# Examining person level social determinants of health recorded in routinely collected healthcare data: insights into effects on healthcare utilisation
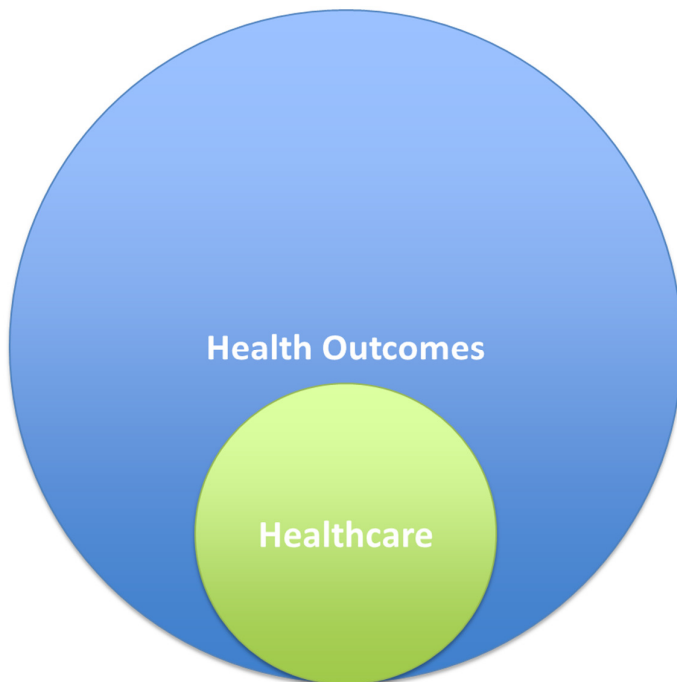
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# Health is not Healthcare



**Health Outcomes**

**Healthcare**

- **Medical care is estimated to account for only 10-20 percent of the modifiable contributors to healthy outcomes for a population[1]**
- Health is broader than healthcare
- Healthcare?
  - Medical services provided to maintain or restore health
- What is health?
  - Overall wellbeing
  - Physical
  - Mental
  - Social well-being
- Influenced by lifestyle, environment, genetics and **social determinants**

1Hood, C. M., K. P. Gennuso, G. R. Swain, and B. B. Catlin. 2016. County health rankings: Relationships between determinant factors and health outcomes. American Journal of Preventive Medicine 50(2):129-135. https://doi.org/10.1016/j.amepre.2015.08.024

# Framework of social health factors
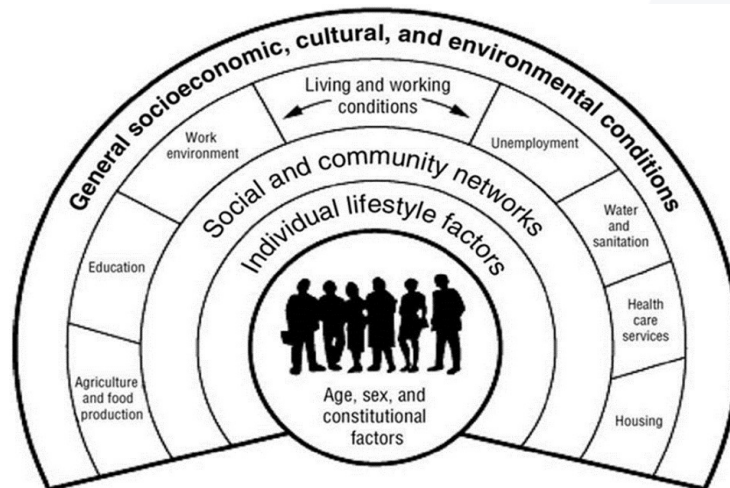


Source: Dahlgren and Whitehead (1991)

# An often-neglected variable that can have a profound impact on health outcomes



BBC

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## Illegal levels of air pollution linked to child's death

3 July 2018

By Claire Marshall, BBC Environment Correspondent

Share

Ella wasn't born with asthma

A nine-year-old girl's fatal asthma attack has been linked to illegally high levels of air pollution.

Ella Kissi-Debrah lived 25m (80ft) from London's South Circular Road - a notorious pollution "hotspot".

# Measuring Social Determinants

- Index of Multiple Deprivation (IMD)
- Relative composite measure of deprivation in a geographical area
- Social needs are not exclusive to areas of high deprivation
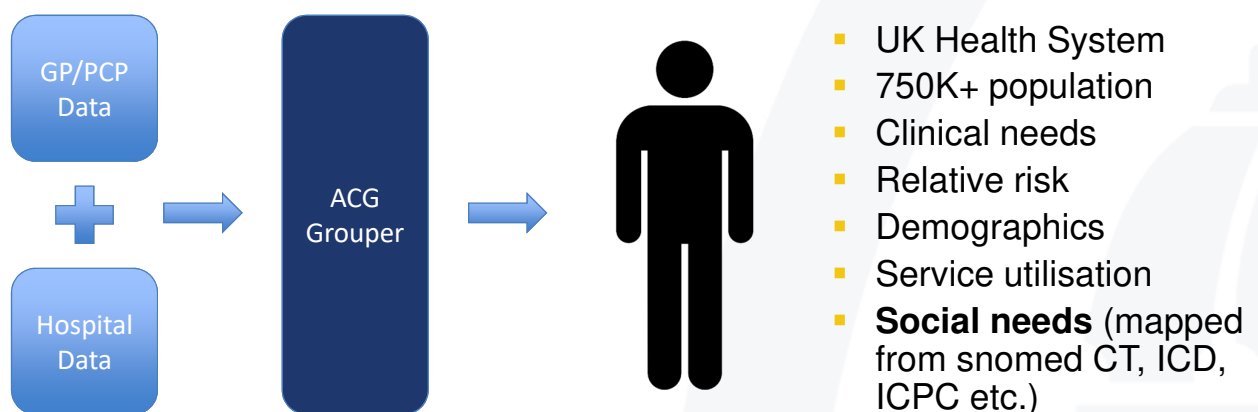


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# What can we learn about individual social needs from routinely collected healthcare data?

- Can we learn about people's social needs from healthcare data?
- To what extent are these captured?
- How do they relate to the relative deprivation of where people live, their age and their clinical position?
- What is the association with emergency hospitalisation and how might this vary depending on the type of person?
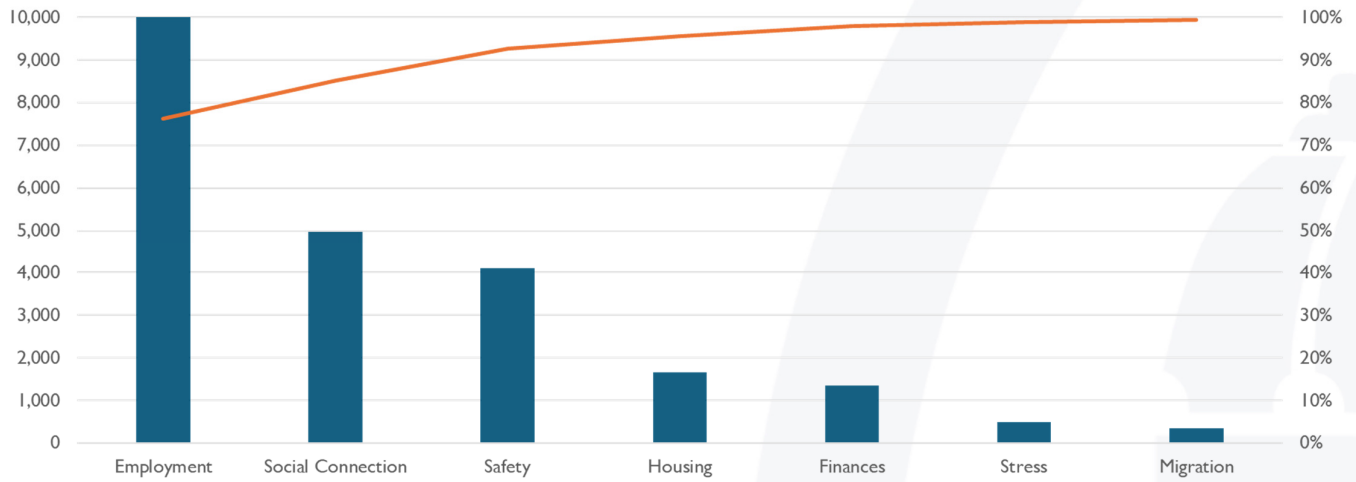
# ACG Social Needs Framework

- Social Needs Framework:
  - **Employment**
    - Not medically fit for work or unemployed
  - **Social Connection**
    - Living alone and housebound
  - **Safety**
    - Adult safeguarding, risk of domestic abuse
  - **Housing**
    - Damp/mould in house, homelessness
  - **Finances**
    - Difficulty/unable to manage personal financial activities
  - **Stress**
    - Stress at work, other problems related to life-management difficulty
  - **Migration**
    - Asylum seeker
  - **Nutrition**
    - Undernourished
  - **Education**
    - Unable to read
  - **Incarceration**
    - Recently released from prison
  - **Military**
    - Served in armed forces

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# Curating a Whole Population Dataset

GP/PCP Data + Hospital Data → ACG Grouper →

- UK Health System
- 750K+ population
- Clinical needs
- Relative risk
- Demographics
- Service utilisation
- **Social needs** (mapped from snomed CT, ICD, ICPC etc.)

## What we discovered – more social needs captured than expected
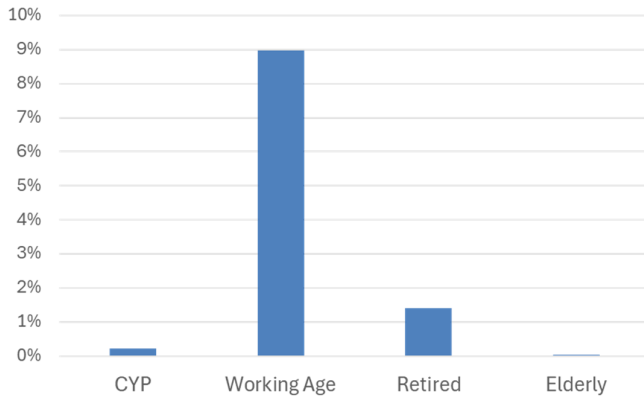


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# A focus on the impact of employment needs



- 5.5%+ of people had employment needs
- 40,937 (~95%) people identified who have had a Doctor's medical certificate in the past year
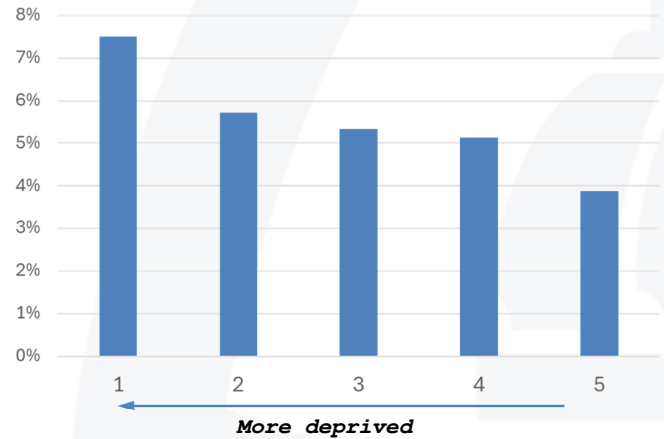
## Employment Needs and Age Group

**Highest proportion of employment needs in the working age group**



Bar chart (y-axis 0% to 10%):
- CYP: ~0.3%
- Working Age: 9%
- Retired: ~1.4%
- Elderly: ~0%

## Employment Needs and relative deprivation

**Highest proportion of employment needs in the most deprived quintile**



Bar chart (y-axis 0% to 8%):
- 1: ~7.5%
- 2: ~5.7%
- 3: ~5.3%
- 4: ~5.1%
- 5: ~3.9%

← *More deprived*

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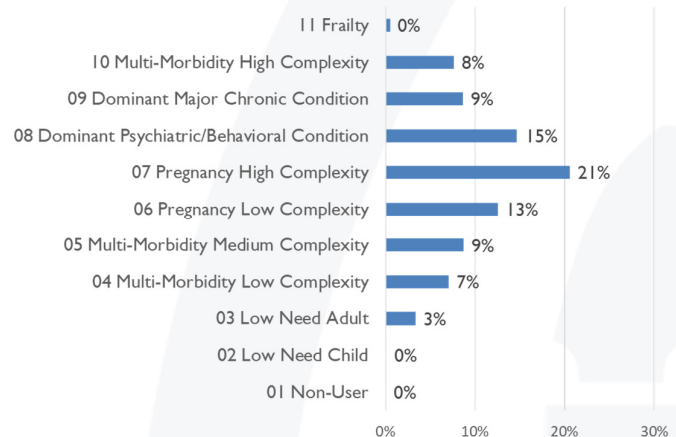# Employment needs by Patient Need Groups (PNGs)

An innovative segmentation model, applicable to all age groups and the whole population, building upon the ACG System's whole-person approach to measuring health needs.

There are **eleven mutually exclusive segments** that describe an individual's health need based on the diseases and conditions they have.
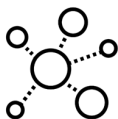
PNGs are clinically coherent and are a 'currency' that is intuitive to understand when considering the overall complexity of an individual.



Horizontal bar chart:
- 11 Frailty: 0%
- 10 Multi-Morbidity High Complexity: 8%
- 09 Dominant Major Chronic Condition: 9%
- 08 Dominant Psychiatric/Behavioral Condition: 15%
- 07 Pregnancy High Complexity: 21%
- 06 Pregnancy Low Complexity: 13%
- 05 Multi-Morbidity Medium Complexity: 9%
- 04 Multi-Morbidity Low Complexity: 7%
- 03 Low Need Adult: 3%
- 02 Low Need Child: 0%
- 01 Non-User: 0%

(x-axis: 0%, 10%, 20%, 30%)

More people use emergency services who have employment needs
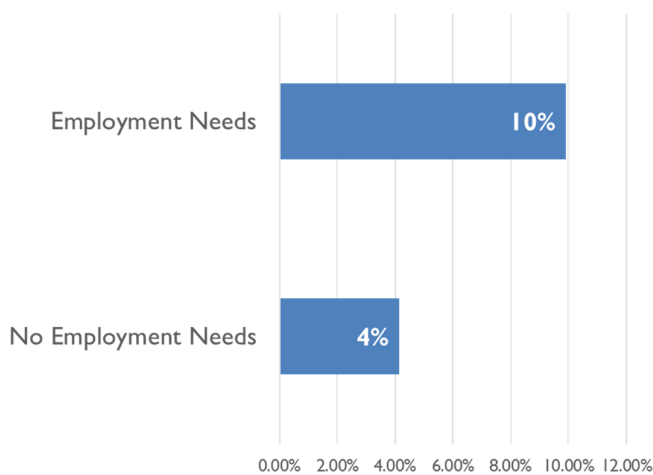


Impact of having employment needs on emergency costs
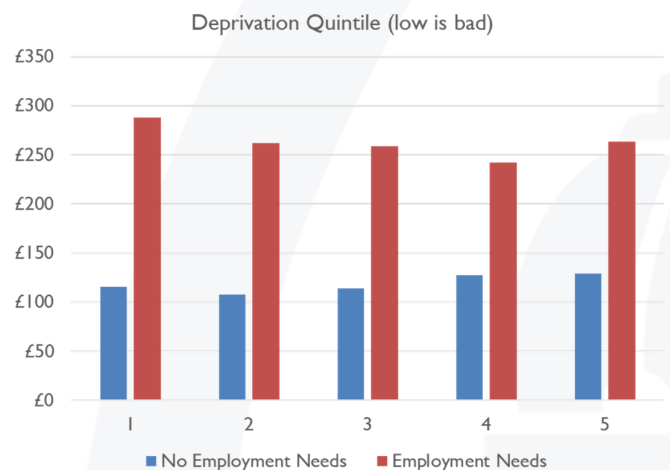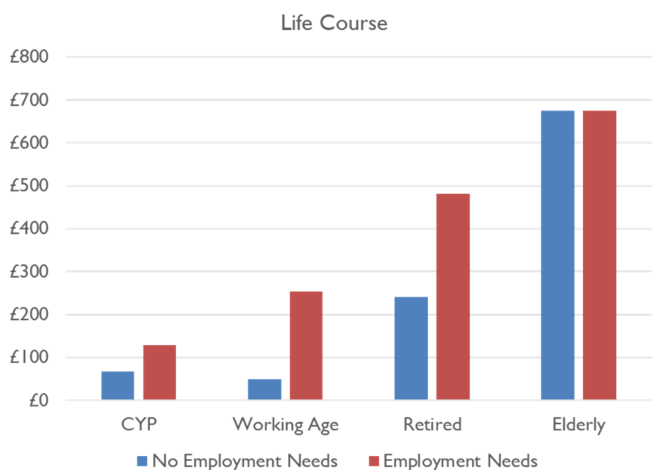
# Most deprived, working age population (n=99K)

**Patient Needs Group (PNG)**



| PNG | Employment Needs | No Employment Needs |
| --- | --- | --- |
| 10 Multi-Morbidity High Complexity | £2,645 | £1,628 |
| 09 Dominant Major Chronic Condition | £341 | £137 |
| 08 Dominant Psychiatric/Behavioral Condition | £191 | £65 |
| 07 Pregnancy High Complexity | £657 | £246 |
| 06 Pregnancy Low Complexity | £123 | £49 |
| 05 Multi-Morbidity Medium Complexity | £265 | £107 |
| 04 Multi-Morbidity Low Complexity | £69 | £28 |
| 03 Low Need Adult | £14 | £5 |

■ Employment Needs   ■ No Employment Needs
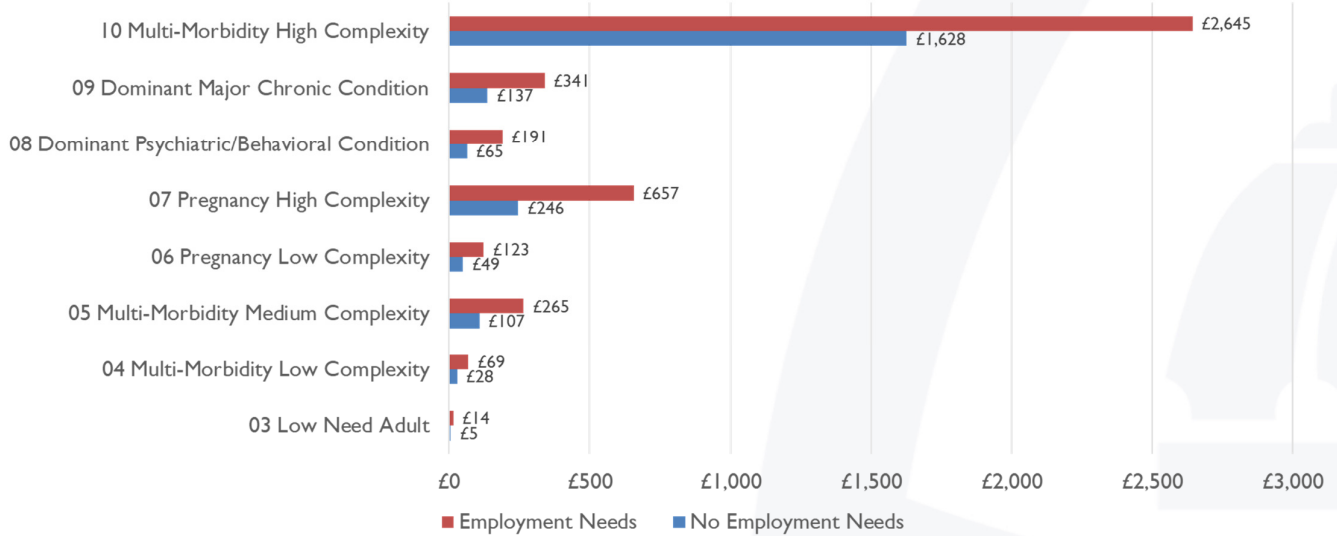
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# Isolating the effect of employment needs

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Zero hurdle model coefficients (binomial with logit link):
                                                        Estimate Std. Error z value Pr(>|z|)
(Intercept)                                            -17.24692   59.71538  -0.289    0.773
Life.CourseCYP                                           1.49172    0.02318  64.347  < 2e-16 ***
Life.CourseElderly                                       0.13873    0.02349   5.905 3.52e-09 ***
Life.CourseRetired                                      -0.08727    0.01614  -5.408 6.38e-08 ***
PatientNeedGroup02 Low Need Child                       11.92941   59.71538   0.200    0.842
PatientNeedGroup03 Low Need Adult                       11.85714   59.71539   0.199    0.843
PatientNeedGroup04 Multi-Morbidity Low Complexity       13.41643   59.71538   0.225    0.822
PatientNeedGroup05 Multi-Morbidity Medium Complexity    14.62011   59.71538   0.245    0.807
PatientNeedGroup06 Pregnancy Low Complexity             13.96449   59.71542   0.234    0.815
PatientNeedGroup07 Pregnancy High Complexity            15.47803   59.71542   0.259    0.795
PatientNeedGroup08 Dominant Psychiatric/Behavioral Condition  14.07303   59.71539   0.236    0.814
PatientNeedGroup09 Dominant Major Chronic Condition     14.67338   59.71538   0.246    0.806
PatientNeedGroup10 Multi-Morbidity High Complexity      16.48283   59.71538   0.276    0.783
PatientNeedGroup11 Frailty                              16.50878   59.71539   0.276    0.782
Local.Quintile2                                         -0.08997    0.01881  -4.783 1.73e-06 ***
Local.Quintile3                                         -0.15727    0.01893  -8.306  < 2e-16 ***
Local.Quintile4                                         -0.08219    0.01865  -4.407 1.05e-05 ***
Local.Quintile5                                         -0.01502    0.01854  -0.810    0.418
Employment                                               0.83829    0.02010  41.712  < 2e-16 ***
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Being unemployed is associated with a 130%+ increase in emergency admission costs among those with positive costs, after adjusting for age, comorbidities, and deprivation.

# Reflections

- Applications:
  - Should this feature as an important variable in case-mix adjustments?
  - Should this augment how services are planned?
  - Could this help create/curate cohort selection?
  - Is this relevant for implementation of new models of support?

# Limitations and next steps

- Limitations and future research:
  - These only represent a fraction of all social needs
  - These social needs are only relevant to the clinical consultation
  - Should we leverage more routinely collected datasets from across all the health and care assets?
  - Does this demand an integrated approach to sharing knowledge and formulating solutions?

# Conclusions

- Social needs are indeed recorded where relevant to the clinical consultation
- They are varied and represent real world challenges for people
- They have a clear and significant impact on emergency hospital utilisation
- We know they are limited in their scope

# Thank you