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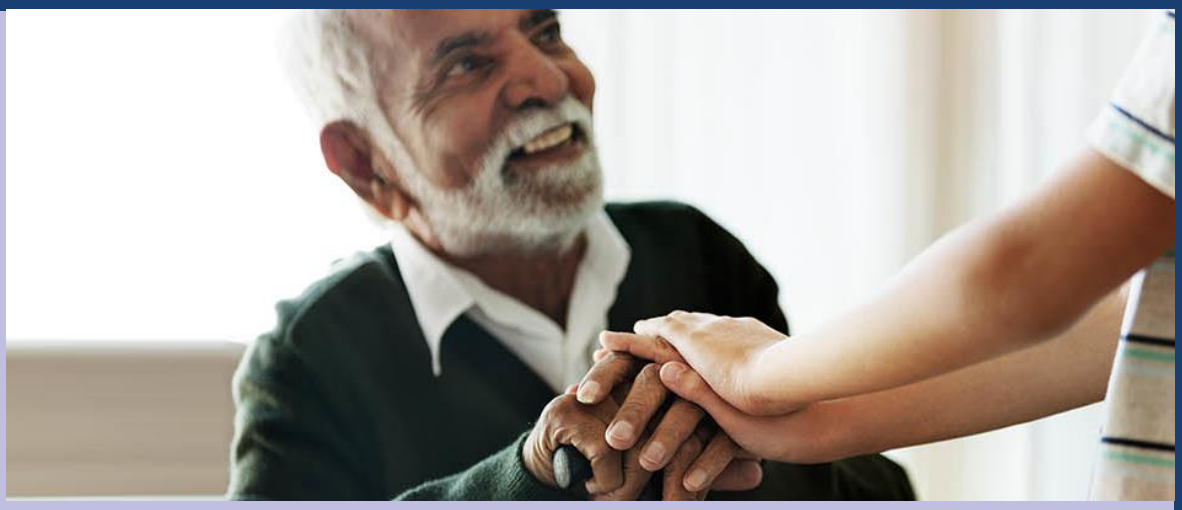

Using individual and neighbourhood profiles and trends to understand frailty with nationally representative population data

Part 3: Linking area level (rurality and deprivation) and individual factors/assets with levels of frailty

David Sinclair, Asri Maharani, Tarani Chandola, Peter Bower, Barbara Hanratty, James Nazroo, Neil Pendleton, Gindo Tampubolon, Chris Todd, Raphael Wittenberg, Terence W O'Neill, Fiona Matthews

Short Report

November 2021

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Short Report

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Background

Area effects on health are recognised within England. Our previous report revealed substantial differences in the prevalence of pre-frailty and frailty between local authority districts in England [1]. Living in a deprived area is associated with poorer self-reported physical function [2], cognitive function [3], and mental health [4] among older adults. The influence of area characteristics may heighten inequalities between rich and poor. Additionally, there is strong evidence of the impact of individual socioeconomic factors on health [5, 6]. Individual-level differences in risk for frailty between different socioeconomic groups may explain the effect of area deprivation.

This report aims to answer the question of whether area-level factors are important over-and-above individual risk, by investigating the association between individuals' socioeconomic status and area deprivation on frailty using a nationally representative cohort of community-dwelling older adults in England.

Methods

Data were analysed from Wave 8 of the English Longitudinal Study of Ageing (ELSA), a nationally representative panel study of people aged 50 years and older living in England [7]. Frailty was measured using the frailty index [8], composed of 51 variables representing conditions that accumulate with age and are associated with adverse outcomes, including disability, mobility, cognitive function, and chronic diseases. The frailty index was categorised into robust (≤ 0.24), pre-frailty (>0.24-0.36) and frailty (> 0.36), based on the proportion of accumulated conditions present [9]. Deprivation was measured by the Index of Multiple Deprivation (IMD) [10], grouped into quintiles.

A generalised ordered logit model was used to investigate the association between pre-frailty, frailty and socioeconomic and demographic variables. Missing data was handled by Multivariate Imputation by Chained Equations (MICE). We performed two analyses: with simple adjustment (age, sex, ethnicity and IMD covariates only) and full adjustment (all covariates).

Results

The study sample consisted of 8,355 respondents (3,727 male and 4,628 female). 8.0 (95% Confidence Interval 7.3-8.8)% were frail and 9.9 (95% CI 9.1-10.7)% pre-frail. Compared to older adults living in the 20% most deprived areas, those in less deprived areas had lower odds of frailty or pre-frailty with the simple adjustment (model 1) (Figure 1). The area deprivation association with pre-frailty and frailty is attenuated in model 2, which accounts for a greater number of individual level determinants and urban status. In model 2, the odds of frailty is only significantly less for the three least-deprived quintiles compared to the most deprived quintile.

Figure 1 Odds ratios of pre-frailty and frailty for each deprivation quintiles, relative to quintile 1 (most deprived). Results for model 1 (simple adjustment, with parameters: age, sex, ethnicity and deprivation) and model 2 (full adjustment, with additional parameters: wealth, education, marital status, drink frequency, smoking history and urbane status). Deprivation measured by IMD (Index of Multiple Deprivation). Error bars show 95% confidence interval.

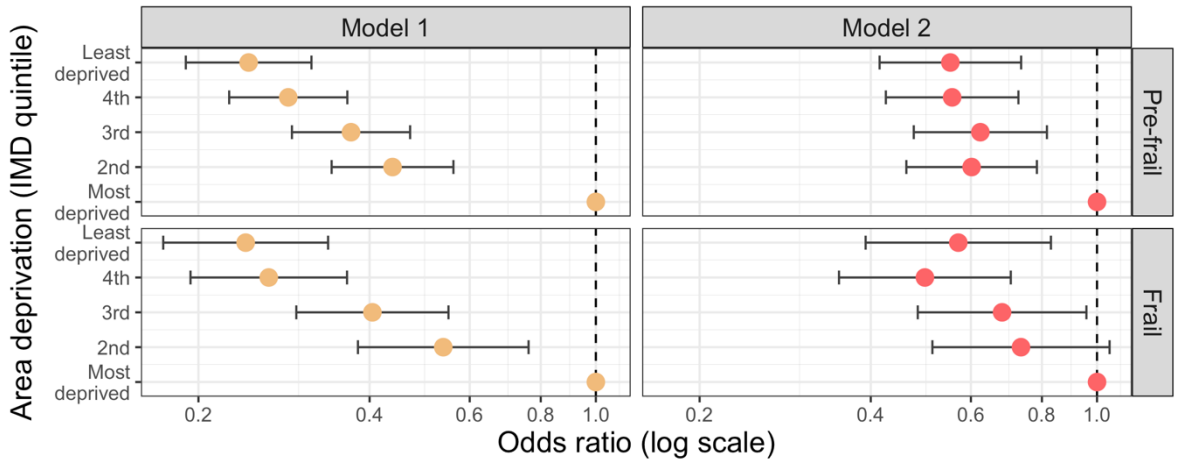

Figure 2 Probability of a person aged over 50 being pre-frail and frail, by wealth and area deprivation

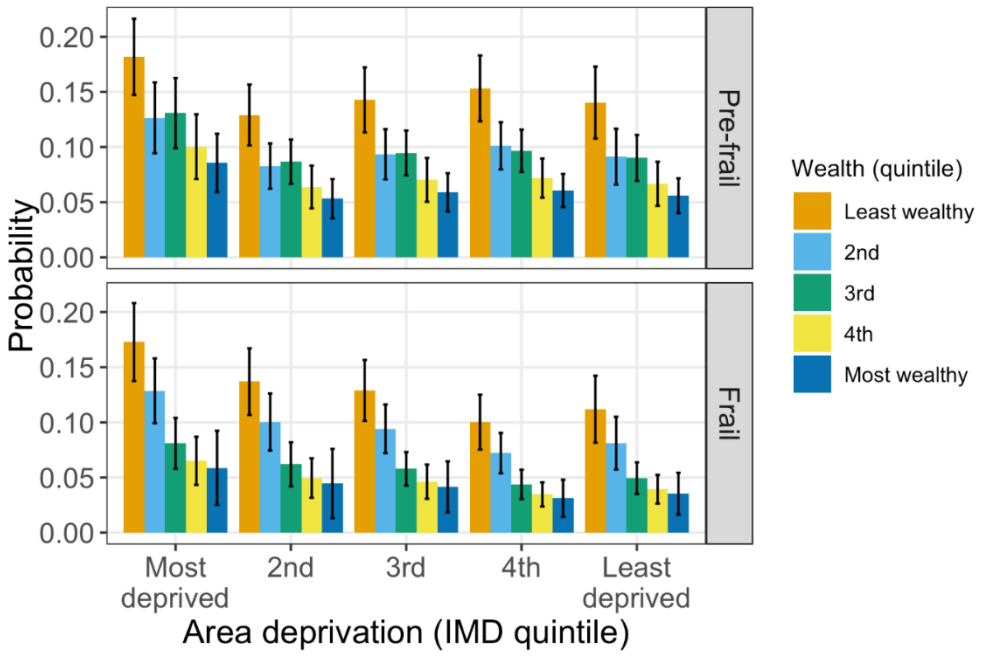

Figure 2 shows that the probability of pre-frailty and frailty among older adults in the most disadvantaged combined circumstances (i.e., for those in the poorest wealth quintile group and living in the most deprived areas) were three and four times greater than those in the most advantaged circumstances.

When evaluating area-level and individual-level risk factors, area deprivation is only associated with increased (pre-)frailty for those in the most deprived quintile. On the other hand, wealth is associated with increased pre-frailty and frailty across a wide range of people: the least wealthy quintile have approximately double the odds of pre-frailty and frailty than the second-least-wealthy quintile (Odds Ratio 0.56 [95% confidence interval 0.45-0.70]), and quadruple the odds of the two wealthiest quintiles (OR 0.24 [0.17-0.34] and 0.24 [0.17-0.34], for the second-most-wealth and most wealthy quintiles, respectively).

Conclusion

- Area deprivation is associated with frailty among older adults in England, independent of individual socioeconomic and demographic characteristics and individual health behaviours.
- Increased wealth is also associated with decreased frailty prevalence, independent of demographic characteristics, individual health behaviour and area deprivation.
- Older adults living in the 20% most deprived areas are at greater risk of pre-frailty and frailty than those of similar wealth in less deprived areas.

References and bibliography

1. Sinclair, D., et al., *Using individual and neighbourhood profiles and trends to understand frailty with nationally representative population data. Part 1: Frailty among older adults and its distribution in England*. 2019, NIHR Policy Research Unit Older People and Frailty: England.
2. Bowling, A., et al., *Do perceptions of neighbourhood environment influence health? Baseline findings from a British survey of aging.* Journal of Epidemiology & Community Health, 2006. **60**(6): p. 476-483.
3. Lang, I.A., et al., *Neighborhood deprivation, individual socio-economic status, and cognitive function in older people: analyses from the English Longitudinal Study of Ageing.* Journal of the American Geriatrics Society, 2008. **56**(2): p. 191-198.
4. Aneshensel, C.S., et al., *Urban neighborhoods and depressive symptoms among older adults.* The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 2007. **62**(1): p. S52-S59.
5. Zaninotto, P., et al., *Socio-economic inequalities in disability-free life expectancy in older people from England and the United States: A cross-national population-based study.* The Journals of Gerontology: Series A, 2020. **75**(5): p. 906-913.
6. Holman, D., S. Salway, and A. Bell, *Mapping intersectional inequalities in biomarkers of healthy ageing and chronic disease in older English adults.* Scientific Reports, 2020. **10**(1): p. 1-12.
7. Banks, J., et al., *English Longitudinal Study of Ageing: Waves 0-8, 1998-2017.[data collection].* 2018. **29**.
8. Wade, K.F., et al., *Does pain predict frailty in older men and women? Findings from the English Longitudinal Study of Ageing (ELSA).* 2017. **72**(3): p. 403-409.
9. Clegg, A., et al., *Development and validation of an electronic frailty index using routine primary care electronic health record data.* Age and Ageing, 2016. **45**(3): p. 353-360.
10. Smith, T., et al., *The English Indices of Deprivation 2015: Technical report*. 2015, Department for Communities and Local Government: London.

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