

Article

Inequalities in Accident and Emergency department attendance, England: March 2021 to March 2022

Association between A&E department attendance and socioeconomic characteristics in England, using Census 2021 data and the Emergency Care Data Set. Experimental Statistics.

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1 . Main points

- People living in more deprived areas were more likely to have attended an Accident and Emergency (A&E) department between March 2021 and March 2022 compared with those living in less deprived areas, with the odds of A&E attendance increasing with the level of deprivation.
- Compared with people living in the least deprived 10% of areas (decile 10), the odds of attending A&E were 1.7 times greater for people living in the most deprived 10% of areas (decile 1); this was 1.3 times greater for people living in decile 5 and 1.1 times greater for people living in decile 9, after adjusting for age, sex and ethnicity.
- This pattern was consistent across age groups but was more pronounced in people aged 30 to 65 years than in younger people (aged 0 to 29 years) and older people (aged 65 to 95 years).
- The differences in A&E attendance by deprivation levels were greater for people who attended A&E for low acuity conditions than for conditions posing an immediate danger to life; compared with people living in the least deprived areas (decile 10), the odds of attending A&E for a low acuity condition were 2.3 times greater for those living in the most deprived areas (decile 1), and 1.2 times greater for conditions that posed immediate danger to life.
- Differences in underlying health partially explained the differences in A&E attendance observed between these groups, except in infants, children and young adults (aged 0 to 29 years), where underlying health was a relatively smaller factor in explaining the differences in A&E attendance.
- Even after adjusting for differences in health, people living in more deprived areas were still more likely to have attended A&E services, with the odds of A&E attendance being 1.4 times greater for people in decile 1 compared with those in decile 10.

2 . Overview

We investigated how Accident and Emergency (A&E) department attendance varies by socioeconomic status in England between March 2021 and March 2022. Socioeconomic status is a complex concept and we used three measures as proxies. These included:

- a measure of area deprivation: [GOV.UK's 2019 Index of Multiple Deprivation \(IMD\)](#) ranks small areas in England from the most deprived 10% (decile 1) to the least deprived 10% (decile 10)
- a measure of occupation: the National Statistics Socio-economic Classification (NS-SEC) measures employment relations and conditions of occupations, as recorded in Census 2021
- a measure of qualification: the highest qualification obtained, as recorded in Census 2021

Because the results were largely consistent between the three different measures, this article focuses on area deprivation. You can find data on NS-SEC and qualification in our accompanying dataset.

Our study population contained 51,776,960 individuals aged 0 to 95 years with a record in [Census 2021](#) and the [NHS's 2019 Personal Demographics Service \(PDS\)](#). Records were linked via NHS number to the NHS's [Emergency Care Data Set \(ECDS\)](#) and [Hospital Episode Statistics \(HES\)](#) to study patterns in emergency care attendance.

3 . A&E department attendance by age and sex

Between 21 March 2021 (Census Day) and 31 March 2022, 11,498,500 people (22% of our total study population) attended an Accident and Emergency (A&E) department at least once.

The proportion of people who attended A&E was highest in infants (aged 0 to 2 years) and in older adults (aged 80 years and above). Between 30% and 50% of individuals in these groups attended an A&E service at least once between March 2021 and March 2022.

A higher proportion (between 20% and 30%) of teenage males and women of childbearing age attended A&E during 2021 to 2022, relative to their counterparts of the opposite sex.

Figure 1: Higher proportions of infants, older adults, women of childbearing age and teenage males attended A&E at least once between March 2021 and March 2022 in England

Proportion of people who attended an Accident and Emergency (A&E) department at least once by one-year age band and sex, England, 21 March 2021 to 31 March 2022

Notes:

1. People aged 0 to 95 years with a Census 2021 record that linked to the 2019 Personal Demographic Service (PDS).
2. A&E attendance is defined as the presence or absence of at least one record in the Emergency Care Data Set (ECDS) for each person in the study population.

Download the data

[.xlsx](#)

4 . Association between deprivation and A&E attendance

We estimated the odds of attending an Accident and Emergency (A&E) department at least once between March 2021 and March 2022 by deciles of area deprivation.

A&E department attendance increased with levels of deprivation, after adjusting for age, sex, and ethnicity (Figure 2). The odds of attending A&E were 1.69 times greater for people living in the most deprived 10% of areas in England (decile 1) than people living in the least deprived 10% of areas (decile 10). For comparison, the odds of attending A&E were only 1.08 times greater for people living in decile 9, relative to people in decile 10.

We further adjusted for health status to understand if the differences in A&E attendance across deciles were driven by differences in the underlying health of these populations. People living in more deprived areas tend to be in poorer health and have a higher mortality rate. For further details, see our [Health state life expectancies by national deprivation deciles bulletin](#) and our [Inequalities in mortality involving common physical health conditions bulletin](#).

Adjusting for health status reduced the odds of attending A&E for people across deciles 1 to 9 relative to people in decile 10 (Figure 2). However, there was still a clear gradient between deprivation levels and A&E attendance, especially for people living in more deprived areas. For example, the odds of visiting an A&E department were 1.41, 1.34 and 1.27 times greater for people in decile 1, decile 2 and decile 3, respectively, than the odds for people in decile 10.

Underlying poorer health in people in more deprived deciles partially explains the differences in A&E attendance we observed after adjusting for age, sex, and ethnicity. The remaining difference in A&E attendance between people in decile 1 to 9, relative to people in decile 10, may be explained by other factors which we could not adjust for, such as primary care access.

Figure 2: The odds of attending A&E were greatest for people living in the most deprived 10% of areas, compared with the same odds for people living in the least deprived 10% of areas, after adjusting for age, sex, and ethnicity

Odds ratios for attending an Accident and Emergency (A&E) department at least once in England by Index of Multiple Deprivation (IMD) deciles, England, 21 March 2021 to 31 March 2022

Notes:

1. People aged 0 to 95 years with a Census 2021 record that linked to the 2019 Personal Demographic Service (PDS).
2. The reference category used in these models is "IMD Decile 10", which represents people who live in the least deprived 10% of areas of England.
3. Because of the large population sample used in this study, confidence intervals for the odds ratios in these models are very narrow and are not displayed in this figure. These are available in the data download.
4. Estimates in the health unadjusted model control for age, sex, and ethnicity.
5. Estimates in the health adjusted model control for age, sex, ethnicity, and health characteristics, including disability status and health status as recorded in Census 2021, number of provider spell records in Hospital Episode Statistics (HES) between 2017 and 2021, and a range of comorbidities derived from HES records between 2017 and 2021.

Download the data

[.xlsx](#)

Deprivation and A&E attendance by age

We examined whether the differences in A&E attendance by deprivation varied across age group. We estimated separate models for people aged 0 to 5 years, aged 6 to 15 years, aged 16 to 29 years, aged 30 to 49 years, aged 50 to 64 years, aged 65 to 79 years, and aged 80 to 95 years.

The odds of A&E attendance increased with levels of deprivation within each age group. The biggest differences were found in people living in the most deprived 10% of areas (decile 1), relative to people living in decile 10.

The association between A&E attendance and deprivation was greatest in middle-aged and older populations, after adjusting for age, sex and ethnicity. Middle-aged and older people (those aged 30 to 49 years, aged 50 to 64 years, and aged 65 to 79 years) living in the most deprived 10% of areas (decile 1) had the greatest odds of A&E attendance, relative to their counterparts in decile 10, after adjusting for sex, age and ethnicity (1.87, 1.86 and 1.73 times greater, respectively).

Further adjusting for health, we observed a substantial reduction in the odds of A&E attendance for middle-aged and older people, especially in the most deprived deciles. The odds of A&E attendance for people aged 30 to 49 years, aged 50 to 64 years, and aged 65 to 79 years in decile 1 reduced to being 1.54, 1.39 and 1.23 times greater, respectively, than for people in the same age brackets in decile 10. Our findings suggest that middle-aged and older populations in the most deprived areas were more likely to be in poorer health compared with their counterparts in decile 10. This explains, in part, the large differences observed in A&E attendance between these groups.

Conversely, adjusting for health was a smaller factor in explaining the differences in A&E attendance observed in young populations. After adjusting for age, sex and ethnicity, the odds of A&E attendance for infants (aged 0 to 5 years), children and young adults (aged 6 to 15 years and aged 16 to 29 years) living in the most deprived 10% of areas were 1.56, 1.46 and 1.57 times greater, respectively, than their counterparts living in the least deprived 10% of areas. After adjusting for health, their odds reduced to being 1.50, 1.40 and 1.43 times greater, respectively. This is a smaller relative reduction than observed in older populations after the same adjustment.

Our findings suggest that health differences play a larger role in explaining differences in A&E attendance observed in older populations than it does in younger populations. They also highlight that, after adjusting for age, sex, ethnicity and health, there are differences in A&E service use between more deprived and less deprived populations that are not explained by differences in underlying health.

Deprivation and A&E attendance by condition acuity

We also looked at whether differences in A&E attendance by deprivation level varied by acuity levels. Acuity levels are assessed when people attend A&E and are classified from least severe to most severe, using the following coding:

- low acuity emergency care level
- standard emergency care level
- urgent emergency care level
- very urgent emergency care level
- immediate care emergency care level

For conditions of low, standard, urgent and very urgent acuity, there was a clear relationship between deprivation levels and A&E attendance, whereby the odds of visiting an A&E department increase with deprivation levels. However, we found no clear relationship between deprivation and A&E attendance for the most severe conditions (immediate care level).

We observed the greatest differences in A&E attendance for low acuity conditions between people living in the most deprived 10% of areas and those in the 10% least deprived areas, after adjusting for age, sex and ethnicity. The odds of attending A&E for a low acuity condition were 2.26 times greater for people living in the most deprived 10% of areas (decile 1), relative to their counterparts in the least deprived 10% of areas (decile 10). Comparatively, the odds for people in decile 1 who attended an A&E service for very urgent, urgent and standard conditions were 2.01, 1.64 and 1.66 times greater, respectively, than for people in decile 10.

Further adjusting for health, we observed a general reduction in the odds of A&E attendance for all acuity levels. However, the overall pattern we observed prior to adjusting for health remained the same: people in the most deprived deciles (1 to 5) who visited A&E for low acuity conditions had greater odds of attendance relative to people in decile 10 (this was 2.02, 1.89, 1.70, 1.92 and 1.73 times greater for deciles 1 to 5, respectively). These heightened differences in service use for conditions of low acuity for people in the most deprived areas compared with those in the least deprived areas cannot be explained by differences in age, sex, ethnicity, or underlying health. Rather, these could be driven by other factors we were not able to account for, such as access to primary care.

While it may seem counterintuitive that bigger differences in service use were found for low acuity conditions, findings suggest that populations in more deprived areas either prefer A&E services for low-acuity conditions, or possibly have poorer access to primary care services than populations living in less deprived areas.

After adjusting for age, sex, ethnicity and underlying health, we observed a reversal in the relationship between deprivation and A&E attendance between people in decile 1 and people in decile 10 who visited A&E for a condition requiring immediate care (the most acute). The odds of attending A&E for the most acute of conditions were 1.20 times greater in people living in the least deprived 10% of areas (decile 10) than in people in the most deprived 10% of areas (decile 1). This may be explained by people in the most deprived areas under-using A&E services for the most acute conditions, or other factors which we did not account for in our analysis.

Figure 3: Differences in A&E attendance were largest in people living in the five most deprived deciles who visited for low acuity conditions, compared with people living in the least deprived decile, and are not explained by differences in age, sex, ethnicity, or underlying health

Odds ratios for attending an Accident and Emergency (A&E) department in England at least once by Index of Multiple Deprivation (IMD) deciles and condition acuity, England, 21 March 2021 to 31 March 2022

Notes:

1. People aged 0 to 95 years with a Census 2021 record that linked to the 2019 Personal Demographic Service (PDS).
2. The reference category used in these models is "IMD Decile 10", which represents people who live in the least deprived 10% of areas of England.
3. Because of the large population sample used in this study, confidence intervals for the odds ratios in these models are very narrow and are not displayed in this figure. These are available in the data download.
4. Acuity represents the severity of a person's condition and the urgency with which they need to be seen and assessed by a medical professional. Low acuity describes the least severe conditions and immediate acuity describes the most severe.
5. Estimates in the health unadjusted model control for age, sex and ethnicity.
6. Estimates in the health adjusted models control for age, sex, ethnicity, and health characteristics, including disability status and health status as recorded in Census 2021, number of provider spell records in Hospital Episode Statistics (HES) between 2017 and 2021, and a range of comorbidities derived from HES records between 2017 and 2021.

Download the data

[.xlsx](#)

5 . Association between other measures of socioeconomic status and A&E attendance

We looked at the association between Accident and Emergency (A&E) attendance and two other measures of socioeconomic status: a measure of occupation (the National Statistics Socio-economic Classification (NS-SEC)) and a measure of qualification (highest qualification level obtained) as recorded in Census 2021. Findings for these two metrics were broadly similar to the findings we report in this article.

You can find all the data related to the association between NS-SEC, highest qualifications and A&E attendance in our accompanying dataset.

6 . Inequalities in Accident and Emergency department attendance data

[Inequalities in Accident and Emergency department attendance, England](#)

Dataset | Released 6 October 2023

Association between A&E department attendance and socioeconomic characteristics in England, using Census 2021 data and the Emergency Care Data Set. Experimental Statistics.

7 . Glossary

Acuity

Acuity measures the severity of a person's condition and the urgency with which they need to be seen and assessed. The acuity of a person's condition can be ranked as either low acuity emergency care, standard emergency care, urgent, very urgent and immediate emergency care. This ranking corresponds to the [acuity coding](#) used in the [Emergency Care Data Set \(ECDS\)](#).

Odds

Odds provide a measure of the likelihood of an outcome (for example, attending an Accident and Emergency (A&E) department). Odds are calculated as the ratio of people who experienced an outcome (for example, people who attended A&E between 2021 and 2022) to those who did not experience it (for example, people who did not attend A&E).

Odds ratio

Odds ratios quantify the strength of the association between an outcome (for example, attending A&E) and a factor of interest (for example, deprivation). Odds ratios compare the odds of experiencing an outcome for people in the presence of the factor of interest (for example, more deprived people) with the same odds for people in the absence of the factor of interest (for example, least deprived people).

Odds ratios equal to 1 indicate that a person's decile of deprivation does not affect their odds of attending A&E, relative to people in the reference category (for example, people in decile 10). Odds ratios greater than 1 indicate that a person's decile of deprivation is associated with higher odds of attending A&E, relative to people in the reference category. Odds ratios inferior to 1 indicate that their deprivation decile is associated with a decrease in their odds of attending A&E, relative to people in the reference category.

Logistic regression

Logistic regression is a statistical modelling technique for quantifying the strength of association between the occurrence of an outcome, such as attending A&E, and a set of characteristics. The model can be used to understand the independent relationship between the outcome and a particular factor of interest, such as deprivation. This is while "adjusting" or "controlling" for other characteristics, which may be related to using A&E services (such as age, sex and ethnicity), or both using A&E services and being deprived (such as health status).

Restricted cubic spline

The relationship between a continuous variable (such as age) and a person's likelihood to attend an A&E department may not be linear. For example, a one-year difference in age among middle-aged people may not correspond to the same change in likelihood to attend A&E as a one-year difference in age among older people. Transforming a continuous variable using a cubic spline is a way of modelling such a non-linear relationship. A restricted cubic spline is a special type of cubic spline whereby the relationship is forced to be linear for people in the lower and upper extremes of the range, where fewer data points are available with which to fit the model.

Statistical significance

The [statistical significance](#) of differences noted within the release are based on non-overlapping [confidence intervals](#).

8 . Data sources and quality

Study data

This analysis uses data from the following linked data sources:

- [Census 2021](#), to derive sociodemographic characteristics, such as age, sex and ethnicity, occupation (using the National Statistics Socio-economic Classification (NS-SEC) and highest level of qualification, as well as general health measures, such as disability status and health in general
- the [English Index of Multiple Deprivation 2019 \(IMD\)](#), to derive deprivation decile for individuals in the study population, linked via postcodes found in Census 2021
- [Emergency Care Data Set \(ECDS\)](#), to look at emergency department records between 21 March 2021 and 31 March 2022
- [Hospital Episode Statistics \(HES\)](#) data, to derive underlying health measures, such as number of hospital care providers spells and a set of comorbidities identified within HES records between January 2017 and March 2021

The study population comprised usual residents of England who responded to Census 2021 and could be linked to the 2019 Personal Demographics Service; the linked dataset covered 94.6% of the usual residents of England who were enumerated at Census 2021.

Outcomes

We looked at people who attended an Accident and Emergency (A&E) department at least once between 21 March and 31 March 2022, as recorded in ECDS. We included all Type 1 General Emergency Departments, Type 2 Specialist Emergency Departments (for example, paediatric, ophthalmology), Type 3 Minor Injury Units and Type 4 Walk-in Centres.

We also looked at people who attended an A&E department at least once by acuity level. We used the acuity coding featured in ECDS, which describes the severity and urgency in receiving care for medical conditions using five levels:

- low acuity care level
- standard emergency care level
- urgent emergency care level
- very urgent emergency care level
- immediate emergency care level

Socioeconomic measures

Socioeconomic status (SES) is a complex concept. We use proxy metrics to capture three aspects of SES:

- a measure of deprivation (using the English Index of Multiple Deprivation (IMD) deciles)
- a measure of occupation (using the National Statistics Socio-economic Classification, as recorded in Census 2021)
- a measure of qualification (using highest qualification level, as recorded in the 2021 Census)

Statistical modelling

We modelled the odds of attending an A&E department at least once between March 2021 and March 2022 using a set of logistic regression models. To estimate the differences in A&E attendance by SES status, we adjusted for a range of confounding factors. These included age (included as a [restricted cubic spline](#)), sex (male, female), and ethnicity (Asian, White, Black, Mixed or multiple ethnic groups, other ethnicity). Adjusting for these factors enabled us to quantify differences in A&E attendance by deciles of deprivation, without reflecting differences in age, sex and ethnic compositions between deciles.

To assess whether the differences in access by SES were driven by differences in health, we also adjusted for individual health. Prevalence of health conditions was measured using data from HES records. We also included measures of health collected Census 2021, including long-term health or disability, and self-reported general health, as well as using information from HES records. To proxy severity, we also created a variable for the number of provider spells from HES in the years prior to our study period, covering the period 21 March 2017 to 20 March 2021.

The effects of health and other covariates on A&E attendance may be different between younger and older people, or between sexes. To account for these effects, we included interaction effects between age, sex and all other confounding variables, except with our socioeconomic measures.

Strengths and limitations

The main strength of this analysis is the use of a population-level linked dataset, covering all usual residents of England enumerated at Census 2021 who could be linked to an NHS number, making this the largest study to examine the socioeconomic factors that influence A&E attendance to date.

The census provides high quality information about characteristics such as socioeconomic classification, self-reported ethnicity and general health, which enable estimates looking at the effect of specific factors of interest, while adjusting for others. Census 2021 covered around 97% of the population, and therefore is the most representative data source available to produce statistics about the population living in England. Linkage to the Hospital Episode Statistics (HES) data provides further important information about the population's underlying health and enables us to partially explain patterns in A&E service use, improving the relevance of our estimates.

However, not all people living in England in March 2021 were enumerated at Census 2021 (for example, because of non-response), and of those who were, not all could be linked to an NHS number via the Personal Demographics Service (PDS). The proportion of people in the Census 2021 population who are in our linked study cohort is lowest among males, people aged 20 to 29 years, and people from ethnic minority groups. For more details, see our [Census 2021 to Personal Demographics Service linkage report](#).

It is likely that the odds of A&E attendance for people who died shortly after Census Day (21 March 2021) are underestimated. This is because logistic regression does not account for differing time at risk (the time within which an individual is at risk of experiencing an outcome, for example, attending A&E) in the population. [People who are more deprived have shorter lifespans](#), and are likely to have shorter time at risk and experience difficulties in accessing A&E services for conditions posing immediate threat to life.

We look at A&E attendances as a binary measure (for example, whether someone attended A&E at least once between 2021 and 2022), which does not discriminate between people who attended A&E only once, and those who attended multiple times. Therefore, we may not capture potential compounding effects of socioeconomic status (SES) on the likelihood of attending A&E multiple times.

Finally, we did not account for other factors, which could explain why A&E service use varies by SES levels. Such factors include access to primary care services (such as distance to a GP practice or hospital).

9 . Related links

[Inequalities in mortality involving common physical health conditions, England: 21 March 2021 to 31 January 2023](#)

Bulletin | Released 31 August 2023

Rates of mortality involving cancers, cardiovascular diseases, chronic kidney disease, dementia, diabetes, and respiratory diseases, by Census 2021 variables. Experimental Statistics.

10 . Cite this article

Office for National Statistics (ONS), released 6 October 2023, ONS website, article, [Inequalities in Accident and Emergency department attendance, England: March 2021 to March 2022](#)