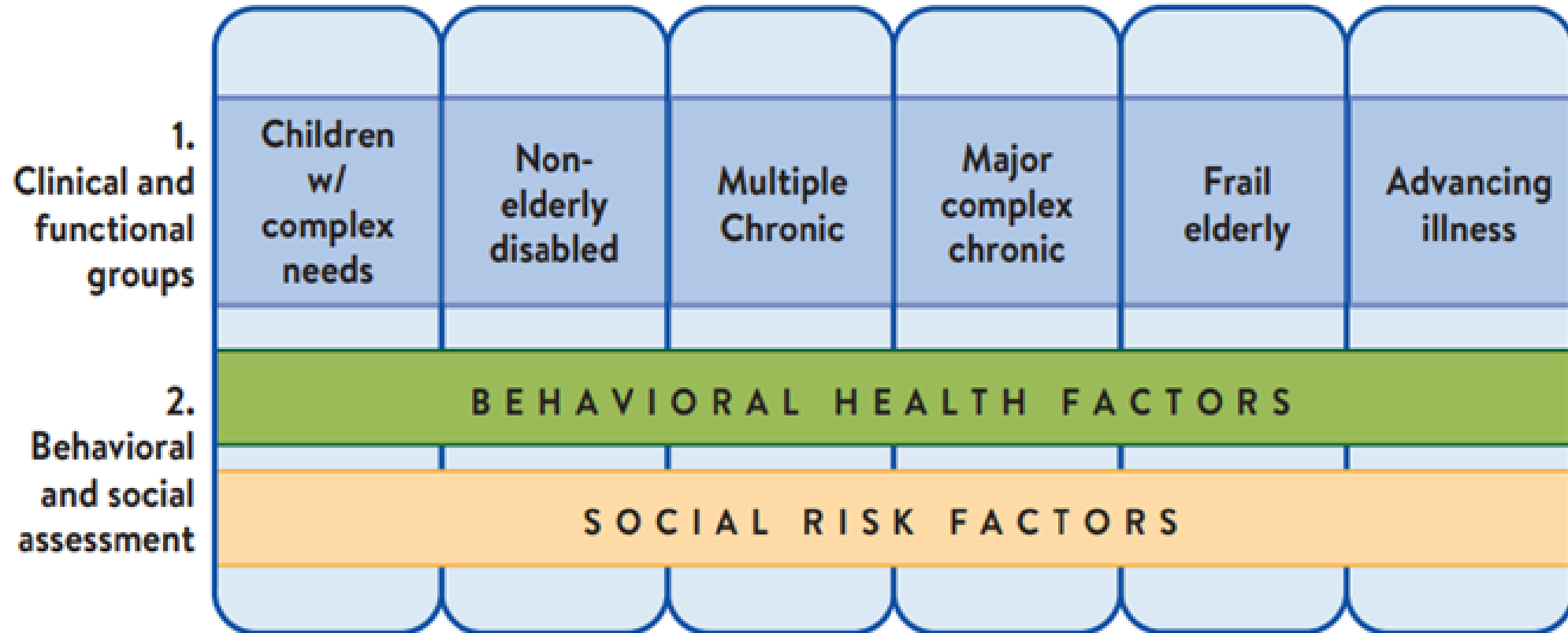JOHNS HOPKINS
M E D I C I N E

POPULATION
HEALTH ANALYTICS

Understanding Social Needs &
Social Determinants of Health
in Relation to Population Health
Management

Dr. Stephen Sutch & Paul Molyneux
ssutch1@jhu.edu   pmolyne1@jh.edu

Wednesday, 29 November 2023

1. Clinical and functional groups

| Children w/ complex needs | Non-elderly disabled | Multiple Chronic | Major complex chronic | Frail elderly | Advancing illness |

2. Behavioral and social assessment

BEHAVIORAL HEALTH FACTORS

SOCIAL RISK FACTORS
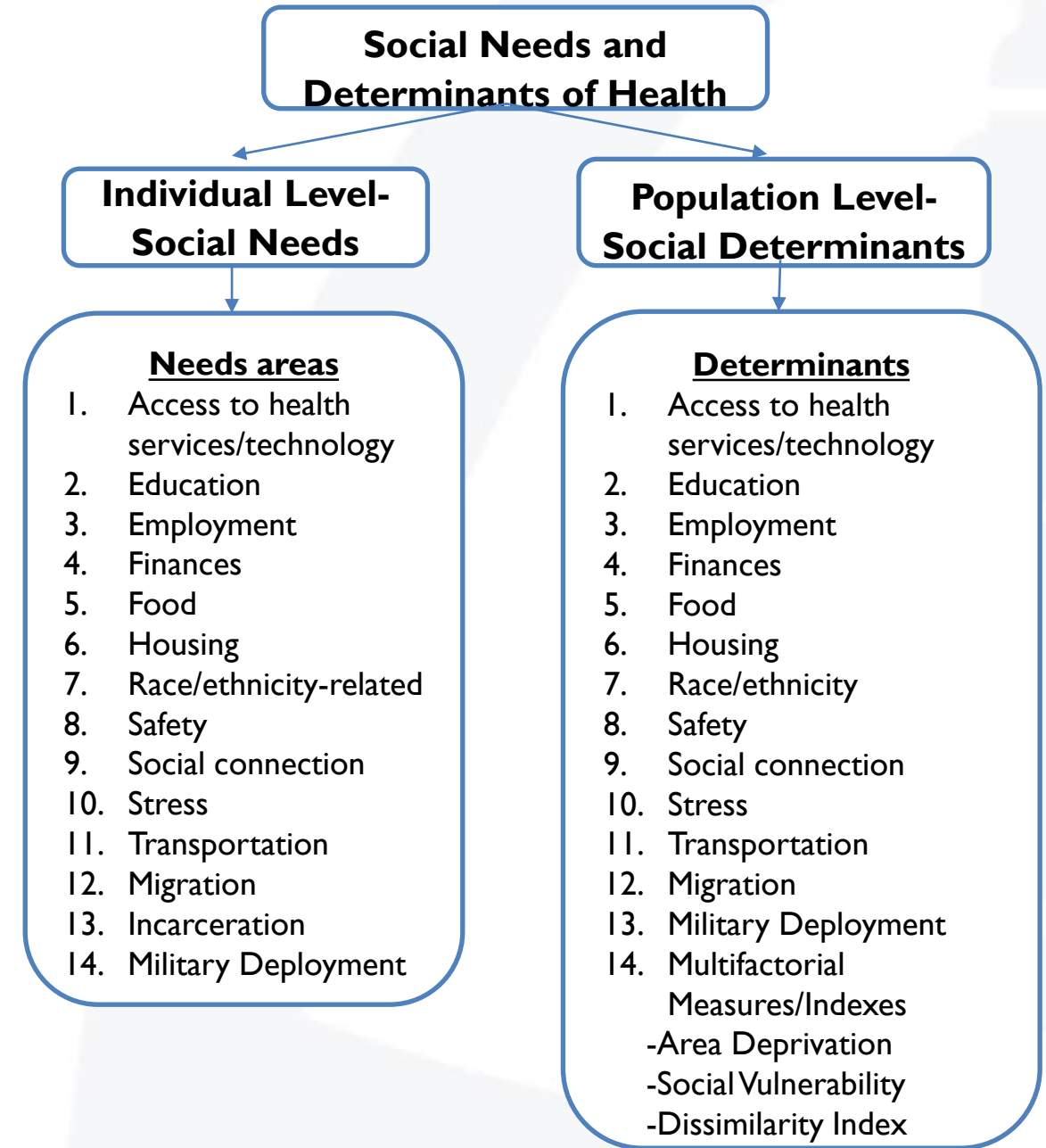
Long P, Abrams M et al. Effective Care for High-Need Patients: Opportunities for Improving Outcomes, Value, and Health. National Academy of medicine fund. 2017.https://nam.edu/HighNeeds/highNeedPatients.html

- Individual social needs
- Population determinants
- Note: Ecological fallacy
- Data recording
  - Positive recording
  - Negative recording
  - Missing data
- Data Sources
  - Health and social care records
  - Patient reported
  - Unstructured data
  - Census & Survey Data

Social Needs and Determinants of Health

Individual Level- Social Needs

Needs areas
1. Access to health services/technology
2. Education
3. Employment
4. Finances
5. Food
6. Housing
7. Race/ethnicity-related
8. Safety
9. Social connection
10. Stress
11. Transportation
12. Migration
13. Incarceration
14. Military Deployment

Population Level- Social Determinants

Determinants
1. Access to health services/technology
2. Education
3. Employment
4. Finances
5. Food
6. Housing
7. Race/ethnicity
8. Safety
9. Social connection
10. Stress
11. Transportation
12. Migration
13. Military Deployment
14. Multifactorial Measures/Indexes
    -Area Deprivation
    -Social Vulnerability
    -Dissimilarity Index

SN Marker	SN Marker Description
ECO_Employ	Employment
ECO_Finances	Finances
ECO_Nutritn	Nutrition
EDU_Educatn	Education
HCS_Access	Access to health care
PHY_Housing	Housing
SOC_Incarctn	Incarceration
SOC_Migratn	Migration
SOC_Military	Military Deployment
SOC_Race	Race/ethnicity
SOC_Safety	Safety
SOC_Connect	Social connections
SOC_Stress	Stress

Note: as of 2023, SNM provided in ACGv13 for ICD-10-CM codes only.

- Persons with potential health hazards related to socioeconomic and psychosocial circumstances (Z55-Z65)
  - Z55 Problems related to education and literacy
  - Z56 Problems related to employment and unemployment
  - Z57 Occupational exposure to risk-factors
  - Z58 Problems related to physical environment
  - Z59 Problems related to housing and economic circumstances
  - Z60 Problems related to social environment
  - Z61 Problems related to negative life events in childhood
  - Z62 Other problems related to upbringing
  - Z63 Other problems related to primary support group, including family circumstances
  - Z64 Problems related to certain psychosocial circumstances
  - Z65 Problems related to other psychosocial circumstances

- **Z59 Problems related to housing and economic circumstances**
  - Z59.0 Homelessness
  - Z59.1 Inadequate housing
    - Lack of heating, Restriction of space, Technical defects in home preventing adequate care, Unsatisfactory surroundings
  - Z59.2 Discord with neighbours, lodgers and landlord
  - Z59.3 Problems related to living in residential institution
  - Z59.4 Lack of adequate food
  - Z59.5 Extreme poverty
  - Z59.6 Low income
  - Z59.7 Insufficient social insurance and welfare support
  - Z59.8 Other problems related to housing and economic circumstances
    - Foreclosure on loan, Isolated dwelling, Problems with creditors
  - Z59.9 Problem related to housing and economic circumstances, unspecified

- **Physical Environment: Housing**
  - 71099008   Living in residence with no sanitation / 105527005 … poor sanitation
  - 105526001 Homeless family
  - 105532006 Overcrowded in house
  - 105535008 Lack of heat in house
  - 160713007 No indoor toilet
  - 160715000 House infested
  - 160752000 Eviction notice served
  - 224256005 Mould on surfaces in home / 224258006 … bedding in home
  - 224259003 Home subject to flooding
  - 224260008 Hazards in the home
  - 224271009 Lives in squalid conditions
  - 424466003 Water supply insufficient

- Hatef et el, *Assessing the Impact of Social Needs and Social Determinants of Health on Health Care Utilization.* Popul Health Manag. 2021 Apr

- *"After adjusting for other factors, patients with housing instability and homelessness (5.8%) had 49% and 34% more encounters with the health care system compared to patients without housing issues."*

- *"Patients living in the most disadvantaged neighborhoods had 55% more encounters with the health care system compared to those living in the most advantaged neighborhoods."*

- Gray et al, *Application of natural language processing to identify social needs from patient medical notes.* JAMIA Open, December 2023

- Residential instability 5.23% (0.40%), Food insecurity 14.08% (0.10%) Transportation issues 18.86% (1.9% ICD-10).

JOHNS HOPKINS
M E D I C I N E

POPULATION
HEALTH ANALYTICS

Clinical contacts:
- Primary Care Events
- Hospital Inpatient Events
- Hospital ED Events

Clinical Databases

Complete Individual Social Needs
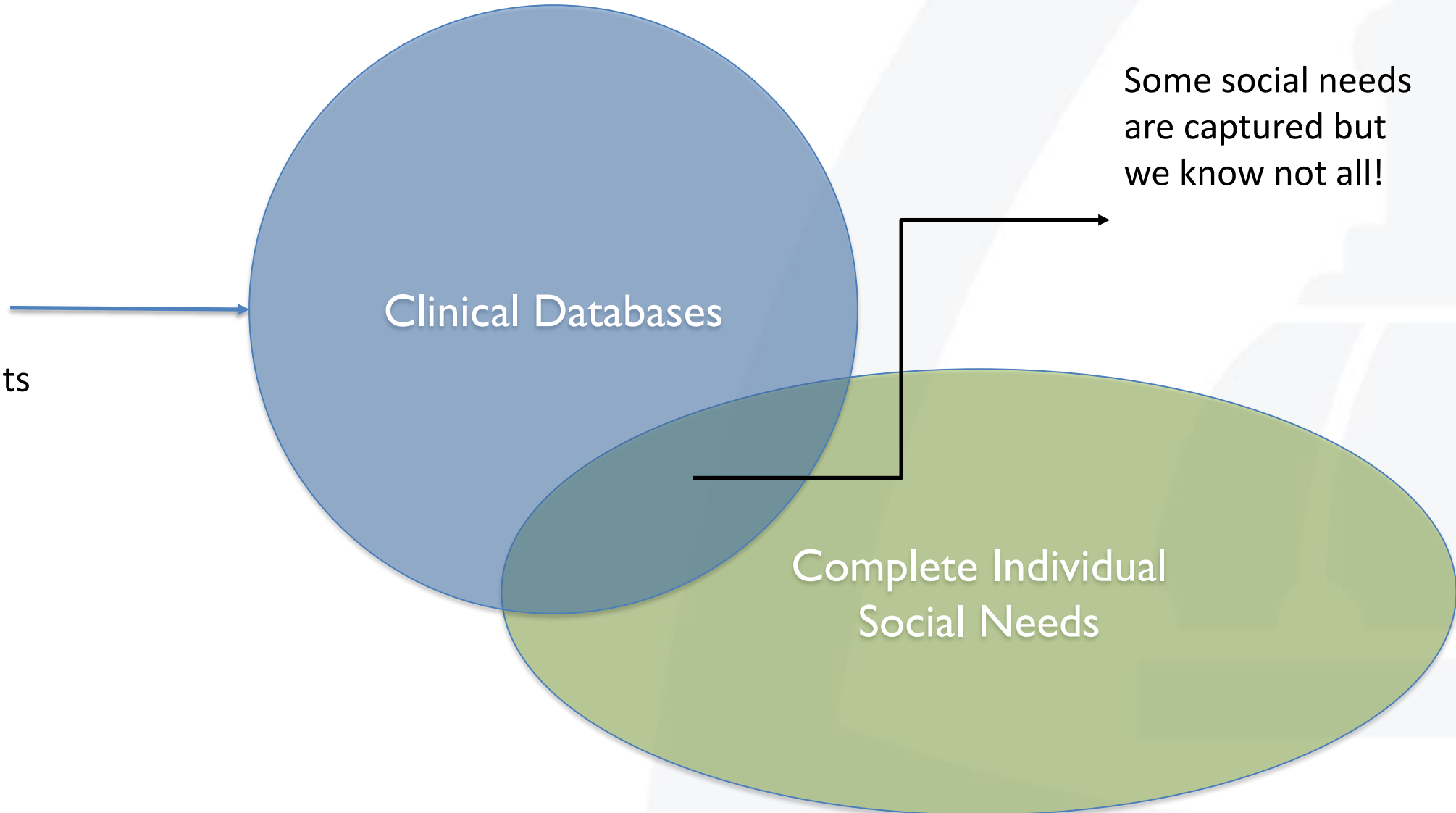
Some social needs are captured but we know not all!

Currently Used Markers

- **73438004 |** Unemployed *(0.35% of total population)*
  - *Maps to Psychosocial EDC*
- **Z738 |** Other problems related to life-management difficulty *(0.3% of total population)*
  - *SN Marker – Stress*
  - *Maps to Psychosocial EDC*

Novel Markers

- **751481000000104** | eMED3 (2010) new statement issued, not fit for work *(8.3% of total population)*
- **160689007 |** Housebound *(1.3% of total population)*
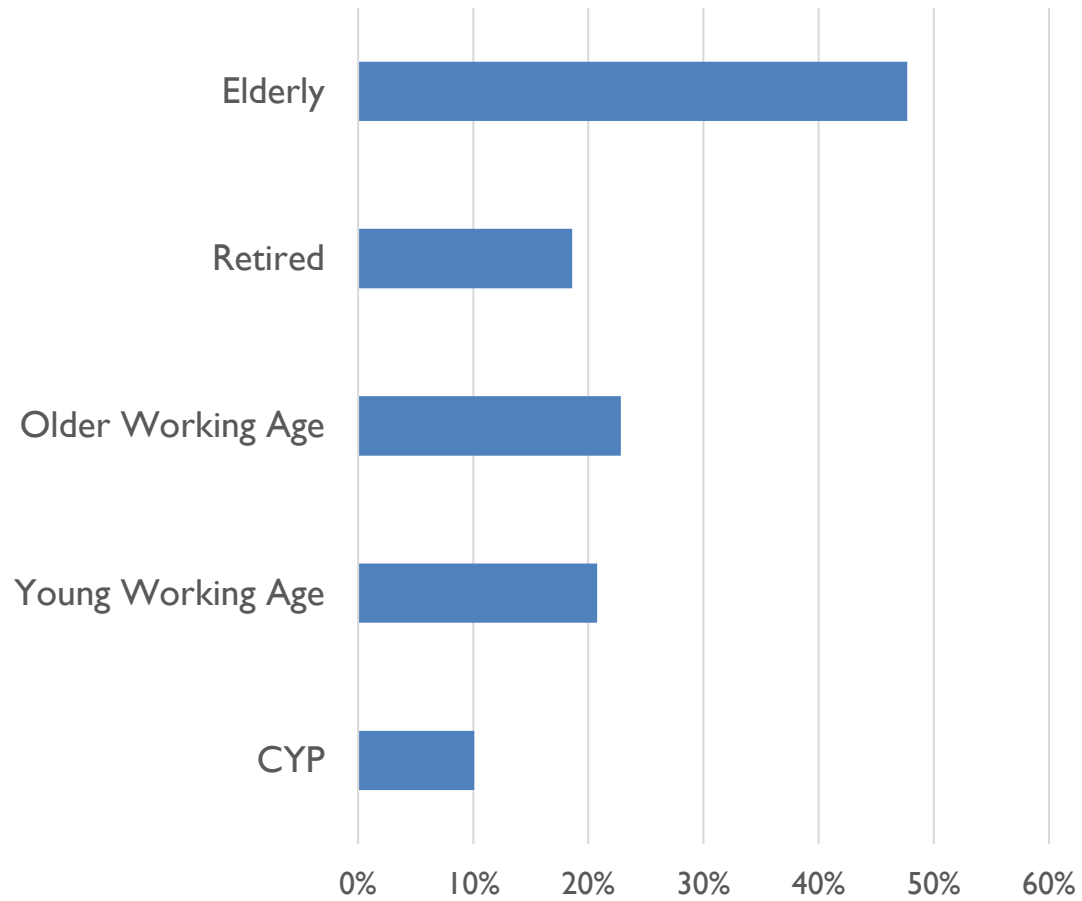
POPULATION
HEALTH ANALYTICS

JOHNS HOPKINS
M E D I C I N E
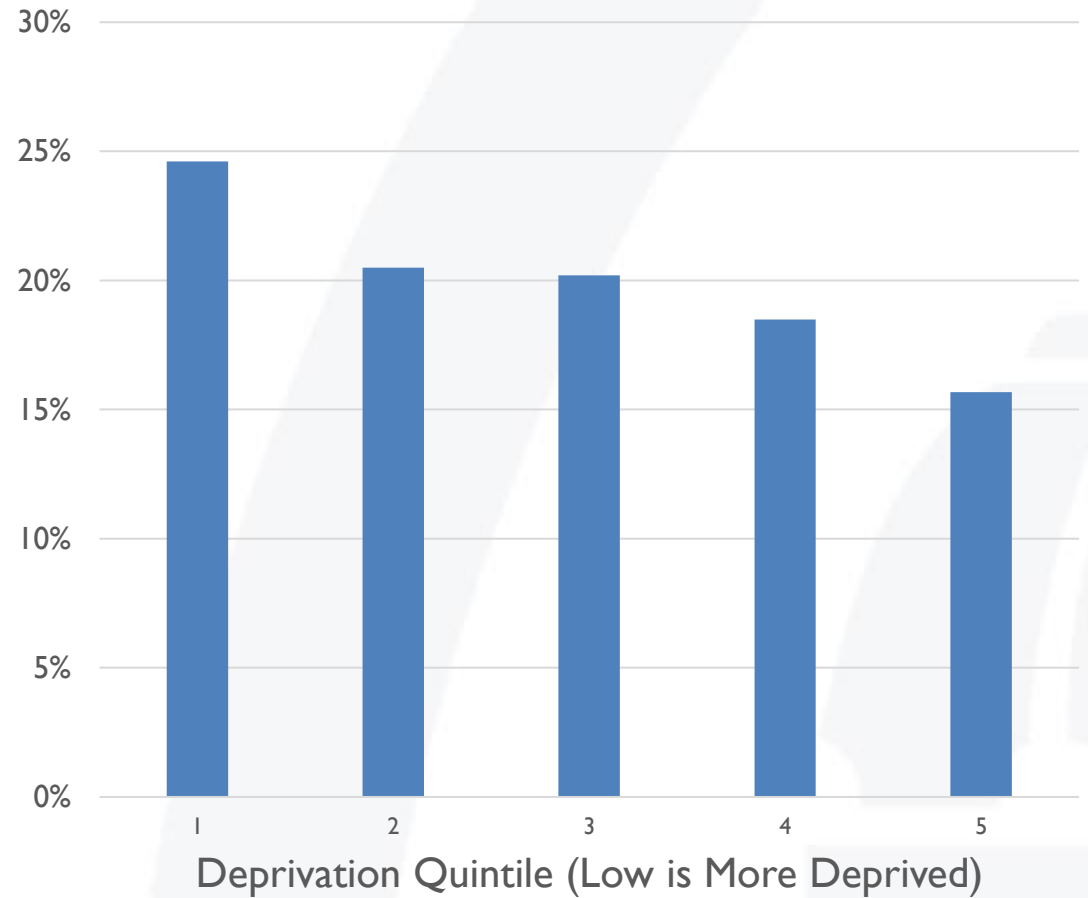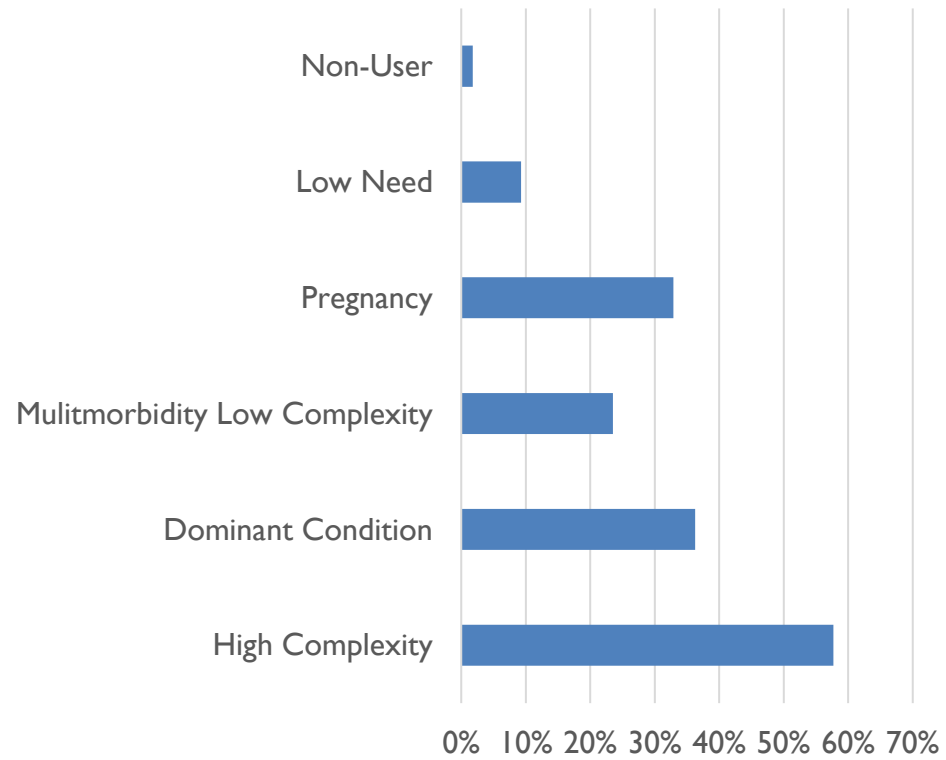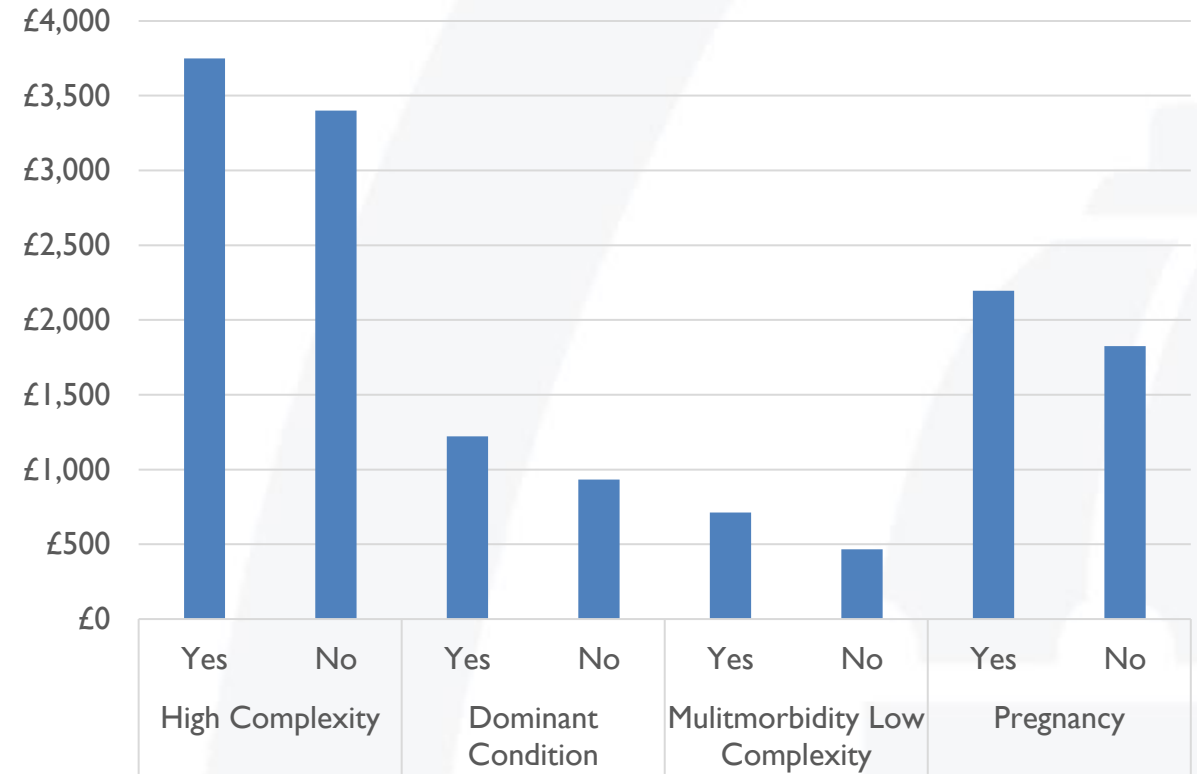
- Simple linear regression modelling controlling for:
  – Age & sex
  – Clinical position (ACG)

- Examining the effect of the presence of any social needs* <12m

- Total Cost +£135 *(<2e-16 ***)*

- Emergency Inpatient Cost +£65 *(<2e-16 ***)*

- A&E Attendance Cost +£30 *(<2e-16 ***)*

- Prescription Cost +£55 *(<2e-16 ***)*

- GP Visits +2 *(<2e-16 ***)*

*this is a working list of social need markers and results are likely to change as the list is expanded and refined

Age	60-65
GenderShort	Male
Total Cost	£2,000
PrescriptionCost	£1,100
GP Appointments	12
Patient Need Group	05 Multi-Morbidity Medium Complexity
Chronic Conditions	8
IMD	Most deprived
Rub Group	Moderate
Asthma Condition	Yes
COPD	Yes
Depression	Yes
Hypertension	Yes
Risk of Hospitalisation	High
Risk of Mortality	High
Active Ingredients	11
EFICategory	Severe

What difference would it make in how systems engage with and manage someone who also has:

- **Mould growth in home**
- **Housebound**

- Wouldn't currently recommend use for whole population analytics:
  - Case-mix adjustment
  - Whole population segmentation
  - Predictive modelling

- May have utility modifying cohorts for specialist case finding
  - Targeted intervention at complex multimorbid individuals who also are known to be out of work

- Will reveal additional needs that may be modifiable for existing cohorts
  - A proportion of our frail elderly cohort are known to be living in homes with mould

- Social needs result in extra healthcare costs – can improved integration across systems and non-medical models support people more effectively?

- Should more be captured as part of clinical contacts OR is it already available in another systems datasets?

- Should greater emphasis be placed on modifiable social needs??

- Should geographic data (SDOH) be used in addition to Individual Social Need data (especially when it is incomplete/missing)?

Thank You

Questions?

ssutch1@jhu.edu
pmolyne1@jh.edu