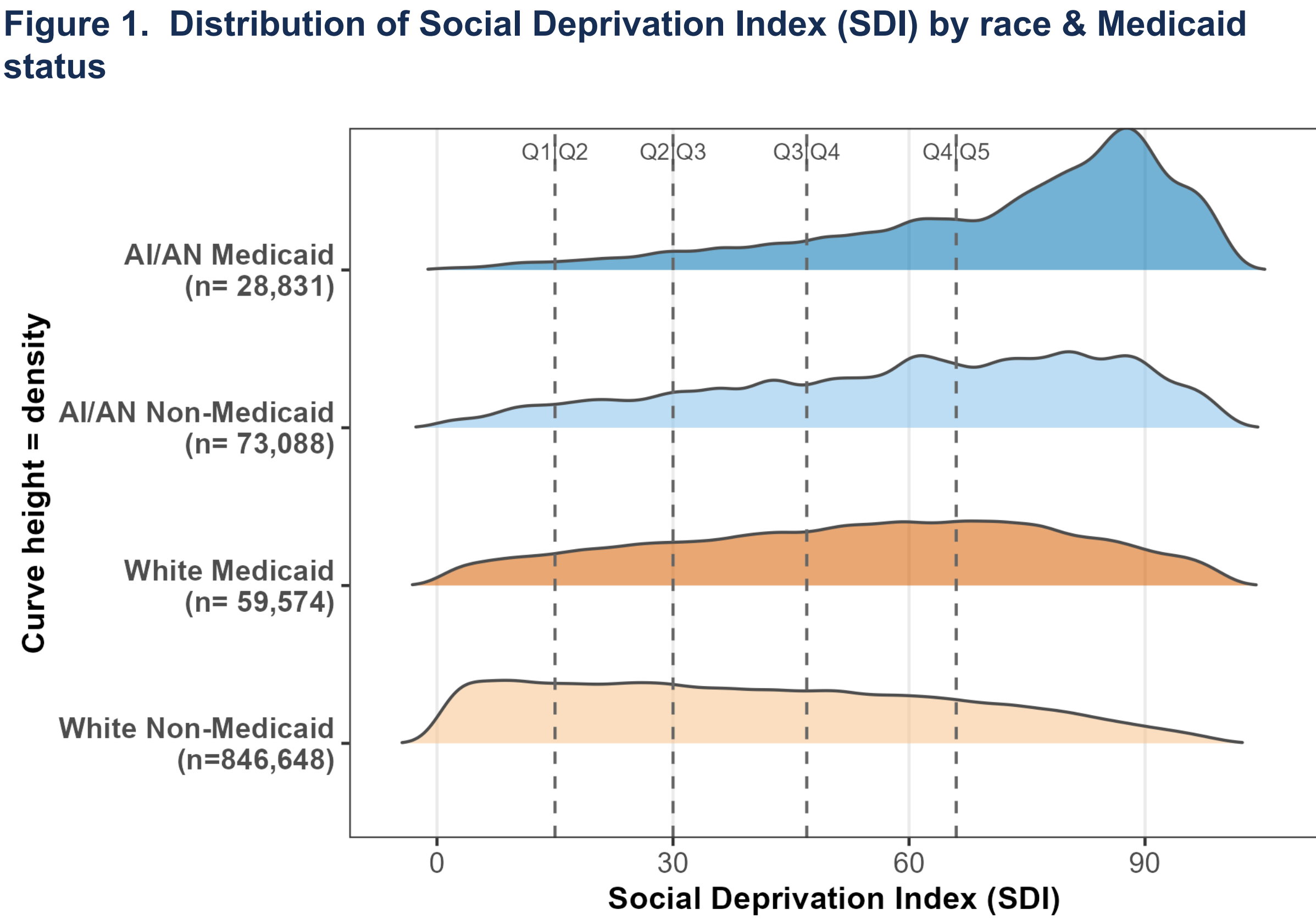
- Analysis**
- Race-stratified Cox proportional-hazards models using age as the time scale and cluster-robust standard errors (within ZCTA).
 - Follow-up time censored at death, loss of FFS coverage, or end of study.
 - Sequential models added covariates step-by-step to track how the SDI–ADRD association changed.
 - Reported HRs with 99.9% CIs.

RESULTS

Table 1. Baseline characteristics by race and Medicaid enrollment, 2016

Characteristic	AI/AN		White	
	Medicaid	No Medicaid	Medicaid	No Medicaid
N	28,848 (28%)	73,159 (72%)	59,605 (6%)	847,171 (94%)
Age, mean (SD)	74.0 (6.7)	74.2 (6.5)	74.7 (7.5)	75.3 (7.2)
Female, %	63.8	55.9	65.2	54.8
Non-metro, %	65.8	58.8	35.7	25.2
SDI score, mean (SD)	72.1 (21.4)	60.1 (24.4)	53.4 (24.9)	40.5 (25.3)
Most-deprived SDI, %	64.7	42.0	30.1	16.1
≥3 conditions, %	33.0	26.9	36.9	22.9
ADRD events, %	17.4	13.2	19.2	13.9
Follow-up, mean yrs	4.6	5.2	4.1	5.3

Over ~5 years, 14.4% of AI/AN and 14.3% of White beneficiaries developed incident ADRD. AI/AN have higher Medicaid enrollment (28% vs 6%) and non-metro residence than White (61% vs. 26%).

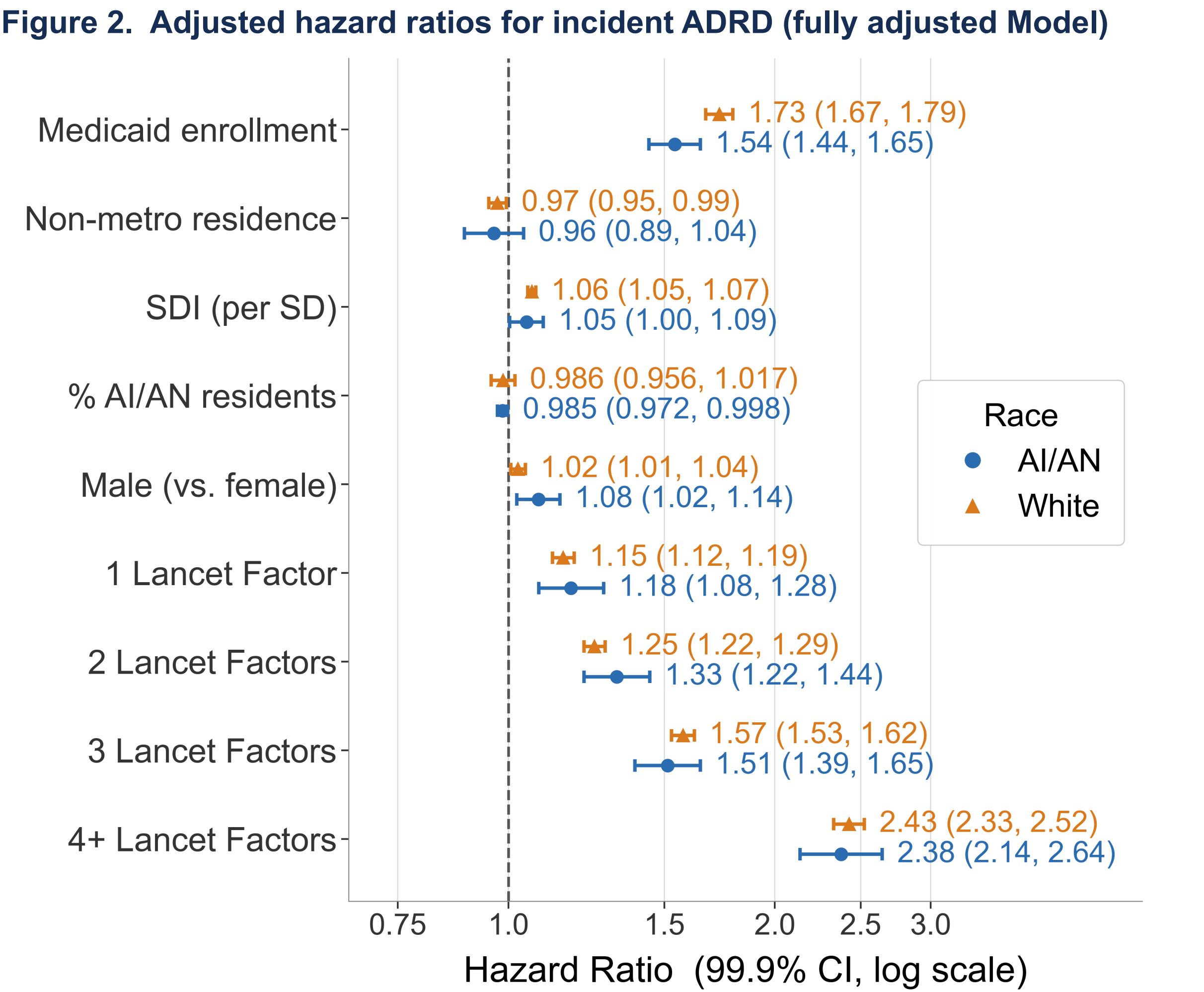


AI/AN beneficiaries, especially Medicaid enrollees, cluster in the most deprived areas, whereas White beneficiaries are more evenly distributed.

Table 2. SDI (per 1 SD ↑) and incident ADRD across sequential Cox models

Sequential model	AI/AN HR (99.9% CI)	White HR (99.9% CI)
Model 0: Age-adjusted alone	1.06 (1.03, 1.10)	1.09 (1.08, 1.10)
Model 1: + Sex & Lancet	1.06 (1.02, 1.11)	1.08 (1.07, 1.09)
Model 2: + Non-metro	1.07 (1.03, 1.11)	1.08 (1.07, 1.09)
Model 3: + Medicaid	1.02 (0.98, 1.06)	1.06 (1.05, 1.07)
Model 4: + % AI/AN (final)	1.05 (1.003, 1.10)	1.06 (1.05, 1.07)

Area deprivation (SDI) was independently associated with ADRD in White beneficiaries; in AI/AN it was attenuated after adjusting for Medicaid but re-emerged after accounting for neighborhood AI/AN concentration; among White it is stable. Bold = significant at $p < 0.001$.



Medicaid dual eligibility (a proxy for low SES) was strongly associated with higher ADRD in both groups (HR 1.54 AI/AN; 1.73 White). Higher neighborhood AI/AN concentration was associated with lower recorded ADRD and acting as a negative confounder (suppressor) of the SDI–ADRD association. Points = HRs; bars = 99.9% CIs.

CONCLUSIONS

- Medicaid enrollment (a proxy for low SES)** is a strong, consistent predictor of incident ADRD in both populations, which identifies low SES older adults as a priority group for ADRD prevention and care.
- The area deprivation–ADRD relationship is population-specific:** independently increased risk in White beneficiaries, but in AI/AN it is entangled with individual-level disadvantage and neighborhood ethnic composition.
- Among AI/AN, higher neighborhood AI/AN concentration is linked to lower recorded ADRD, reflecting possible ethnic-density protection and/or under-diagnosis, and masks the underlying deprivation gradient.
- Individual-, area-, and ethnic-composition factors are tightly intertwined, underscoring the need for population-specific approaches to the structural determinants of dementia.

LIMITATIONS

- Medicaid enrollment was used as a proxy for socioeconomic disadvantage due to the lack of direct SES measures in Medicare data.
- Claims-based ADRD ascertainment may undercount cases, particularly in populations with lower diagnostic rates.

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