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# Using NILS to analyse socio-economic & demographic determinants of antibiotic prescribing patterns.

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# Outline

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- Study context: using the Northern Ireland Longitudinal Study (NILS) to meet HSC aims & policy needs
- Analysis: using linked administrative data sources i.e. NILS & NI Enhanced Prescribing Database (EPD)
- Results
- Key findings & implications

# Background

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- Antibiotic (AB) resistance major public health concern = fuelled by **inappropriate community** prescribing
- Prescribing & consumption patterns 'context-dependent' = **wide variation**
- Stewardship programmes, best-practice guidelines & awareness campaigns need to be **culturally tailored & targeted**
- Thus far ... no work on AB consumption trends in NI & shortage of suitable data to undertake population-based analysis in UK



# NI Pharmaceutical Statistics

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2009:

- 34,000,000 prescription items
- gross cost / capita = £261
- antibacterial drugs
  - number of prescriptions: 1,800,000
  - ingredient cost / prescription: £3.72

# Using Linked Data: NILS & EPD

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- Project approval:
  - relevant to HSC aims & support public policy
  - legal & ethical considerations
- NILS database:
  - c. 28% representative sample of NI population
  - core sample linked to census & administrative data
  - potential linkage to HSC data for distinct projects (based on Health & Care Number)
- EPD database:
  - electronic patient-centred record of all drugs prescribed, successfully scanned & issued to those eligible: fully functional & complete since 2008
- Database linkage & encryption methodology

**Enhanced Prescribing Database (EPD)  
Business Services Organisation (BSO)**

**Northern Ireland Longitudinal Study (NILS)  
Data at NISRA**



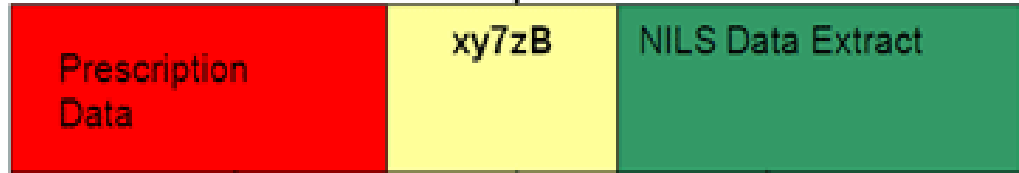
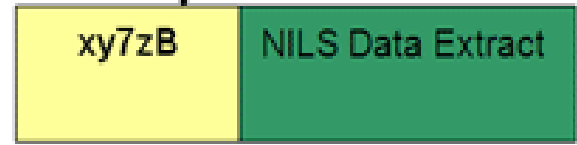
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One-way encryption

One-way encryption



Matching



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Researcher access



# Project Design

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## Aim:

- AB prescribing patterns &
  - a. **individual characteristics** (demographic, cultural & socio-economic)
  - b. **area attributes** (deprivation and settlement classifications)

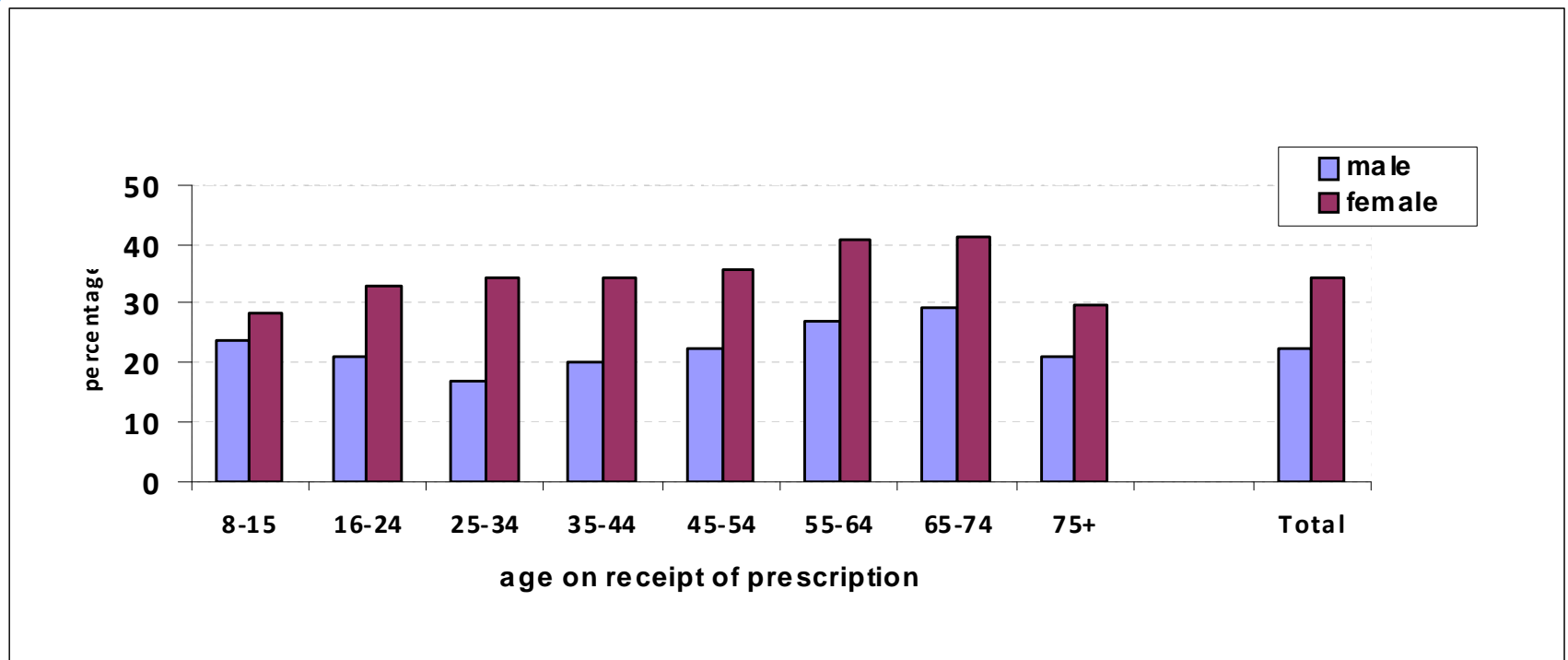
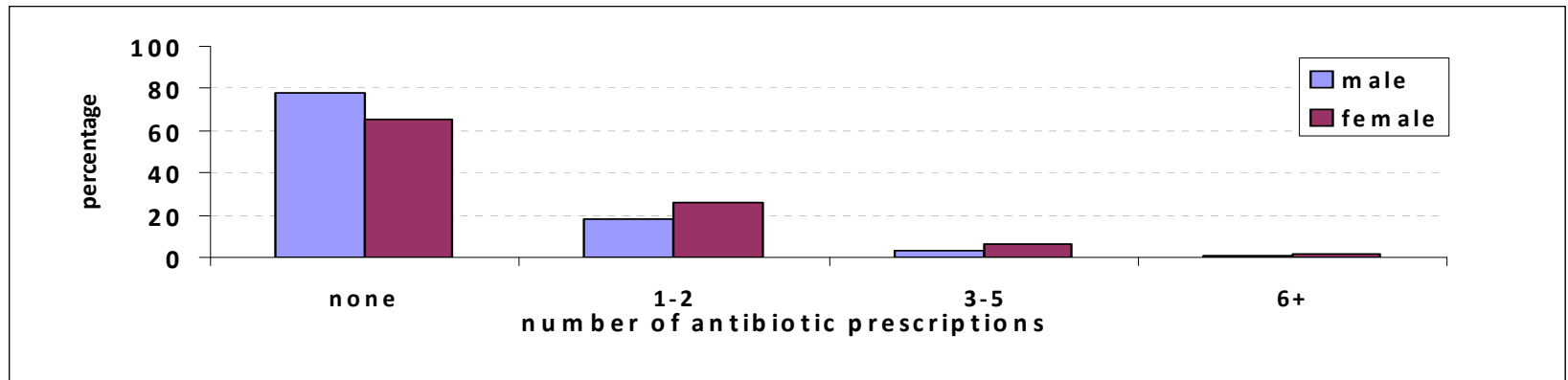
## Sample:

- AB prescription items for 12 month period ending May 2010:
  - a. 1-2 (minimal)
  - b. 3-5
  - c. 6+ (high-volume & long-term)
- linked AB data to 28% of sample (approx. **125,000** individuals)
- indicator for practices with high (**70% >**) & low scanning rates

## Methods:

Multinomial Logistic Regression (MLR) modelling framework (Stata 10) to look at relative risks (RR) of falling into an AB item grouping

# Results: Population Distribution





## Sex & Age (mutually adjusted)

All	1 to 2 Items	3 to 5 Items	6+ Items
Male	1.00	1.00	1.00
Female	1.70 ***	2.39 ***	2.53 ***
8-15	1.00	1.00	1.00
16-24	1.03 ***	1.23 ***	1.17
25-34	0.96	1.15 ***	1.33 ***
35-44	1.01	1.32 ***	1.82 ***
45-54	1.08 ***	1.54 ***	2.68 ***
55-64	1.27 ***	2.30 ***	4.96 ***
65-74	1.27 ***	2.76 ***	7.76 ***
75+	0.73 ***	1.82 ***	6.34 ***

## Marital Status & Community Background (adjusted for age, sex & SES)

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25+	1 to 2 Items	3 to 5 Items	6+ Items
Single	1.00	1.00	1.00
Married	1.23 ***	1.28 ***	1.30 ***
Separated/widowed/divorced	1.15 ***	1.25 ***	1.33 ***

All	1 to 2 Items	3 to 5 Items	6+ Items
Catholic	1.00	1.00	1.00
Protestant	0.97 ***	0.96 *	0.86 ***
Other/No	0.79 ***	0.66 ***	0.60 ***

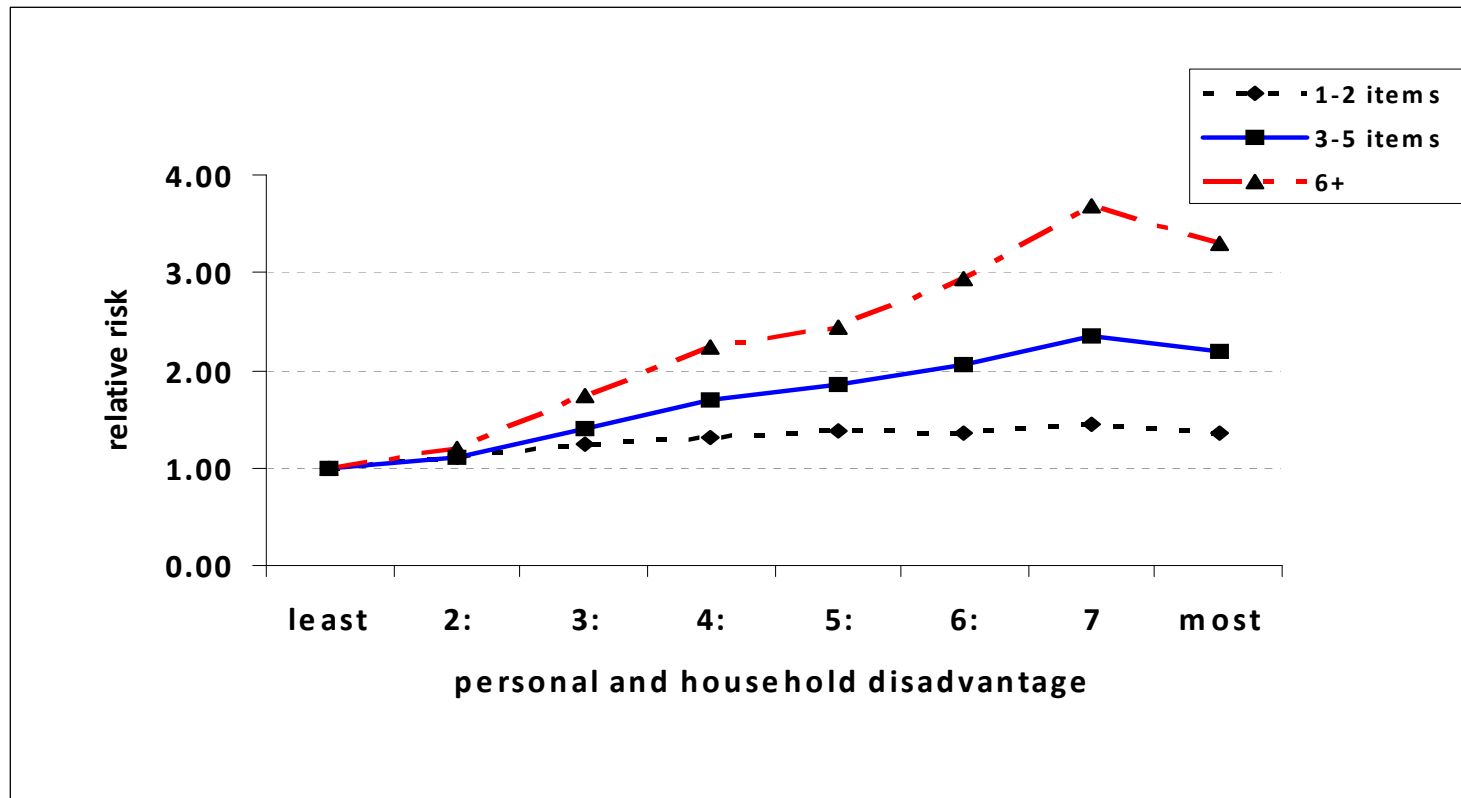
# Housing Tenure & Capital Value of Property (adjusted for age & sex)

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All	1 to 2 Items	3 to 5 Items	6+ Items
Owner Occupier > 200,000	1.00	1.00	1.00
150 - 199,999	1.10 ***	1.21 ***	1.22 ***
100 - 149,999	1.20 ***	1.31 ***	1.38 ***
75 - 99,999	1.30 ***	1.46 ***	1.56 ***
< 75,000	1.34 ***	1.60 ***	1.92 ***
Social Renter	1.37 ***	1.85 ***	2.30 ***

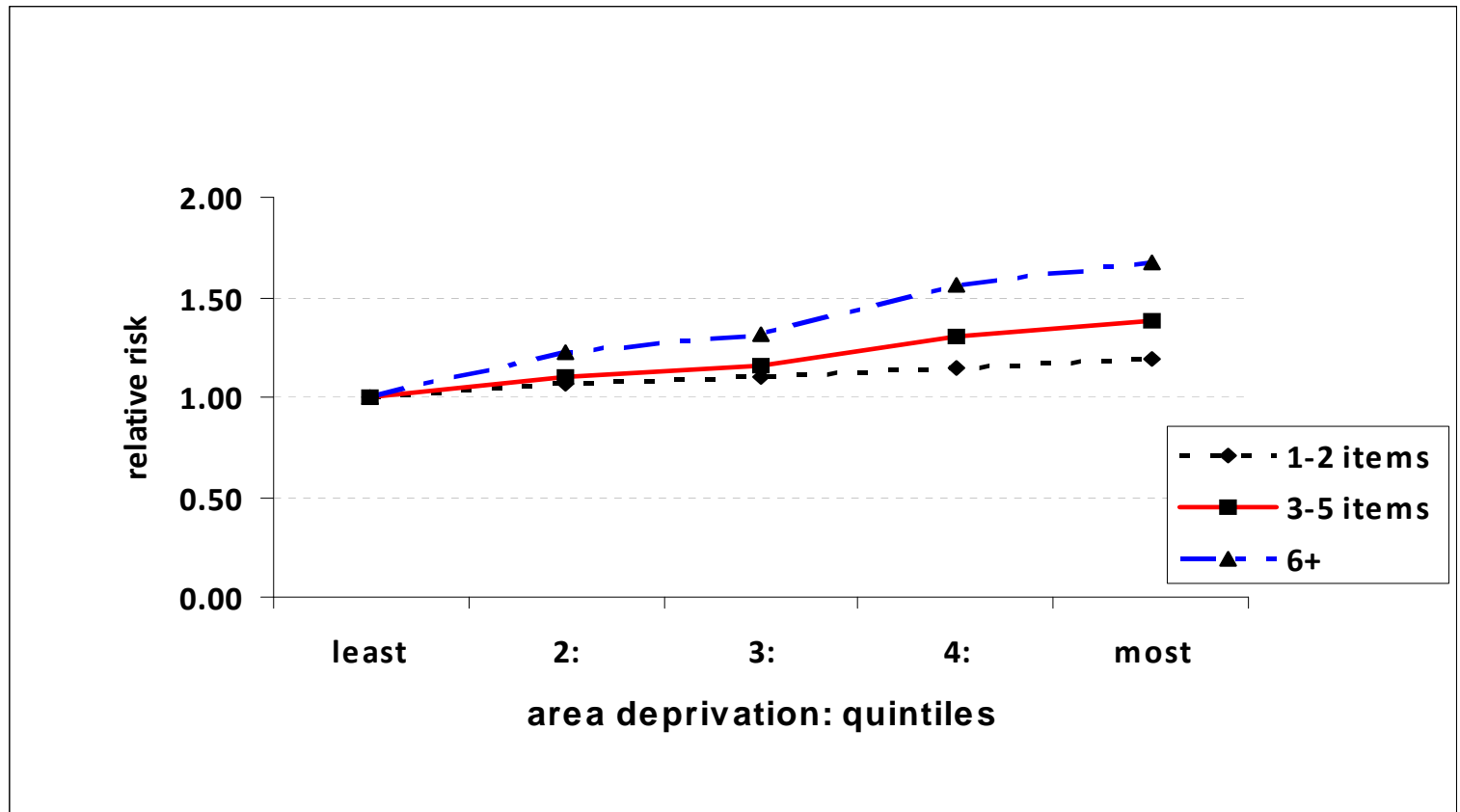
# Personal & Household Disadvantage Measure (adjusted for age & sex)

Aged 27-74 (at Census): 35-82 (age at prescription)



# Area Deprivation Measure (adjusted for age & sex)

All



# Key Findings & Implications

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## Highest risks:

- **older age groups** = longer-term health needs
- **married** = partnerships have known effects on health outcomes
- **females (all ages)** = parental/patient expectations & type of illness presenting?
- **Catholic community background** = impact of religion on attitudes to illness & authority?
- **most deprived** (accumulated wealth, area-level deprivation & personal/household disadvantage) = lack of income, education & flexibility?

***Policy Implications:*** *inform management of AB prescribing in the community: use trends to develop targeted, tailored & relevant information for practitioners & patients*

## Limitations / Future Research:

- indication / mortality data
- qualitative analysis: practitioner attitudes & patient expectations
- Census 2011 population characteristics
- more DLPs +++

# NILS DLPs

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- **HSC BSO** dental activity data:
  - adolescent dental health (PhD thesis) & child dental health & use of dental care services (ongoing)
- **HSC BSO** prescribing data:
  - pharmaco-epidemiological studies of characteristics related to; anxiolytic and anti-depressants (pending) diabetes (pending) & anti-obesity medication (approved)
  - antidepressant use among women of reproductive age (submitted for approval)
  - antidepressant use among carers (submitted for approval)
- **QARC** breast screening data: variations in breast screening uptake (PhD thesis & 2 peer-reviewed papers published)
- **SOSCARE** social services admin data: children & families with long term & complex needs (approved)
- **Child Health System** data (gestational age, smoking status & birth weight): lone mothers & socio-economic characteristics (pending)
- **Northern Ireland Cancer Registry** data: individual, household & area level deprivation & cancer incidence & survival (approved)



# Acknowledgements

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**The authors alone are responsible for the interpretation of the data.**





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## Sex & Age (mutually adjusted)

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All	1 to 2 Items	3 to 5 Items	6+ Items
Male	1.00	1.00	1.00
Female	1.70 (1.68, 1.73)	2.39 (2.32, 2.47)	2.53 (2.38, 2.69)
8-15	1.00	1.00	1.00
16-24	1.03 (1.01, 1.06)	1.23 (1.16, 1.32)	1.17 (0.97, 1.41)
25-34	0.96 (0.93, 0.99)	1.15 (1.07, 1.23)	1.33 (1.11, 1.60)
35-44	1.01 (0.98, 1.04)	1.32 (1.23, 1.40)	1.82 (1.54, 2.16)
45-54	1.08 (1.05, 1.11)	1.54 (1.45, 1.64)	2.68 (2.27, 3.15)
55-64	1.27 (1.23, 1.31)	2.30 (2.17, 2.45)	4.96 (4.24, 5.81)
65-74	1.27 (1.23, 1.31)	2.76 (2.59, 2.94)	7.76 (6.65, 9.06)
75+	0.73 (0.71, 0.75)	1.82 (1.71, 1.94)	6.34 (5.44, 7.39)

## Marital Status & Community Background (adjusted for age, sex & SES)

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17+	1 to 2 Items	3 to 5 Items	6+ Items
Single	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
Married	1.23 (1.20, 1.27)	1.28 (1.22, 1.34)	1.30 (1.18, 1.43)
Separated/widowed/divorced	1.15 (1.11, 1.18)	1.25 (1.18, 1.33)	1.33 (1.20, 1.48)

All	1 to 2 Items	3 to 5 Items	6+ Items
Catholic	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
Protestant	0.97 (0.96, 0.99)	0.96 (0.94, 0.99)	0.86 (0.81, 0.91)
Other	0.79 (0.75, 0.83)	0.66 (0.59, 0.74)	0.60 (0.46, 0.78)

## Housing Tenure & Capital Value of Property (adjusted for age & sex)

---

All	1 to 2 Items	3 to 5 Items	6+ Items
Owner Occupier > 200,000	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
150 - 199,999	1.10 (1.07, 1.14)	1.21 (1.14, 1.30)	1.22 (1.06, 1.41)
100 - 149,999	1.20 (1.16, 1.23)	1.31 (1.24, 1.39)	1.38 (1.22, 1.57)
75 - 99,999	1.30 (1.26, 1.34)	1.46 (1.37, 1.56)	1.56 (1.37, 1.76)
< 75,000	1.34 (1.29, 1.38)	1.60 (1.49, 1.70)	1.92 (1.68, 2.19)
Social Renter	1.37 (1.33, 1.41)	1.85 (1.74, 1.96)	2.30 (2.04, 2.61)