

Title: Dose-dependent Association between Income and Frailty in the All of Us Research Program

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Background: Frailty is an increased vulnerability to stressors, which is associated with numerous poor health outcomes like increased hospitalization, functional decline, and mortality. Although lower annual income has been associated with increased frailty, less is known about how frailty risk varies across income strata.

Objectives: We aim to characterize the relationship between income and frailty. We hypothesize that the effects of income on frailty will scale with income incrementally.

Methods: A cohort (n= 138,877) was created in the All of Us platform of those participants with available data necessary for comparisons. A deficit-accumulation model was employed to measure frailty. Multivariate analysis was done using linear regression to assess for associations with mean frailty and several frailty predictors. A logistic regression was also performed to understand the association between these factors and clinical frailty. All analyses were performed in the All of Us Jupyter notebook.

Results: Among frailty predictors studied, the factor most strongly associated with increased frailty was an annual income of <\$10,000/year, with a coefficient of 0.0572 (95% CI, 0.055 – 0.060). Conversely, the most protective factor against frailty development was an annual income of >\$200,000/year, with a coefficient of -0.0392 (95% CI, -0.041 – -0.037). The income bracket of <\$10,000/year had an odds ratio (OR) of 2.958 (95% CI, 3.197 – 2.738) for developing clinical frailty, while the income bracket of >\$200,000/year had an OR of 0.204 (95% CI, 0.180 – 0.232).

Conclusion: Higher annual income was associated with lower mean frailty scores and less risk of frailty development, while lower annual income demonstrated the opposite effect.

Recommendations: These results demonstrate the powerful consequences of annual income on health. These data suggest a role for economic support as a frailty prevention tool, supporting initiatives which address income inequality broadly rather than simply poverty assistance.

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