

# Integrating Social-environmental Determinants into Machine Learning Algorithms in Dementia Care: A Systematic Review

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## Introduction & The Global Burden

- A Growing Global Crisis:** Dementia affected 57 million people in 2021 and is projected to reach 153 million by 2050.
- \$1.3 Trillion Annual Economic Burden:** As of 2019, dementia was the seventh leading cause of death and a primary driver of global disability and dependency.
- 45% Preventable Risk:** The 2024 Lancet Commission posits that nearly half of dementic cases could be prevented by addressing 14 modifiable risk factors.



## Conclusion: The Future of Care

- Call for “Fairness-by-Design”:** Future AI architectures must prioritize ethics and equity from the initial design phase to prevent the amplification of existing societal disparities.
- Population-Centered Integration:** Algorithmic outputs should be seamlessly integrated into community level interventions and clinical decision-making to foster equitable care.

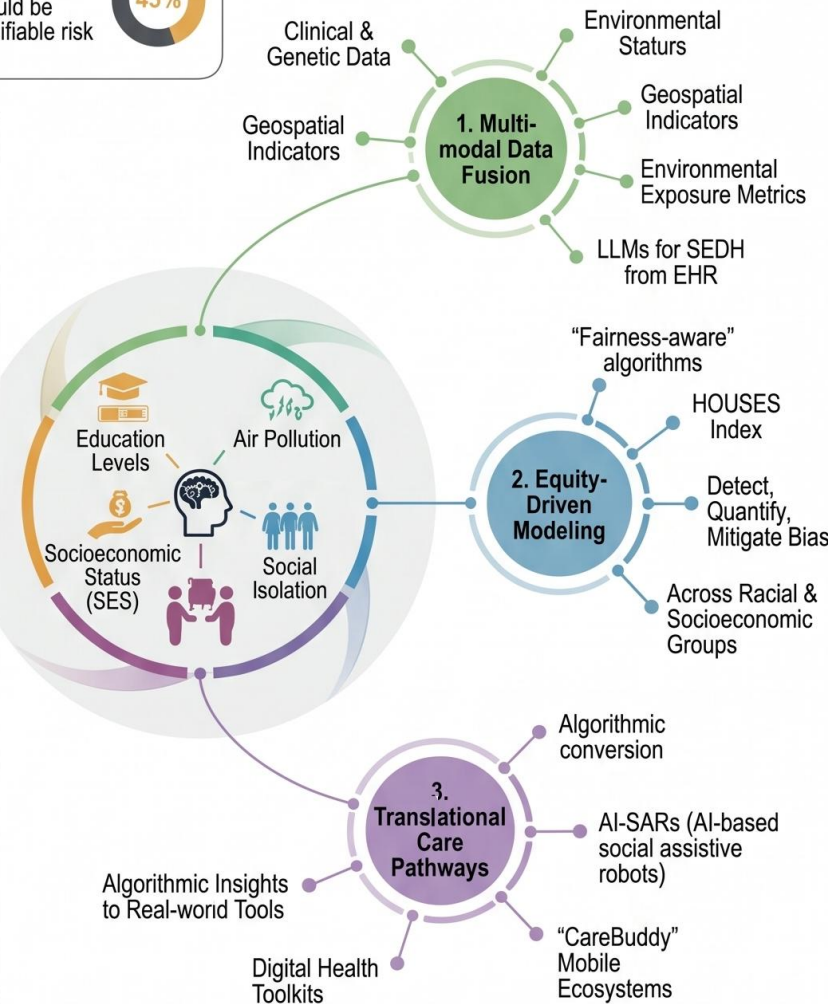


## Methodology

**PRISMA-Compliant Systematic Review:** A rigorous search of PubMed, ProQuest, and Scopus databases identified 2,000 results, narrowed down to 24 pivotal studies.

**2024–2026 Publication Window:** The review focuses on the most recent advancements in AI/ML methodologies and their application to social environmental data.

**Targeted Search Strategy:** The methodology utilized specific MeSH terms combining “Dementia” or “Alzheimer” with “Artificial Intelligence” and “Social” or “Environmental” factors.



## Results & Insights

**Social Disadvantage vs. Biology:** Research by Baez S, et al. (2026) suggests that social disadvantage often predicts dementia risk more accurately than purely biological or genetic knowledge.

**Enhanced Predictive Accuracy:** Integrating SEDH through multi-modal models significantly improves model performance (AUC) and clinical relevance compared to single-modality approaches.

**Addressing Algorithmic Bias:** Models often underperform for lower socioeconomic groups; however, individual-level SES measures are more effective for bias mitigation than area-level metrics.



## Select Key References

**Global Forecasting & Trends:** GBD 2019 Dementia Forecasting Collaborators. *Lancet Public Health*, 2022.

**Lancet Commission 2024:** Livingston G. et al. Dementia prevention, intervention, and care. *Lancet*, 2024.

**Social Disadvantage Study:** Baez S, et al. Social disadvantage outweighs knowledge in dementia risk. *Alzheimer's & Dementia*, 2024.

**Sociodemographic Impact:** Liu X, et al. Assessing the impact of Sociodemographic Factors on AI models. *JMIR Medical Informatics*, 2026.