

Artificial Light At Night And Dementia
Prevalence And Mortality In U.S. Counties

P2-13

Yuhui Luo, Janani Rajbhandari-Thapa, Shiyuan Huang, Donglan Zhang, John S. Ji, Xi Chen, Suhang Song

- Higher ALAN exposure was associated with greater dementia prevalence and mortality in U.S. counties.
- Positive associations were observed for both contemporaneous and cumulative ALAN exposure.
- ALAN may represent a modifiable environmental risk factor for cognitive aging.

INTRODUCTION

Artificial light at night (ALAN) is a pervasive environmental exposure. Although increasing evidence suggests ALAN influences circadian rhythms and human health, its role in cognitive aging remains underrecognized.

METHODS

2,846 U.S. Counties
Adults aged ≥65 years

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ALAN Exposure

- Contemporaneous ALAN (2020)
- Cumulative average ALAN (2012–2020)
- Satellite-derived radiance (nW/cm²/sr), NASA GES DISC / VIIRS nighttime light data

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Outcomes

- Dementia prevalence (2020), CHAP/NCHS
- Dementia mortality (2020–2022), CDC WONDER

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Multivariable Regression

- Adjusted for county-level: (from U.S. Census/ ACS/ CHRR/ BRFSS/ BLS and other public databases)
- Sociodemographic factors
- Behavioral factors
- Environmental factors

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Primary Analysis

- ALAN exposure → dementia prevalence
- ALAN exposure → dementia mortality

RESULTS

Panel A. Distribution of cumulative average ALAN (2012–2020)

County-level ALAN
Median = 0.56 nW/cm²/sr; IQR = 0.22–1.41

Panel B. Distribution of dementia outcomes

Dementia prevalence in 2020
Median = 11.03%; IQR = 9.96–12.04

Dementia mortality in 2020–2022
Median = 543.38 per 100,000; IQR = 449.41–631.25

Panels A–B summarize county-level ALAN exposure and dementia outcomes.

Panel C. Adjusted association with dementia prevalence

Exposure: cumulative average ALAN from 2012 to 2020 (adjusted model)

Exposure	β	95% CI
Continuous	0.08	0.06 to 0.11
Q2 vs Q1	0.16	0.08 to 0.23
Q3 vs Q1	0.21	0.13 to 0.29
Q4 vs Q1	0.16	0.06 to 0.26

Reference = Q1 p-trend < 0.001

Panel D. Adjusted association with dementia mortality

Exposure: cumulative average ALAN from 2012 to 2020 (adjusted model)

Exposure	β	95% CI
Continuous	19.54	14.29 to 24.78
Q2 vs Q1	33.28	17.58 to 48.99
Q3 vs Q1	50.53	33.25 to 67.81
Q4 vs Q1	65.68	44.61 to 86.75

Reference = Q1 p-trend < 0.001

Panels C–D show positive adjusted associations of cumulative ALAN with dementia prevalence and mortality.

CONCLUSIONS

Key Findings

- Higher ALAN exposure was associated with increased dementia prevalence and mortality.
- Associations were observed for both contemporaneous and cumulative ALAN exposure.
- ALAN may represent a modifiable environmental risk factor.
- Findings may inform urban planning and public health policy.

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CONTACT

Yuhui Luo, MPH

Cornell University

Email: yl4268@cornell.edu