Using Artificial Intelligence and Machine Learning Strategies to Advance Health Equity for Older Adults

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Overview

1. Older Adult Demographics At a Glance
2. The Challenge of Health Equity
3. The Potential Role of AI/ML in Addressing Health Equity
4. Research Finding and Proposed Strategies

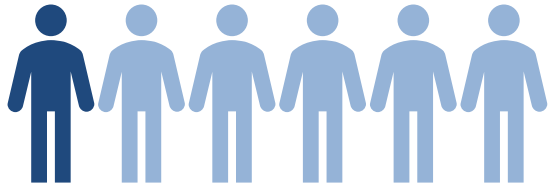
The Facts on Older Adults in the U.S

31.9M Women

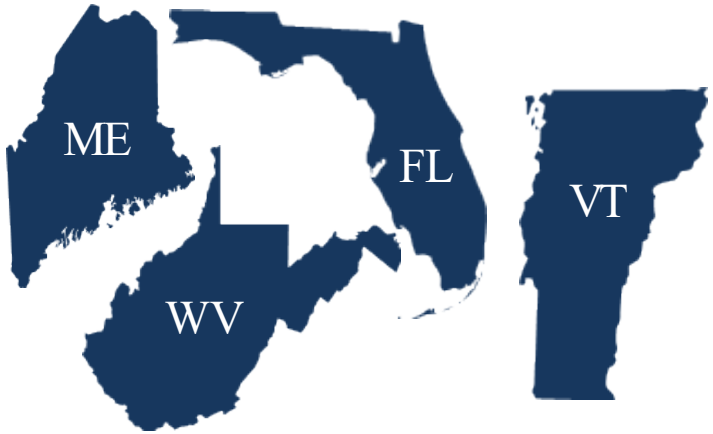
25.9M Men

aged 65+ in 2022

17.3% of the US population aged 65+ and growing to 22% by 2040



States with highest % aged 65+



5.9M people aged 65+ live below poverty level

1/4 of adults 65+ from racial and ethnic minority communities

Administration for Community Living. (2023). Profile of Older Americans 2023. Retrieved from https://acl.gov/sites/default/files/Profile%20of%20OA/ACL_ProfileOlderAmericans2023_508.pdf

Health of Older Adults in the U.S.

Today's Older Americans

- Healthier overall
- Living independently for longer

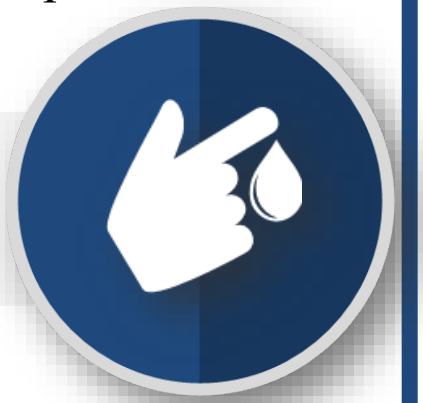
In 2022, the average 65-year-old was expected to live another 18.9 years

Most have at least one chronic health condition and many are dealing with multiple.

Heart Disease is the #1 cause of death for all Americans, 24.1% are 75+

Arthritis affects 44% of Americans aged 65-75 and 53.9% of those 75+

20.1% of adults 65+ diagnosed with Diabetes



Evidence increasingly shows that differences in chronic health conditions between racial and ethnic groups are due to non-biological factors.

Administration for Community Living. (2023). Profile of Older Americans 2023. Retrieved from https://acl.gov/sites/default/files/Profile%20of%20OA/ACL_ProfileOlderAmericans2023_508.pdf

The Challenge of Health Equity

Health Disparities

- common among older adults
- impact marginalized communities disproportionately
- driven by social and economic inequities

Recent NASEM report titled 'Ending Unequal Treatment: Strategies to Achieve Equitable Health Care and Optimal Health for All' highlights:

"Racial and ethnic inequity remains a fundamental flaw of the U.S. health care system."

"EHR data can be used to train AI models that can help clinicians tailor diagnostic and treatment plans."

"Algorithms based on data that are biased or insufficient to represent the racial and ethnic diversity of the population risk inappropriate clinical decision making."

Predictive Accuracy of Stroke Risk Models Across Black and White Race, Sex, and Age Groups

Objective

- Novel Machine Learning vs. Published Models
- Prediction of stroke across subgroups (race, sex, age)

Design and Participants

- 1983-2019
- 62,482 participants
- 45 years of age and older
- Free of Stroke or TIA

Outcome of Interest

- Primary stroke: occurrence of ischemic or hemorrhagic stroke
- Time to event or censoring measured in days since baseline

Models:

Published Models

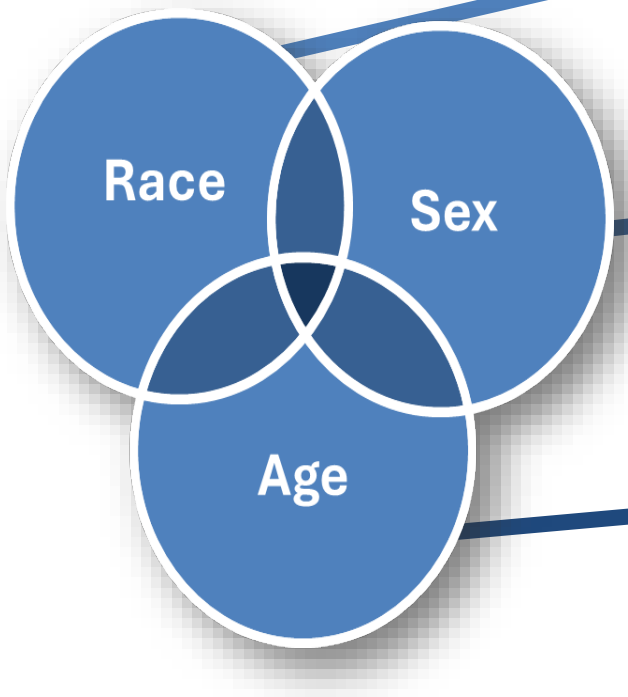
1. Pooled Cohort Equations model for ASCVD risk estimation, adjusted for stroke risk
2. Framingham Stroke model
3. REGARDS self-report model

Machine Learning Models

1. Elastic net regularized Cox proportional hazards model (CoxNET)
2. Random Survival Forest model

Hong C, Pencina MJ, Wojdyla DM, Hall JL, Judd SE, Cary, MP, et al. Predictive Accuracy of Stroke Risk Prediction Models Across Black and White Race, Sex, and Age Groups. JAMA. 2023;329(4):306–317. doi:10.1001/jama.2022.24683

Bias in Stroke Risk Prediction Models



Less Accurate for Black than White Individuals

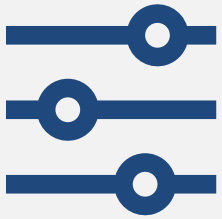
Less accurate for Men than Women

Less Accurate for Older than Younger Individuals

Key Takeaway: Bias Can Result in Under or Over Estimation of Stroke Risk
(potentially reducing access to care or providing unnecessary and costly treatment)

Technical Strategies to Address Bias

Diverse Training Data



Algorithmic Adjustment

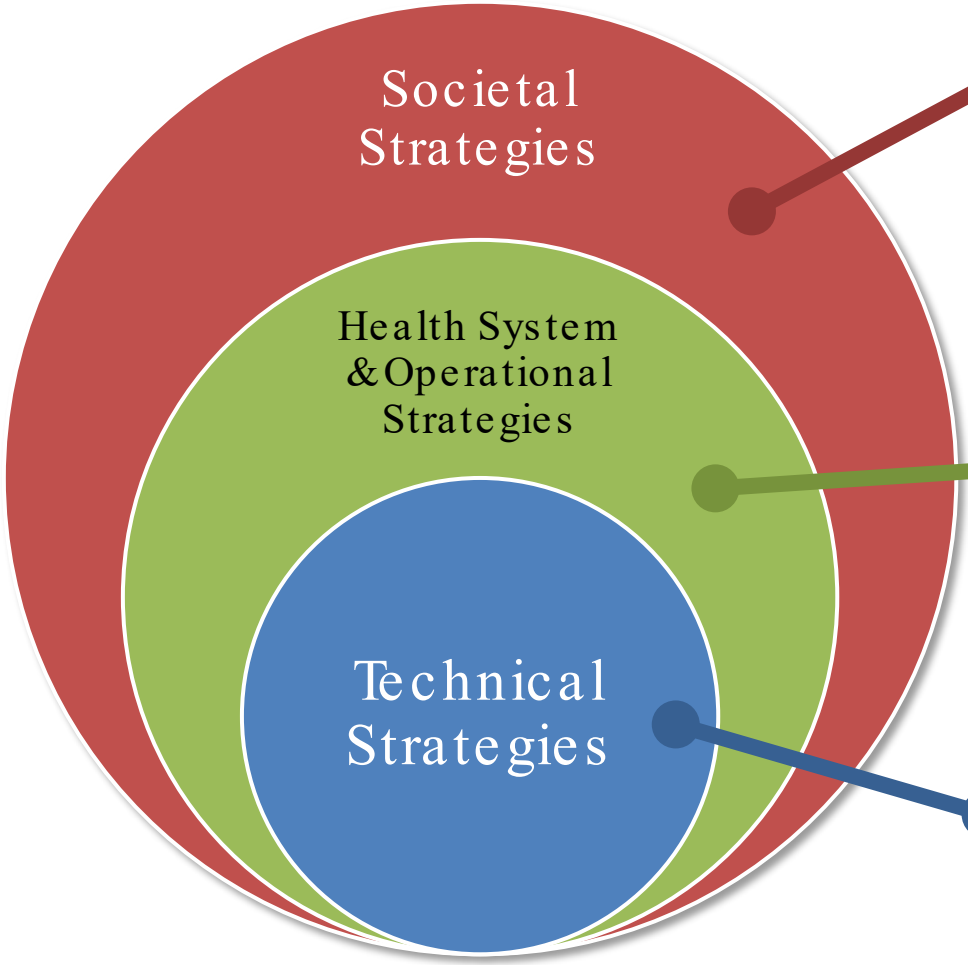
Continuous Monitoring and Updating

Mitigating Racial And Ethnic Bias And Advancing Health Equity In Clinical Algorithms: A Scoping Review

Our scoping review encompassed 109 articles comprising:

- **16** Frameworks
- **48** Reviews/ Perspectives
- **45** Health Care Applications/ Tools

Categorizing Strategies Focused on Bias Mitigation in Clinical Algorithms



Broader societal approaches to bias mitigation in AI. Goes beyond individual AI systems and health care organizations and touches upon the ecosystem in which AI operates

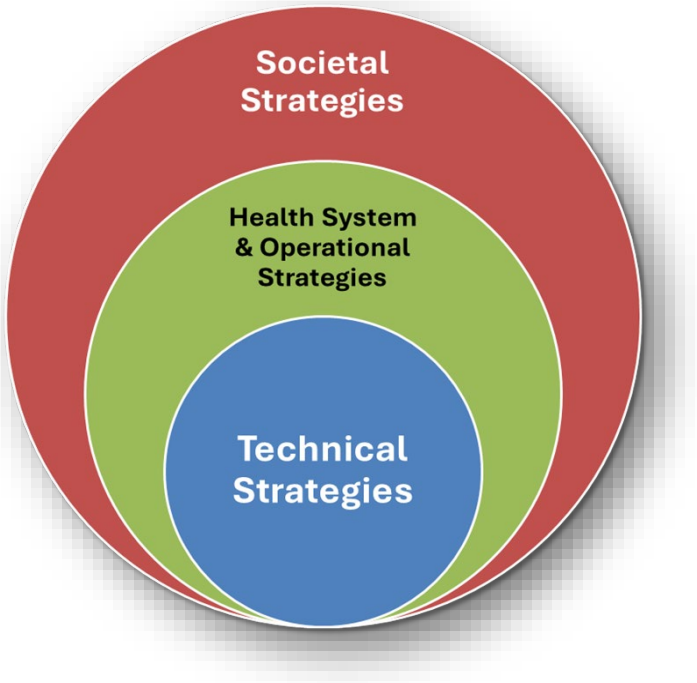
Structures, processes and procedures adopted within a health care organization to ensure responsible deployment of AI systems.

Specific techniques, methods, and tools used in the design, evaluation, and deployment of AI systems to mitigate bias.

Key Takeaway: Can be used in combination to mitigate bias in clinical algorithms to advance equity promote responsible AI evaluation.

Technical, Health System, and Societal Strategies for Mitigating Bias in Clinical Algorithms

Identification of common biases and strategies to mitigate them



Public Awareness Campaigns

AI Governance including Inclusive Data Practices and Algorithmic Auditing

Equity by Design, Sensitive Variables, Weighting, Algorithmic Performance Review

Cary MP Jr, Zink A, Wei S, Olson A, Yan M, Senior R, Bessias S, Gadhoumi K, Jean-Pierre G, et al. Mitigating Racial And Ethnic Bias And Advancing Health Equity In Clinical Algorithms: A Scoping Review. *Health Aff (Millwood).* 2023 Oct;42(10):1359-1368.

Conclusion

AI and ML hold the promise to fair, personalized, and effective care however additional research is needed.

Bias detection and mitigation are needed at technical, health system and societal levels, if we are to advance health equity for all through AI and ML.

Team Members