Area-level socioeconomic inequalities in activities of daily living disability-free life expectancy in England: a modelling study

Laurie E Davies, David R Sinclair, Christopher Todd, Barbara Hanratty, Fiona E Matthews, Andrew Kingston

Summary

Background More evidence of socioeconomic inequalities in disability-free life expectancy (DFLE) is needed to help develop approaches to narrow the gap between the most and least socioeconomically deprived people. Activities of daily living (ADL) disability represents the most severe and expensive disablement stage. Using combined longitudinal data, we aimed to quantify area-level socioeconomic inequalities in ADL-DFLE and the total person-years lived with ADL disability, in older men and women in England.

Methods In this modelling study, we harmonised data on ADL disability, area deprivation, age, and self-reported gender for individuals aged 50 years or older from three longitudinal studies in England: the English Longitudinal Study of Ageing (n=11 337), the Cognitive Function and Ageing Study II (n=7469), and the Newcastle 85+ Study (n=847). We used multistate modelling, and calculated the remaining life expectancy with and without ADL disability by gender and area-level socioeconomic status (<20%, 20–80%, and >80% of Index of Multiple Deprivation). From these data and Office for National Statistics population figures for the year 2024, we estimated the extra person-years lived with ADL disability by those aged 65 years from the most socioeconomically deprived areas.

Findings Those living in the least deprived areas had a reduced risk of ADL disability compared with those in the most deprived areas (hazard ratio [HR] 0·61 [95% CI 0·55–0·69]; p<0·0001), as did those in the middle area-level socioeconomic group (HR 0·76 [0·69–0·84]; p<0·0001). Increasing area-level socioeconomic disadvantage was associated with reduced life expectancy and more time spent with ADL disability, particularly for women. Living in the most disadvantaged areas was associated with people having ADL disability 11·0 years earlier for men and 12·0 years earlier for women, compared with living in the least deprived areas. An extra 59 000 person-years for men and 88 000 person-years for women were lived with ADL disability by those in the most deprived areas, at the population level, compared with the least deprived areas.

Interpretation Targeted policies to address underlying socioeconomic inequalities in health are likely to be the long-term definitive solution.

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Introduction

Disability-free life expectancy is defined as the estimated length of time an individual can expect to live without disability. It provides an insightful measure of remaining time spent in good health, at a particular age, and a shorter disability-free life expectancy is associated with a range of adverse outcomes, including poor quality of life and increased health service use.[1] UK citizens spend approximately 60 years disability-free from birth,[2] but this population estimate conceals marked socioeconomic inequalities—namely, that the gap in disability-free life expectancy between the most and least disadvantaged areas in England (according to Index of Multiple Deprivation [IMD] deciles) is more than 15 years.[3] Social determinants of health such as poverty or education are likely to be important causal factors, along with inequitable access to services.[4] However, more evidence of the size of the difference in disability-free life expectancy across socioeconomic strata is needed.

The UK Labour government was elected in 2024 with a manifesto pledge to halve the gap in healthy life expectancy between high-income and lower-income areas.[5] To achieve this, they will require robust evidence of the existing inequalities in disability-free life expectancy. This evidence is crucial for determining the scale of change needed, and for developing targeted strategies to close the inequality gap.

Activities of daily living (ADL) disability represents the most severe and expensive disablement stage, as it describes impairments in self-care activities that are fundamental for independent living, such as washing and toileting. As such, the social care required is typically more intensive. Most people prefer to remain living at home as they age,[6] and older people with complex care needs are also more likely to

Research in context

Evidence before this study

We searched PubMed from database inception to Sept 1, 2024, without language restrictions, using the keywords: (disability-free [Title] OR life expectancy[Title] OR health expectancy[Title] OR health expectancies[Title] OR DFLE[Title]) AND socioeconomic [Title] OR area deprivation[Title/abstract] OR index of multiple deprivation[Title/abstract] AND ADL [Title/abstract]. We identified three relevant studies (all longitudinal), one of which was from the UK but was based on a single data source (the Cognitive Function and Ageing Studies I and II), and did not examine activities of daily living (ADL) disability inequalities in terms of person-years.

Added value of this study

Our study provides more detailed and comprehensive estimates of area-level socioeconomic inequalities in ADL-disability-free life expectancy, which is the most severe and resource-intensive stage of disablement where quality of life is most compromised. We found that area-level socioeconomic disadvantage leads to a shorter overall life expectancy and more time spent with ADL disability, especially for women. Those in the most disadvantaged areas spent half of their remaining life with ADL disability 11·0 years (for men) and 12·0 years (for women) earlier than their least disadvantaged counterparts. The number of extra person-years spent with ADL disability by those most disadvantaged at age 65 years was substantial.

Implications of all the available evidence

The area-level socioeconomic inequalities highlighted by this study underscore the pressing need for interventions to support the UK Government's ambition to halve the gap in healthy life expectancy.

live supported in the community.[7] The numbers of older users of care funded by the local authority are also projected to increase substantially by 2040.[8] Thus, estimating the extra person-years lived with ADL disability by those who live in the most socioeconomically disadvantaged areas is timely with respect to informing interventions aimed at preventing or mitigating the transition to severe disability.

Using combined nationally representative longitudinal data, we aimed to quantify the extent of area-level socioeconomic inequalities in ADL disability-free life expectancy and the total person-years lived with ADL disability among older individuals in England.

Methods

Study design and population

In this modelling study, to create the base population of sufficient size, we harmonised data on ADL disability, area deprivation, age, and self-reported gender for individuals aged 50 years or older from three longitudinal studies in England: the English Longitudinal Study of Ageing (ELSA), the Cognitive Function and Ageing Study II (CFAS II), and the Newcastle 85+ Study.

The Newcastle 85+ Study is a longitudinal cohort study of people aged 85 years or older (born in 1921) in northeast England, in which the sample was broadly representative of people aged 85 years in England and Wales at inception (in terms of gender, care home residence, and whether living alone).[9] We used waves 1–5 of the study, covering 2006 (when the study began) to 2016, with the data collected at baseline through to 1·5, 3, 5, and 10 years. ELSA is an ongoing, nationally representative study of adults aged 50 years and older in England, in which participants are followed up every 2 years, with the original sample drawn from the Health Survey for England via a stratified random sampling approach.[10] We used ELSA waves 1–6 only (covering 2002–03, when the study began, to 2012–13) because access to mortality data is restricted from wave 6 onwards. CFAS II is a population-based study of people aged 65 years and older recruited from three areas of England (Cambridgeshire, Newcastle-upon-Tyne, and Nottingham). CFAS II was designed to be nationally representative through a structured sampling approach, geographical diversity, inclusion of populations in care homes, rigorous statistical adjustments, and standardisation to national demographics.[11] We used data from the baseline wave (collected between 2008 and 2011) and the incidence wave (collected between 2011 and 2013).[11] We excluded participants from CFAS II if they had taken part in the Newcastle 85+ Study. Participants with data collected for at least one timepoint were eligible for inclusion.

For **ELSA ethical approval details** see https://www.elsa-project.ac.uk/ethical-approval

This data harmonisation resulted in a baseline sample of 19 653 participants, comprising 11 337 of the 11 391 ELSA members in 2002–03, 7469 of the 7762 CFAS II members in 2008–11, and 847 of the 849 Newcastle 85+ members in 2006.

98 participants joined the study after baseline, 96 of whom were ELSA refreshment members. 1386 ELSA members participated in non-consecutive study waves. Participants were lost to follow-up for health reasons, non-health reasons, and death. Thus, for the subsequent waves, the sample size was 14 595 at wave 2 (8873 from ELSA, 5093 from CFAS II, and 629 from Newcastle 85+), 8090 at wave 3 (7607 from ELSA and 483 from Newcastle 85+), 7034 at wave 4 (6691 from ELSA and 343 from Newcastle 85+), 6393 at wave 5 (6305 from ELSA and 88 from Newcastle 85+), and at wave 6 it comprised 5714 ELSA members.

Ethical approval for all the ELSA waves was granted from National Health Service Research Ethics Committees under the National Research and Ethics Service, and participants gave written informed consent to participate. The Newcastle and North Tyneside Local Research Committee One approved the Newcastle 85+ Study (reference 06/Q0905/2); written informed consent was obtained from participants, and where people lacked capacity to consent—for example, because of dementia—an opinion

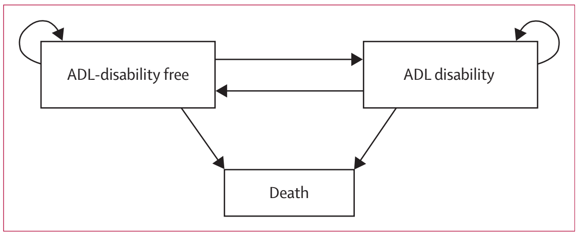

Figure 1: **Markov multistate transition model for ADL disability and death**
ADL=activities of daily living.

was sought from a relative or carer (a consultee). CFAS II was approved by relevant local research ethics committees and obtained written informed consent from participants.

This study is reported as per the STROBE guidelines (appendix pp 2–4).

Variable definitions

We categorised disability into two groups: those without ADL disability and those with ADL disability (comprising difficulty washing, dressing, toileting, or getting in or out of bed). The rationale behind this categorisation was that ADL disability represents the most expensive category in terms of care and support costs, and has thus been the only disability domain represented in calculations of health-care expenditure for the UK Government.[12] Participants' self-reported ability to do ADL was collected through interviews. For each ADL disability item, participants were either asked "are you able to…" (Newcastle 85+ and CFAS II) or "do you have difficulty…" (ELSA). The more granular responses for the Newcastle 85+ (no difficulty, some difficulty, need aid or appliance, or unable) and CFAS II studies (no difficulty, some difficulty, or needs help) were manipulated into the binary format already present in ELSA (ie, any difficulty [yes or no] with ADL). Socioeconomic status was measured at the small-area level using the IMD based on participants' postcodes (this being a weighted construct of income, employment, education, health, crime, and the living environment).[13] This variable was categorised into three groups—the lowest 20% (most disadvantaged), the middle 60%, and the highest 20% (least disadvantaged) of IMD—because the social gradient in health exists across the socioeconomic spectrum.[14]

Multistate models and life expectancy estimates

All analyses were conducted in R version 3.6.0. To model transitions to and from ADL disability, as well as death, we fitted a Markov multistate transition model using the msm package (figure 1).[15] Disability was treated as time-varying to account for values potentially changing over time. Survival time was calculated from the date of baseline interview to the date of death or censoring. Participants were followed up for a median of 4 years (IQR 1·3–8·0; median 5 years [2·0–9·0] for ELSA, median 2·1 years [0·0–6·9] for CFAS II, and median 1·9 years [0·0–5·0] for the Newcastle 85+ Study), with a maximum follow-up time of 12·68 years. Participants were lost to follow-up for health reasons, non-health reasons, and death. Models were adjusted for age, self-reported gender, and area-level socioeconomic status (most, middle, and least disadvantaged IMD quintiles). We then calculated the remaining life expectancy, with and without ADL disability, in men and women, for each area-level socioeconomic group, using the ELECT library (estimating life expectancies for continuous time) with 500 replications of the point estimates to approximate uncertainty,[16] and age 65 years as the reference. Using these estimates, we calculated area-level socioeconomic inequalities in the age at which a person's disability-free life expectancy is 50% of a person's remaining life-years (ie, the remaining life-years are expected to be equally shared between the ADL and non-ADL disability states; the DFLE50%).[17] CIs for DFLE50% were generated through bootstrapped replications of life table estimates to account for uncertainty. Using the results that delineate the breakdown of remaining life expectancy with and without ADL disability, in conjunction with Office for National Statistics population figures for the year 2024, we also calculated, at the population level, the number of extra person-years lived with ADL disability by those in the most disadvantaged areas compared with the least disadvantaged areas at age 65 years (steps are outlined in appendix p 5). Regarding our multistate model, model fit was assessed using the Pearson goodness-of-fit test, which showed no significant deviation from model assumptions. The Markov property was evaluated by examining sojourn time distributions, and the proportional hazards assumption was tested, confirming stable hazard ratios (HRs) over time. Sensitivity analyses were conducted by re-estimating models with alternative baseline hazard structures and excluding participants with missing data, both of which produced consistent results.

See Online for appendix

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

At baseline, the mean age of participants ranged from 65·0 years (SD 10·2; ELSA) to 85·5 years (0·4; Newcastle 85+), with a combined mean of 69·8 years (10·7; table 1). Overall 10 758 (54·7%) of 19 653 participants were women and 8895 (45·3%) were men. ADL disability prevalence increased with age, with 349 (41·2%) of 847 Newcastle 85+ participants reporting disability, compared with 2289 (20·2%) of 11 337 in ELSA. Area-level socioeconomic distribution was similar across cohorts, with the majority in the middle deprivation category (12 132 [61·7%] of 19 653).

Our analysis showed statistically significant associations between sociodemographic factors and transitions between ADL disability states and death (table 2). Compared with people living in the most disadvantaged areas (<20% of IMD), people in the middle area-level socioeconomic group (20–80% of IMD) had a lower risk of developing ADL disability (HR 0·76 [95% CI 0·69–0·84]; p<0·0001),

	Combined dataset (n=19 653)	ELSA (n=11 337)	CFAS II (n=7469)	Newcastle 85+ Study (n=847)
Mean age, years	69·8 (10·7)	65·0 (10·2)	75·4 (7·1)	85·5 (0·4)
Gender				
Men	8895 (45·3%)	5143 (45·4%)	3429 (45·9%)	323 (38·1%)
Women	10 758 (54·7%)	6194 (54·6%)	4040 (54·1%)	524 (61·9%)
ADL disability				
No	14 808 (75·3%)	9048 (79·8%)	5262 (70·5%)	498 (58·8%)
Yes	4845 (24·7%)	2289 (20·2%)	2207 (29·5%)	349 (41·2%)
Deprivation category				
Most disadvantaged (<20% IMD)	3061 (15·6%)	1718 (15·2%)	1175 (15·7%)	168 (19·8%)
Middle (20–80% IMD)	12 132 (61·7%)	7051 (62·2%)	4574 (61·2%)	507 (59·9%)
Least disadvantaged (>80% IMD)	4460 (22·7%)	2568 (22·7%)	1720 (23·0%)	172 (20·3%)
Ethnicity*				
White	18 162/18 575 (97·8%)	10 004/10 267 (97·4%)	7317/7464 (98·0%)	841/844 (99·6%)
Other	413/18 575 (2·2%)	263/10 267 (2·6%)	147/7464 (2·0%)	3/844 (0·4%)

Data are mean (SD) or n (%). Where numbers do not sum to 11 391, 7762, and 849 for ELSA, CFAS II, and the Newcastle 85+ Study, data are missing. ADL=activities of daily living. CFAS II=Cognitive Function and Ageing Study II. ELSA=English Longitudinal Study of Ageing. IMD=Index of Multiple Deprivation. *As ethnicity was not part of our analysis, missing data are not an issue for sample size considerations.

Table 1: **Participant characteristics at baseline**

	Age (additional year)	Gender (women compared with men as reference)	Middle socioeconomic group (compared with most disadvantaged)	Least disadvantaged (compared with most disadvantaged)
ADL disability free to ADL disability	1·07 (1·07–1·08); p<0·0001	1·16 (1·08–1·24); p=0·0003	0·76 (0·69–0·84); p<0·0001	0·61 (0·55–0·69); p<0·0001
ADL disability free to death	1·10 (1·09–1·12); p<0·0001	0·67 (0·54–0·83); p=0·0003	0·72 (0·53–0·97); p=0·033	0·57 (0·39–0·82); p=0·0031
ADL disability to ADL disability free	0·99 (0·98–0·99); p=0·0001	1·04 (0·96–1·12); p=0·32	1·19 (1·07–1·32); p=0·0012	1·31 (1·15–1·49); p=0·0005
ADL disability to death	1·07 (1·07–1·08); p<0·0001	0·62 (0·57–0·68); p<0·0001	1·02 (0·90–1·15); p=0·76	0·99 (0·86–1·15); p=0·90

Data are hazard ratio (95% CI); p value. ADL=activities of daily living.

Table 2: **Transitions between ADL disability states and to death, adjusted for age, gender, and area-level socioeconomic disadvantage**

an increased chance of recovery from ADL disability (HR 1·19 [1·07–1·32]; p=0·0012), and a lower risk of death without ADL disability (0·72 [0·53–0·97]; p=0·033). The differences between people living in the least disadvantaged areas (>80% of IMD) and people living in the most disadvantaged areas were more pronounced. Compared with people living in the most disadvantaged areas, people living in the least disadvantaged areas had a lower risk of developing ADL disability (HR 0·61 [0·55–0·69]; p<0·0001), a greater chance of recovery from ADL disability (HR 1·31 [1·15–1·49]; p=0·0005), and a lower risk of death without ADL disability (HR 0·57 [0·39–0·82]; p=0·0031).

Women had a significantly higher risk of developing ADL disability compared with men (HR 1·16 [95% CI 1·08–1·24]; p=0·0003), but had a lower risk of death either with (HR 0·62 [0·57–0·68]; p<0·0001) or without (HR 0·67 [0·54–0·83]; p=0·0003) an ADL disability (table 2).

Each additional year of age increased the risk of developing ADL disability and death from this state (HR 1·07 [95% CI 1·07–1·08]; p<0·0001), and increased the risk of death without ADL disability (HR 1·10 [1·09–1·12]; p<0·0001; table 2).

Increasing area-level socioeconomic disadvantage was associated with a decrease in total life expectancy and an increase in the proportion of remaining life spent with ADL disability, particularly for women (figures 2, 3).

Participants of lower area-level socioeconomic status were found to spend more of their remaining life with ADL disability starting from age 50 years compared with those of middle and highest area-level socioeconomic status (figure 4). The DFLE50% also showed a marked decrease with lower area-level socioeconomic status (figure 4).

Women living in the least disadvantaged areas reached their DFLE50% at a mean age of 83·5 years, decreasing to age 77·5 years for women in the middle area-level socioeconomic-area group (20–80% of IMD), and age 71·5 years for women in the most disadvantaged areas. Similarly, for men, the DFLE50% was mean age 89·5 years for those in the least disadvantaged areas, decreasing to age 84·5 years for those in the middle area-level socioeconomic-area group, and age 78·5 years for those in the most disadvantaged areas. Those living in the most disadvantaged areas spend half of their remaining life with ADL disability 11·0 years (men) and 12·0 years (women) earlier than those in the least disadvantaged areas (figure 4).

We estimate that, for the year 2024, for people aged 65 years in the most disadvantaged areas, an extra 59 000 person-years for men and 88 000 person-years for women

Figure 2: **Mean remaining life expectancy spent with and without ADL disability for each area-level socioeconomic group, in men and women at age 65 years (with 95% CIs)**
ADL=activities of daily living.

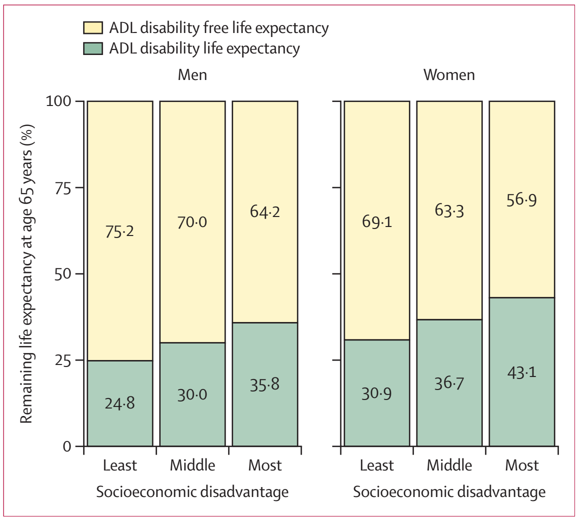

Figure 3: **Remaining life expectancy (as a proportion) spent with and without ADL disability for each area-level socioeconomic group, in men and women at age 65 years**
Estimates of uncertainty are shown in figure 2. ADL=activities of daily living.

were lived with ADL disability, at the population level, compared with people in the least disadvantaged areas.

Discussion

The objective of this study was to quantify the effect of area-level socioeconomic status on ADL disability-free life expectancy (DFLE) in older people in England.

We found that those in the most disadvantaged areas not only have a shorter life expectancy but spend a greater proportion of their lives with ADL disability, reaching the point at which 50% of remaining life is spent disabled 11·0 years (men) and 12·0 years (women) earlier than their least disadvantaged counterparts. This underscores the important effect of socioeconomic status on quantity and quality of life, and the need for strategies that address the underlying causes.

The inequalities we highlight align with UK Government initiatives aimed at halving the gap in healthy life expectancy between the most and least socioeconomically deprived areas,[5] as well as previous research on DFLE in older people,[18,19] and the known differences in healthy ageing between men and women. The younger age from which time is spent with ADL disability in those in the most disadvantaged areas also reflects previous research, in which multiple long-term conditions (which are upstream of disability) occur 10–15 years earlier in this group.[20] The Marmot report also states that those in more deprived areas spend more of their shorter lives in ill health.[14] Factors that shorten DFLE, such as obesity and smoking,[21] are for example more common in areas of high deprivation.[22]

Our results suggest that a life-course approach is needed to mitigate inequalities, in-keeping with the cumulative disadvantage hypothesis.[23] More generally, for example, the Core20PLUS5 framework, which initially focused on health-care inequalities experienced by adults, has now been adapted to apply to children and young people.[24] The Chief Medical Officer's report also stresses the need for preventive health care to compress the time spent with disability in older age.[25] Indeed, as well as adversely affecting individual health and wellbeing, caring for people with ADL disability is acknowledged as being more costly than caring for those at other levels of need.[26] This difference is primarily due to the nature of ADL, which are fundamental self-care activities required for independent living (such as washing and toileting). When individuals are unable to perform these tasks, the level of care and assistance required is typically more intensive and constant. As such, the resources needed to support individuals with ADL disabilities, in terms of time and finances, are greater.

Regarding the strengths of our work, our analysis examined harmonised data for disability over time, in a large sample. We included participants of all ages 50 years and older, including individuals aged 85 years and older, who are the fastest growing age group[27] yet are often overlooked in research studies. Examining ADL disability (ie, difficulty with personal care) as a standalone component is also important, as it is the most expensive disablement stage with respect to social care costs, and the number of people with ADL disability is projected to increase.[8]

However, our work has limitations. First, we used the area IMD to measure socioeconomic status, but we acknowledge that this is subject to the ecological fallacy (ie, not every individual living in a deprived area will be of low socio-economic status themselves, and vice versa). This is particularly true of cities, which can have high concentrations of deprivation often very close to areas of affluence.[22] Furthermore, as the IMD refers to current residence, it cannot account for some study participants potentially

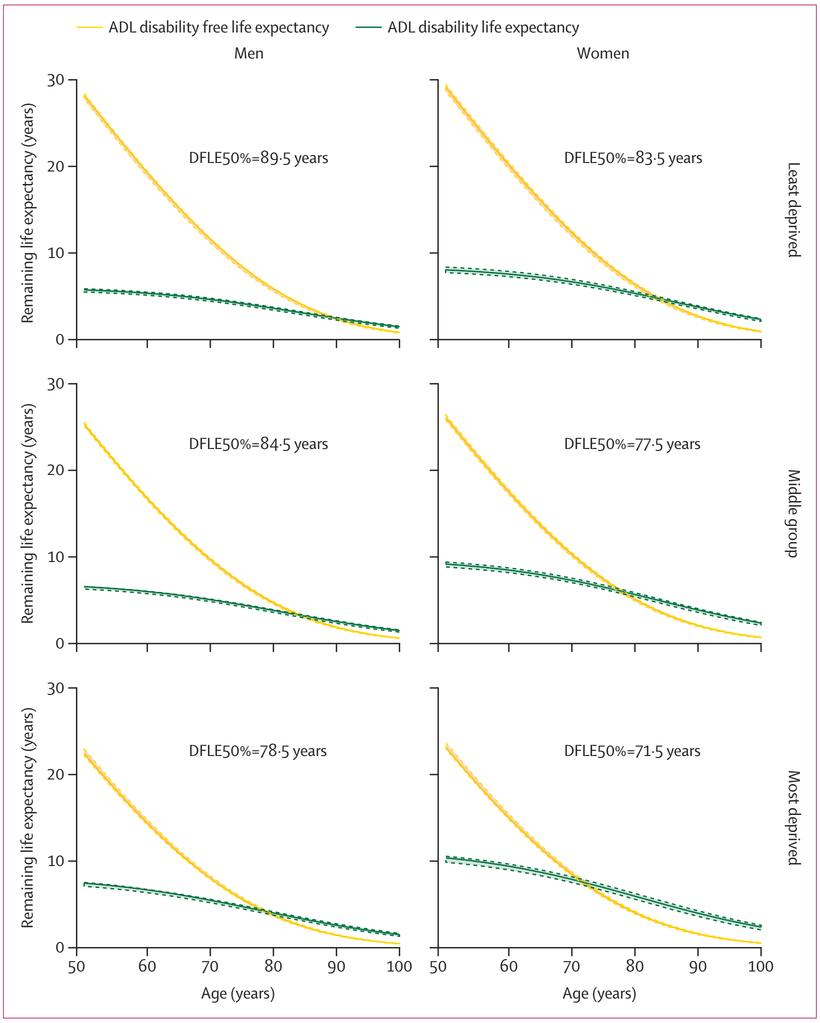

Figure 4: **Remaining life expectancy spent with and without ADL disability for each area-level socioeconomic group, in men and women from age 50 years**

The point at which the lines for ADL disability-free life expectancy and ADL disability life expectancy intersect is the DFLE50%. The 95% CIs are plotted for DFLE and DLE at each age, and appear faint due to their precision, but do not apply to the DFLE50%, which is obtained from point estimates and is the intersection of DLE and DFLE. ADL=activities of daily living. DFLE=disability-free life expectancy. DFLE50%=age at which a person's remaining life-years are expected to be equally shared between the ADL and non-ADL disability states. DLE=life expectancy with disability.

moving between disadvantaged and advantaged areas earlier on in their life course. Our decision to use the IMD primarily stemmed from data availability constraints, as individual-level wealth, which varies over the life course and would have provided a more robust indicator of socio-economic status in older people,[28] was not available in two of the three contributing datasets (CFAS II and the Newcastle 85+ study), nor were individual-level income data. Second, we recognise that in these UK age cohorts, education might only distinguish the most advantaged from the rest of the population, and be prone to gender bias, as most of today's older population left school at the minimum age, although men historically had more educational opportunities than women.[29] Thus, future research could disentangle how different individual-level socioeconomic status measures, which tap into different causal mechanisms of health inequalities, such as education, occupational class, income, and wealth, contribute to disparities in DFLE.[30] We accounted for losses to follow-up due to mortality in our multistate model, but we could not account for other losses to follow-up that were thus assumed to be random. In this respect, dropout due to poor health might mean that we underestimated disability duration (attrition bias). We might also have missed some transitions between ADL disability states, as previous research has shown that disability is a dynamic process.[31] In terms of generalisability, our results might not apply to non-White populations as there is little ethnic diversity in the Newcastle 85+, ELSA, and CFAS II studies (selection bias). Moreover, participants from the Newcastle 85+ Study were exposed to unique early life experiences that might have influenced their subsequent health trajectories (ie, growing up just after World War 1). That said, in terms of survivorship bias, older participants who survived to baseline might be healthier, thus potentially underestimating the disability burden at the population level. Indeed, the timeframes of the three contributing studies did not wholly overlap, and the earlier waves of the Newcastle 85+ and ELSA studies precede some policies (particularly austerity, which began in 2010) that are likely to affect the physical health of future older cohorts. In terms of measurement bias, there is also the potential for inconsistencies in the self-reported prevalence of disability between the studies. This is due to their use of different rating scales, in terms of ability ("are you able to" in the Newcastle 85+ and CFAS II studies) versus performance ("do you have difficulty doing" in the ELSA study), in conjunction with different response categories (ie, in ELSA only, the disability questions make no reference to needing help).[32] Finally, our analysis provides no information on the drivers of the observed area-level socioeconomic differences in DFLE because we did not adjust for confounding factors, such as long-term conditions. Our estimates might also change when longitudinal data are available from a post-pandemic dataset, given the disproportionate effect of COVID-19 on socioeconomically disadvantaged groups. We also make no assumptions about how older people's experience of disability might be influenced by future availability of paid and unpaid carers.

The findings of our work—that people living in the most deprived areas spend a greater proportion of time with ADL disability from a younger age compared with their counterparts in the least deprived areas—have wide ranging implications, particularly for women. An inability to work threatens financial stability, which might be compounded by increases in the state pension age in the UK. Disability will affect the demand for social care. It might also influence social care provision, as many women take on caring responsibilities for parents and spouses or partners, which might be more difficult if they are living with disability themselves. This might be particularly important, given the projected declines in the numbers of paid and unpaid carers in many countries, including the UK.[33]

Measures to prevent long-term health conditions might have some potential to delay downstream disability development.[34] For example, physical activity can lower the incidence of dementia,[35] which is associated with disability. Routine assessment of functional ability in the community might also be beneficial, as reablement is more effective when disability is at an earlier stage (eg, at mobility disability rather than ADL disability). Last, our study reinforces the need for a life-course approach, as well as place-based interventions to reduce health inequalities,[22] as those in the most deprived areas transition to disability significantly earlier than those in the least socioeconomically deprived areas.

In summary, we describe trends in the relationship between area-level socioeconomic status and disability in older people (aged 50 years and older). Our findings suggest that greater area-level socioeconomic disadvantage is linked to reduced life expectancy and an increased proportion of life spent with ADL disability. Women living in the most disadvantaged areas reach the age at which half of their remaining years will be lived with ADL disability 12 years earlier than their least disadvantaged counterparts. For men, this difference is approximately 11 years. Targeted policies to address underlying socioeconomic inequalities in health are likely to be the long-term, definitive response.

Contributors

LED contributed to the design of the study, analysed the data, interpreted the data, and drafted and revised the paper. DRS contributed to the design of the study, interpreted the data, and critically revised the paper. FEM designed the study (co-investigator), critically revised the paper, and was co-investigator of CFAS (previously at Cambridge). AK conceived and designed the study (principal investigator on project), supervised the analysis, interpreted the data, critically revised the manuscript, and curated the Newcastle 85+ data. BH and CT gained the funding, contributed to the design of the study, interpreted the data, and critically revised the paper. Not all authors had access to the full dataset due to institutional restrictions. NHS Digital shared some data with the Newcastle 85+ Study, but contractual agreements prevented onward sharing with external institutions (ie, Manchester University or Hull University). As a result, only LED, AK, DRS, and BH had access to or verified the underlying data reported in the manuscript. All authors read, contributed to, and approved the publication that arose from the analysis.

Declaration of interests

We declare no competing interests.

Data sharing

Data cannot be shared publicly because of data governance, General Data Protection Regulation, and contractual arrangements with outside organisations who provided individual level data (NHS Digital). Regarding the Newcastle 85+ Study, data requests are submitted to the Newcastle 85+ Study project email (n85.plus.enquiries@newcastle.ac.uk), which is monitored and accessed by the project administrator and data manager. Such requests are then forwarded to the Newcastle 85+ Data Guardians group, and data can be made available for researchers who meet the criteria for access to confidential data. CFAS II de-identified data are freely available on application after approval from the CFAS management committee. The application form and essential data information can be found at http://www.cfas.ac.uk/cfas-ii/cfasii-data/. The ELSA dataset from the main survey is available in a public, open-access repository and can be accessed through the UK Data Service at https://ukdataservice.ac.uk/. The data can be used after registration and acceptance of end-user licence.

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