# Outcomes across the asthma care pathway in primary care by socioeconomic status: an East London population-based study

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## Introduction

About 5.4 million receive active treatment for asthma in UK.
Socioeconomic status (SES) has previously been linked to asthma prevalence (Gupta et al., 2018)
and outcomes (Gupta et al., 2018, Alsallakh et al., 2021) in the UK.

## Dataset

A retrospective open cohort of asthma patients from 2010 to 2019 using patient-level primary care records from three East London CCGs: Tower Hamlets, City & Hackney and Newham.

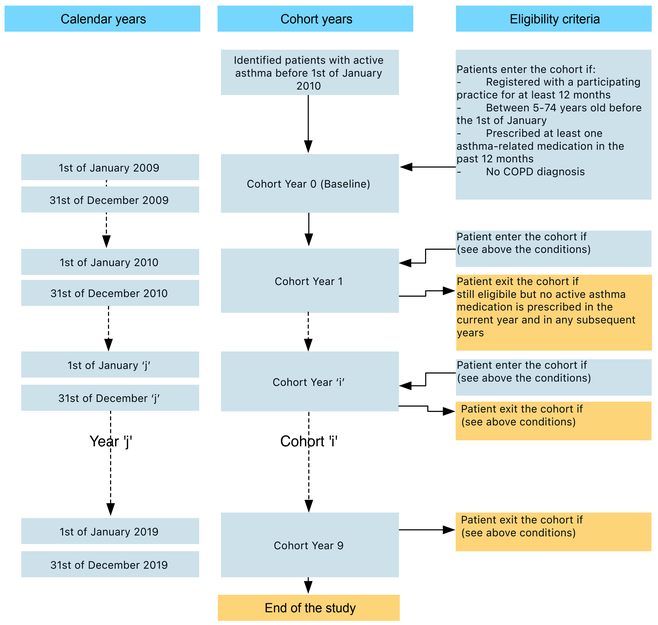
- Among the most socially deprived localities in Britain (Office for National Statistics, 2013).
- More than 139 ethnically diverse general practices (with over-represented Black or South Asian ethnicities).

Extract complete information on:

- All contacts with primary care services,
- READ and other diagnoses codes;
- Records of medications and diagnostics from 01/01/2008 onwards.

- 69,237 patients (51,536 adults and 17,701 children)

Figure 1. The selection of asthma patients into the open cohort




Source: Authors' contribution

## Methods

Multivariate regressions were used to model the relationships between the tertiles of SES and

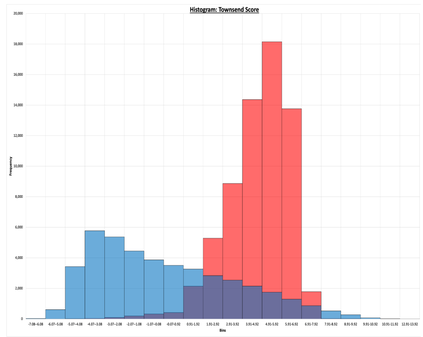
- "Care outcomes" (annual asthma review, asthma management plan, inhaler technique, excessive prescriptions of reliever and preventer inhalers), and
- "Asthma clinical outcomes" (asthma severity, asthma control (RCP3Q).

Tests for longitudinal trends were reported.

Table 1. Outcomes, variables and the methodology used

| Outcome | Variable | Source of Data | Model type | Covariate adjustment |
|---|---|---|---|---|
| Asthma Review | Binary | Asthma Review Indicator | Multilevel (mixed-effects) logit model | Socio-demographic in current year + comorbidities in previous year + risk factors in current year+ BTS/SIGN severity in previous year. |
| Asthma management plan | Binary | Filled in during asthma reviews | Multilevel (mixed-effects) logit model | (same as above) * |
| Inhaler technique | Categorical | As measured in asthma reviews | Multinomial logistic regression | (same as above) * |
| Overprescribed SABAs | Binary | Prescription data | Multilevel (mixed-effects) logit model | (same as above) * |
| Under-prescribed ICS inhalers | Binary | Prescription data | Multilevel (mixed-effects) logit model | (same as above) |
| Asthma Severity Steps | Categorical (1-5) | Prescription data | Multinomial logistic regression | (same as above) |
| Asthma Control (RCP3Q) | Categorical | As measured in asthma reviews | Multinomial logistic regression | (same as above) * |

Figure 2. The comparative distribution of the deprivation index in the UK general population (in BLUE) and in study cohort (in RED)




## Results

Adults in the most deprived tertile were:

- more likely to have an asthma review (odds ratio [OR]: 1.05 [1.02,1.08], trend p-value<0.01)
- suboptimal asthma control (relative risk ratio [RRR]: 1.19, trend p-value<0.01),
- over-prescribed SABAs (OR: 1.34 [1.24,1.46], trend p-value<0.01).

Poorer inhaler technique increased with deprivation in:

- Children (RRR: 2.08, trend p-value<0.01), and
- Adults (RRR: 2.09, trend p-value<0.01).

The other trends for children or adults were not statistically significant (or, in the case of asthma severity, indiscernible).

## Conclusion

Evidence of gradients across SES for several asthma management outcomes was observed. While asthma reviews appeared to reach more disadvantaged categories, they did not 'translate' into similar abilities to manage and control asthma. Targeting these outcomes among the socio-economically disadvantaged may reduce health inequalities.

Table 2. Results by outcomes for adults and children

| Care outcomes | Adults Base case | Children Base case |
|---|---|---|
| Asthma review OR [95% CI] | N=275,035 | N=67,554 |
| Socioeconomic deprivation (Tertile 1 ref.) | | |
| Tertile 2 | 1.04* [1.02,1.07] | 0.97 [0.92,1.02] |
| Tertile 3 | 1.05* [1.02,1.08] | 1.00 [0.94,1.06] |
| Test for trend across tertiles | p<0.01 | p=0.95 |
| Asthma Management Plan OR [95% CI] | N=170,332 | N=40,753 |
| Socioeconomic deprivation (Tertile 1 ref.) | | |
| Tertile 2 | 1.00 [0.97,1.03] | 0.98 [0.92,1.05] |
| Tertile 3 | 1.00 [0.96,1.03] | 1.03 [0.96,1.11] |
| Test for trend across tertiles | p=0.89 | p=0.34 |
| Overprescribed SABAs OR [95% CI] | N=275,035 | N=67,554 |
| Socioeconomic deprivation (Tertile 1 ref.) | | |
| Tertile 2 | 1.21* [1.12,1.30] | 1.02 [0.88,1.18] |
| Tertile 3 | 1.34* [1.24,1.46] | 1.06 [0.91,1.24] |
| Test for trend across tertiles | p<0.01 | p=0.45 |
| Under-prescribed ICS OR [95% CI] | N=275,035 | N=67,554 |
| Socioeconomic deprivation (Tertile 1 ref.) | | |
| Tertile 2 | 1.01 [0.97,1.06] | 1.03 [0.96,1.11] |
| Tertile 3 | 1.01 [0.97,1.06] | 1.04 [0.97,1.12] |
| Test for trend across tertiles | p=0.61 | p=0.29 |
| Checked RCP3Q OR [95% CI] | N=170,322 | N=40,753 |
| Socioeconomic deprivation (Tertile 1 ref.) | | |
| Tertile 2 | 0.974 [0.92,1.02] | 0.93 [0.84,1.03] |
| Tertile 3 | 1.02 [0.96,1.08] | 0.973 [0.87,1.09] |
| Test for trend across tertiles | p=0.45 | p=0.70 |
| Checked Inhaler Technique OR [95% CI] | N=170,332 | N=40,753 |
| Socioeconomic deprivation (Tertile 1 ref.) | | |
| Tertile 2 | 1.00 [0.97,1.03] | 0.94 [0.88,1.01] |
| Tertile 3 | 1.02 [0.98,1.06] | 0.97 [0.90,1.04] |
| Test for trend across tertiles | p=0.33 | p=0.44 |

| Inhaler Technique** RRR (se) | Poor | Moderate | Missing or not known | Poor | Moderate | Missing or not known |
|---|---|---|---|---|---|---|
| | N=170,332 | | | N=40,753 | | |
| Socioeconomic deprivation (Tertile 1 ref.) | | | | | | |
| Tertile 2 | 1.43* | 1.14* | 1.13* | 1.42* | 0.96 | 1.15* |
| | (0.08) | (0.03) | (0.02) | (0.18) | (0.05) | (0.04) |
| Tertile 3 | 2.09* | 1.36* | 1.14* | 2.08* | 0.94 | 1.05 |
| | (0.11) | (0.04) | (0.02) | (0.24) | (0.05) | (0.03) |
| Test for trend across tertiles | p<0.01 | p<0.01 | p<0.01 | p<0.01 | p=0.25 | p=0.19 |

| Asthma disease outcomes | Adults Base case | | | | | Children Base case | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| BTS/SIGN Severity** RRR (se) | Step 1 | Step 3 | Step 4 | Step 5 | Missing or not known | Step 1 | Step 3 | Step 4 | Step 5 | Missing or not known |
| | *N=275,035* | | | | | *N=67,554* | | | | |
| Socioeconomic deprivation (Tertile 1 ref.) | | | | | | | | | | |
| Tertile 2 | 1.03 | 0.91* | 1.03 | 1.07* | 0.95* | 1.05 | 0.91 | 1.42* | 1.12 | 0.98 |
| | (0.02) | (0.02) | (0.03) | (0.03) | (0.02) | (0.03) | (0.05) | (0.12) | (0.10) | (0.03) |
| Tertile 3 | 1.02 | 0.90* | 1.06* | 1.07* | 0.93* | 1.04 | 0.92 | 1.29* | 1.11 | 0.96 |
| | (0.02) | (0.02) | (0.03) | (0.03) | (0.02) | (0.03) | (0.05) | (0.11) | (0.10) | (0.03) |
| Test for trend across tertiles | p=0.30 | p<0.01 | p=0.02 | p=0.03 | p<0.01 | p=0.18 | p=0.11 | p<0.01 | p=0.27 | p=0.28 |

| RCP3Q*** RRR (se) | Suboptimal | Missing or not known | Suboptimal | Missing or not known |
|---|---|---|---|---|
| | *N=170,322* | | *N=40,753* | |
| Socioeconomic deprivation (Tertile 1 ref.) | | | | |
| Tertile 2 | 1.12* | 1.21* | 1.07* | 1.17* |
| | (0.02) | (0.03) | (0.04) | (0.06) |
| Tertile 3 | 1.19* (0.02) | 1.20* (0.03) | 1.06 (0.04) | 1.08 (0.06) |
| Test for trend across tertiles | p<0.01 | p<0.01 | p=0.10 | p=0.18 |

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