



Employment outcomes for older adults aged 50-74 by major local industry typology and the health of a place: findings from the ONS Longitudinal Study 2001-2011

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HIGHLIGHTS

- There are large inequalities between health in a place and industry mix in a place.
- Healthy service sector areas in London had lowest work exit chances.
- There was a gradient; unhealthy rural areas had the highest chance of work exit.

ARTICLE INFO

Keywords:
Census
Work exit
Retirement
Industry
Health

ABSTRACT

Objectives: Poor health at the individual and area level has been shown to be associated with earlier labour market exit. This paper builds on work demonstrating that health in a place is associated with higher chances of work exit for older workers even once their own health is taken into account. This paper looks at an additional risk factor for work exit: industrial mix.

Study Design: Data was drawn from the full 2011 Census and an approximately 1.1 % representative sample from England and Wales, the Office for National Statistics Longitudinal Study from 2001 to 2011.

Methods: We analysed people aged 40–64 in paid work in 2001 and measured their employment outcomes in 2011, at ages 50–74. Four industrial landscape clusters were derived by K-means cluster analysis using industry mix for 348 local authorities from 2011 Census. ‘Health of a place’ was measured using 2001 Census data for the usually resident population aged 50–74 years, the proportion who reported ‘fair’, ‘bad’ or ‘very bad’ self-rated health (as opposed to ‘good’ or ‘very good’) was calculated and split into tertiles.

Results: Work exit showed industrial landscape and area health inequalities. Older workers in healthy service sector areas in London had the lowest work exit chances with a gradient to those in unhealthy rural areas having the highest chance of work exit.

Conclusions: More research is required to investigate why, in areas where the same types of industry dominate, the health of the local population was associated with differing odds of work exit.

1. Introduction

Previous research found that poor health at the individual and area level is associated with earlier exit from labour market (Murray et al., 2022). There has been very little focus on differences in employment outcomes for older workers in England by the characteristics of where they live other than by deprivation, with the rather circular reasoning

that work exit in older ages is simply due to, or part of, lower overall employment levels.

This paper seeks to build on work by Murray et al. (2022), Head et al. (2024) and ILCUK (2022), that has demonstrated that health in a place is associated with higher chances of work exit for older workers even once one’s own health is taken into account. There was an association between area health and occupational group with people living in the

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<https://doi.org/10.1016/j.archger.2025.105973>

Received 13 March 2025; Received in revised form 24 July 2025; Accepted 27 July 2025

Available online 28 July 2025

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healthiest third of areas more likely to be in the ‘Managers and senior officials’ or ‘Professional’ major occupation groups in 2001 than people living in the unhealthiest third of areas. Head et al. (2024) demonstrated that though risk is attenuated by adjustment for occupational group in previous job work exit remains associated with health in a place and potential mechanisms for this discussed therein. It is possible that the reason that area health measures correlate with employment rates is due to differences in types of occupation (and hence would be associated with industry) in different areas. It may also be that healthy areas are an asset that have broader economic benefits such as attracting new industry and investment. There may be reputational damage with terms used in the media such as ‘sick cities’ and ‘sickest towns’ used to identify locations where for example sickness benefits claim rates are highest. Given the wide variations in the health of local populations, it has been suggested that place-based policies to improve the health of local populations might have additional benefits for the local economy over and above the health of individuals living there, for example, through increased spending power and lower demand for local services such as social care, and thus lead to increased employment of older workers (Murray et al., 2022).

This paper looks at an additional risk factor for work exit: industrial landscape. The industry mix in UK has changed considerably over the working life of older workers. In 1970 the industry mix was far less dominated by the service sector which then accounted for just over half (56 %) of the UK economy. By 2016, services accounted for 80 % of the UK economy. The number of workers in the production sector declined from 8.6 million in 1970 to 3.0 million in 2016. (ONS, 2019a). Mining and quarrying, forestry and fishing and agriculture were relatively small-scale employers even in the 1970s, but further declined in the 2000s with the primary sector accounting for 4.5 % of employment between 1960 and 1980 and 1.4 % in 2000–2016 (ONS, 2019b). But primary sector industries cover a large geographical area and were often a major employer in specific areas. Utilised agricultural area in 2000 in England was 73 % of land space in 2001 and 70 % in 2011 despite very low employment levels (476,000 workers in 2011) (DEFRA, 2022). Additionally agricultural landholder’s median age in 2010 was 59 so agriculture is an importance source of employment for older workers in rural areas.

2. Methods

This paper uses data from the 2011 Census and an approximately 1.1 % representative sample in a national longitudinal study from England and Wales, the Office for National Statistics Longitudinal Study (ONS LS) from 2001 to 2011, the most recently available at the time of writing. The ONS LS uses a dynamic sampling method: new members are added to the data from qualifying new births, immigration, and succeeding censuses, so that starting at each census it is possible to construct similar-sized but distinct baseline cohorts (more information about the study can be found in the ONS LS cohort profile, (Shelton et al., 2019).

For this study, we included people aged 40–64 in 2001 (aged 50–74 in 2011) who were in paid work in 2001.

2.1. Employment outcomes

Employment outcomes were measured 10 years later, in 2011, when people were aged 50–74. We analysed whether or not they were ‘In paid work’ in 2011, with death between 2001 and 2011 as an additional outcome category.

2.2. Industrial landscape

This was created using K-means cluster analysis with 5 clusters specified using industry mix for 348 local authorities from the 2011 Census using the 18 groups from the Standard Industrial Classification 2007 (ONS, 2022a). This led to 4 major clusters and 1 single local

authority cluster which was added to its most similar neighbouring cluster. 2011 was chosen as the time point at which industry mix was measured as this was the cluster at the time point at which employment outcomes were measured and reflected any changes in local employment opportunities by 2011, given that everyone in the analysis had been in work in 2001.

2.3. Health of a place measures

The ‘Health of a place’ is measured using 2001 Census data for the whole population usually resident in each local authority. For each local authority area, the proportion of census respondents aged 50–74 years who reported ‘fair’, ‘bad’ or ‘very bad’ self-rated health (as opposed to ‘good’ or ‘very good’) was calculated. This health measure was chosen as in a previous study, it was found to be most strongly associated with employment outcomes when compared with other health indicators that are measured for the whole population and available at local authority level (Murray et al., 2022).

Staff at the Centre for Longitudinal Study Information and User Support (CeLSIUS) provided each LS member’s local authority (LA) identifier in 2001. LA identifiers were then used to link local authority level ‘health of a place’ and industry mix cluster measures to LS members records.

2.4. Covariates

Individual level covariates were taken from 2001 LS data and included age of the LS respondent in 2001 (continuous), sex, self-rated health, hours providing informal care, highest qualification level, whether self-employed or not, and whether in part-time or full-time work. The question on self-rated health asked individuals ‘over the last 12 months would you say, your health has on the whole been: very good, good, fair, bad or very bad?’. Area level local unemployment rates for each local authority in 2001 were also linked to individual level data for LS members. Additionally own social economic classification using a 3-level classification (NS-SEC) was included in the models.

2.5. Statistical analysis

First, distributions of employment outcomes, industry mix clusters, health-in-a-place and covariates were described for the LS analysis sample used in this paper.

Multinomial logistic regression was used to investigate associations of both industry mix and area level health in 2001 with the employment outcome in 2011. Industry mix and area health categories were combined to create a twelve category variable (Table 1).

Models for health in a place and industry mix were initially adjusted

Table 1
Odds of work exit between 2001 and 2011, England and Wales.

	odds ratio	p-value	95 % CIs	
Healthy / Service Sector London	1.00			
Middle / Service Sector London	1.04	0.761	0.81	1.34
Unhealthy / Service Sector London	1.08	0.547	0.85	1.37
Healthy / Service Sector	1.42	0.001	1.16	1.74
Middle / Service Sector	1.44	0.001	1.17	1.77
Unhealthy / Service Sector	1.39	0.002	1.13	1.71
Healthy / Manufacturing Utilities	1.48	<0.001	1.20	1.82
Transport				
Middle / Manufacturing Utilities Transport	1.55	<0.001	1.26	1.89
Unhealthy / Manufacturing Utilities	1.64	<0.001	1.34	2.01
Transport				
Healthy / Rural related	1.40	0.002	1.14	1.74
Middle / Rural related	1.60	<0.001	1.30	1.96
Unhealthy / Rural related	1.80	<0.001	1.46	2.23

Source: ONS Longitudinal Study. Analysis author’s own. Sample size 102,169.

for age and sex, individual self-rated health, hours of caring, and highest qualification level and area unemployment rate. Final models were also adjusted for own social economic classification using a 3-level classification (NS-SEC). Age and area unemployment rates were included as continuous variables after checking for departure from linearity. All other variables were included as categorical variables. The results were tested for spatial autocorrelation.

3. Results

The cluster typology identified four major clusters: Administrative and education (urban) $n = 105$, Manufacturing $n = 159$, Administrative (London) $n = 15$ and Agriculture and mining $n = 67$. The clustering reflects to some extent land use as well as industry type to due to the geographical focus and spread of different industries. The location of these are shown in Fig. 1 alongside the locations of tertiles of self-rated health. (Other clusters were excluding the single cluster LA were rejected after testing: seven and six clusters led to multiple small clusters and five clusters led to clusters that were similar in self reported health and three clusters led to data reduction excluding the London cluster – full methodology (not shown) is available online). Spatial autocorrelation effects were minimal with no change in statistical significance (results not shown).

In the north of England the geography of the most unhealthy tertile corresponds well with the manufacturing, utilities and transport industry cluster, but this cluster extends into areas in the midland and south where health is rated much better, demonstrating that places can be healthier irrespective of their major industries. Conversely much of London where the service sector dominates is in the unhealthiest tertile, yet in the South-East where service sector is also dominant the majority of areas are in the healthiest tertile. Table 1 shows the results of the regression by health in a place and industry cluster for adults aged 40–64 in 2001 for work exit between 2001 and 2011. There were no significant differences between odds of work exit in service sector areas in London regardless of the health of the local authority cluster. In the service sector areas outside of London there were marginal differences in odds between the health of the districts, but they ranged from 39–42 % higher odds of work exit than the healthy service sectors in London. In the Manufacturing Utilities Transport the odds of work exit ranged from 38–64 % higher odds of work exit than the healthy service sectors in London increasing as the health of the area decreased.

4. Discussion

This short paper has shown there are large inequalities in the interaction between health in a place and industry mix in a place. In London work exit chances were the lowest and did not differ regardless of population health in a place. Within those service sector areas outside of London work exit chances were c40 % higher than healthy, service sector areas in London. Within the areas where manufacturing industries dominated and in the areas with rural and former mining industries odds were much higher in the least healthy areas. Service sector employment seems to protect workers from job loss in relation to the health of the area.

It is unclear why in areas where the same type of industry dominates, the health of the local population was associated with differing odds of work exit. One potential explanation for areas with dominant manufacturing, rural, and former mining industries is the higher number of jobs in these industries that are physically demanding. If in certain areas a higher number of workers develop poor health over time, then there will be a higher rate of work exit. In areas where less physically demanding jobs dominate, like the service sector, health of the local population would then have less influence on rates of work exit.

It is possible that people with poorer health may be selected into certain areas and industries. Although we adjusted for individual self-rated health which are found to be associated with objective measured health and mortality, and known to be related to early exit from the labour market we were not able to adjust for poor mental health specifically as that is not captured in the England and Wales Census. Area deprivation and own socio-economic group was adjusted for in the analysis. Other individual level factors that may be important but were not available in our data include access to private pensions, wealth and income. People aged 50–64 who had not returned to work after exiting in the pandemic era were less likely to have debts or mortgages (ONS, 2022b), but much of the work exit in older people was attributable to ill health (Health Foundation, 2022) so the associations reported here may be increased by worsening population health and negatively by income selective work exit which will vary by industry. For future generations of older people declines in levels of home ownership may present challenges to health both at the area and individual and area level. The 2011 Census question does not detail for whom care is provided and only asked about care of long term disability or old age thereby excluding providing childcare which may be a reason for work exit in older people,

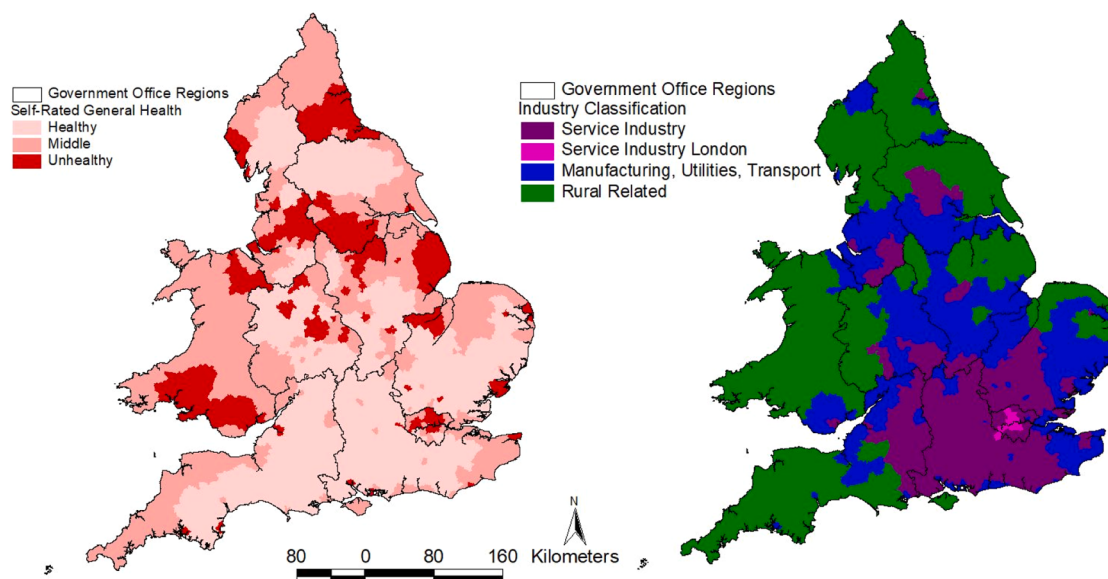


Fig. 1. The Geography of Self-rated Health and Industrial Clusters, England and Wales, 2011
Date Source: ONS. Analysis authors' own.

especially women in lower socio-economic groups. This may explain why women in some industries experience greater rates of work exit. However the adjustment for hours of care for those of old age or with long term disability, which may be related to local rates of poor health did not attenuate the risk of work exit by health of a place.

Another potential explanation includes known differences in the availability and reliability of transport networks. Feedback from focus groups where these findings were presented to older workers outside of London (ILCUK, 2022) indicated that poor rural public transport was a key barrier to access to work. Previous work (Shelton et al., 2018) has also shown that access to cars is associated with reduced risk of work exit in older people. Eighty-three percent of people aged 50–59 and 80 % of people aged 60–69 in 2011 had a driving license, but there were noticeable gender differences with 90 % of males and 76 % of females in 50–59 years age group and 90 % of males and 71 % of females 60–69 years. There was a sharp decline in having a driving license for the 70–79 years age group (there is an eye test required at age 70) with a reduction to 59 % of adults and a large gender divide 79 % (m) and just 44 % (f) having full driving license in 2011 (Department for Transport, 2023). There was also a large urban/rural divide, where 12 % of rural households had no access to a vehicle compared to 26 % of households in urban areas in 2011, (Nomis, 2013) but access to a car will be much less important for access to most employment opportunities in urban areas. Also, if work exit occurs, then retaining a vehicle may be unaffordable, reducing opportunities to then return to the workforce if a vehicle is required. Similarly, if a driving license or access to a car is lost then remaining in work in rural areas may become untenable.

There remain other regional challenges – this analysis is restricted to those in work in 2001 and many older people may have exited work earlier or have not entered the workforce. London has higher levels of females not in work in the period. This is explained to some extent by ethnic differences due to higher levels of caring responsibilities (Roantee & Vera, 2018) so caring services need to be made more accessible. Employment in agriculture in the twenty first century needs to be supported given that it is currently relying heavily on older workers who will age out of the workforce soon. It is noted as a limitation that as longitudinal data from the 2021 Census is not available at the time of writing this data relates to work exit between 2001 and 2011 a period when work exit was declining in this age group (ONS, 2022c). Following the Covid-19 pandemic increases in economic activity in the UK were largely in older working ages 50–64 (ONS, 2025) with professional, associate professional and service sector occupations experiencing the largest declines with notable decline among the self-employed (ONS, 2022c). As noted above much of this work exit was attributable to ill health (Health Foundation, 2022) so the associations reported here may be strengthened by this pattern.

In conclusion, if the relationships observed in this paper were causal, levelling up population health in the least healthy places could reduce the odds of work exit by 40 % (from 1.80 to 1.40) in these areas. This would be a huge gain for local labour markets and individuals. However, more research is required to investigate why, in areas where the same type of industry dominates, was the health of the local population associated with differing odds of work exit.

CRedit authorship contribution statement

Nicola Shelton: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Paul Norman:** Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jenny Head:** Writing – review & editing, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Emily T Murray:** Writing – review & editing, Project administration, Methodology,

Investigation, Funding acquisition, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Nicola Shelton reports financial support was provided by The Health Foundation. Emily Murray reports financial support was provided by The Health Foundation. Jenny Head reports financial support was provided by The Health Foundation. Paul Norman reports financial support was provided by The Health Foundation. Nicola Shelton reports financial support was provided by UK Research and Innovation Economic and Social Research Council. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work was funded by the Health Foundation (R-000002350). The funders had no role in the study design, data collection, analysis, decision to publish, or preparation of the manuscript. The permission of the Office for National Statistics to use the Longitudinal Study is gratefully acknowledged, as is the help provided by staff of the Centre for Longitudinal Study Information & User Support (CeLSIUS). CeLSIUS is supported by the ESRC under project ES/V003488/1. The authors alone are responsible for the interpretation of the data.

This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

The project was approved by the ONS Longitudinal Study Research and Development Board and Research Accreditation Panel. Project no 2000166

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.archger.2025.105973](https://doi.org/10.1016/j.archger.2025.105973).

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