

BRIEF COMMUNICATION

Associated social factors of prevalent asthma in adults and the very old in the UK

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Abstract

Social determinants of asthma in adults and the very old have received little attention. Hence, it was aimed to examine social determinants of asthma in adults and the very old in a national population-based setting. Data were analyzed in the UK Longitudinal Household Survey, 2009–2010. Information on demographics, living and work conditions, self-reported ever asthma and age of onset was obtained by household interview. Regional difference was also examined. Analysis involved t-test and logistic regression modeling. Of 50 994 people included in the cohort, 6269 (12.3%) had ever asthma. In 2977 people, it occurred in the adulthood (16+ years) and only 91 people had their first asthma (incident asthma) at the age when they were interviewed. Education was borderline associated with asthma in the very old. In the young and middle-aged adults, however, birth place had a significant impact. Additionally, there was no regional difference in asthma prevalence across the entire UK.

Social determinants of asthma in adults have received little attention, and measures of them were not addressed comprehensively, in particular in the very old. Hence, it was aimed to examine social determinants of asthma in adults and the very old in a national population-based setting.

Methods

Study cohort

Data were extracted and analyzed in the UK Longitudinal Household Survey (Understanding Society, access available via: <http://www.understandingsociety.org.uk/>) Wave 1, 2009–2010, which is a national population-based study among people above 16 years of age residing in England, Scotland, Wales, and Northern Ireland. Study design and sampling method were described and published in detail in the working paper series and can be found online (1). Information on demographics, living and work conditions, and self-reported asthma (Has a doctor or health professional ever told you that you have any of the condition listed? What age were you when you were first told you had asthma?) was obtained by household interview.

Statistical analysis

Study variables which aimed to describe potential social determinants of asthma in adults in the UK included age, sex, birth place, age gap with parents (proxy of maternal age), education, marital status, salary (proxy of occupation), and willingness to stay in the current neighborhood (proxy of perception on neighborhood satisfaction). Likert scale was used (very agree and agree into 'agree'; 'neither agree nor disagree, disagree, and very disagree into 'disagree'). In the subsequent analysis, regional difference in adult asthma was examined.

Analyses involved chi-squared test, t-test, and logistic regression modeling. Adjustments were also made to control for covariates mentioned previously and age of onset (binary: 0 = ex-asthma, 1 = new onset asthma). Effects were estimated by using odds ratios (OR) and 95% confidence intervals (CI), with $P < 0.05$ considered statistically significant. Statistical software STATA version 12.0 (STATA, College Station, TX, USA) was used to perform all the analyses. As it is secondary data analysis in the present study, no further ethics approval is required.

Table 1 Characteristics of people with or without ever asthma in adults aged 16 and above

	Asthma (<i>n</i> = 6269, 13.2%)	Nonasthma (<i>N</i> = 41 336, 86.8%)	<i>P</i> value
Sex			
Male	2618 (41.8%)	18 357 (44.4%)	0.132
Female	3651 (58.2%)	22 979 (55.6%)	
Age (mean ± SD)	43.3 ± 18.3	46.3 ± 18.1	
16–39	2939 (46.9%)	16 231 (39.3%)	<0.001
40–59	1960 (31.3%)	14 328 (34.7%)	
60–79	1172 (18.7%)	9201 (22.3%)	
≥ 80	198 (3.2%)	1576 (3.8%)	
Birth place			
Born in England	4569 (72.9%)	26 682 (64.5%)	<0.001
Born in Scotland	462 (7.4%)	2944 (7.1%)	
Born in Wales	329 (5.2%)	1716 (4.2%)	
Born in Northern Ireland	206 (3.3%)	1718 (4.2%)	
Not born in the UK	703 (11.2%)	8269 (20.0%)	
Education			
≥ high school	2429 (38.7%)	24 845 (60.1%)	0.113
<high school	3835 (61.2%)	16 446 (39.9%)	
Marital status			
Never married	2370 (37%)	12 552 (30.4%)	<0.001
Married	2710 (43.2%)	21 396 (51.8%)	
Not living together	1185 (18.9%)	7351 (17.8%)	
Salary			
<£20 000	2291 (36.5%)	14 504 (35.1%)	0.085
£20 000–49 999	247 (3.9%)	1863 (4.5%)	
£50 000–99 999	52 (0.8%)	362 (0.9%)	
≥ £100 000	8 (0.1%)	64 (0.2%)	
Mother's age			
16–39	314 (5.0%)	2862 (6.9%)	<0.001
40–59	1549 (24.7%)	10 505 (25.4%)	
60–79	1299 (20.7%)	6801 (16.5%)	
≥ 80	40 (0.6%)	115 (0.3%)	
Father's age			
16–39	239 (3.8%)	1688 (4.1%)	<0.001
40–59	1402 (22.4%)	9044 (21.9%)	
60–79	1096 (17.5%)	5276 (12.8%)	
≥ 80	26 (0.4%)	86 (0.2%)	
Age gap with mother's			
10–19	276 (4.4%)	1636 (4.0%)	0.415
20–29	2126 (33.9%)	13 417 (32.5%)	
≥ 30	800 (13.2%)	5230 (12.7%)	
Age gap with father's			
10–19	76 (1.2%)	416 (1.0%)	0.290
20–29	1556 (24.8%)	8837 (21.4%)	
≥ 30	1131 (18.0%)	6841 (16.5%)	
Neighborhood satisfaction			
Strongly agree	1156 (18.4%)	7525 (18.2%)	<0.001
Agree	2146 (34.2%)	15 050 (36.4%)	
Neither agree or disagree	1034 (16.5%)	6342 (15.3%)	
Disagree	603 (9.6%)	3224 (7.8%)	
Strongly disagree	375 (6.0%)	1690 (4.1%)	

Table 1 (continued)

	Asthma (<i>n</i> = 6269, 13.2%)	Nonasthma (<i>N</i> = 41 336, 86.8%)	<i>P</i> value
Work location			
At home	50 (0.8%)	412 (1.0%)	0.332
At the employer's premises	2158 (34.4%)	13 796 (33.4%)	
Driving or traveling	222 (3.5%)	1437 (3.5%)	
At more than one location	192 (3.1%)	1190 (2.9%)	
Other	9 (0.1%)	89 (0.2%)	

Results

There were 6269 people who ever had asthma in the study cohort, which was about 12.3% of the total study population (*n* = 50 994). Among those who ever had asthma, 4651 (72.8%) people still had asthma at the time of household interview and 2977 (47.5%) asthma diagnoses occurred in the adulthood (16+ years). Only 91 people had their first asthma (incident asthma) at the age when they were interviewed. Table 1 presents characteristics of participants with or without prevalent asthma.

Table 2 shows associated social factors for prevalent adult asthma across age groups. In the very old (age >80 year), less education was borderline associated with asthma (OR 1.36, 95% CI 1.00–3.45, *P* = 0.05). In the young (aged 16–39 year) and middle-aged adults (aged 40–79 year), however, birth place seemed to play a role in the prevalence (not born in the UK: OR 0.34, 95% CI 0.28–0.42, *P* < 0.001 and OR 0.72, 95% CI 0.57–0.90, *P* = 0.01, respectively). Moreover, although some regional difference in adult-prevalent asthma across age groups was observed, the significance all disappeared after full adjustments (data not shown).

Discussion

Main findings

In the present study, it was observed that birth place and education were significant social contributors to risk of adult-prevalent asthma throughout the UK, which is similar to previous studies showing low socioeconomic status (SES) is associated with higher risk of (adult) asthma (2–11).

Previous observations

In the United States, there were ethnic variations observed in people with asthma and differences in SES partially explained ethnic disparities in adult asthma (7,8). In the UK, ethnic disparities were explained by birth place as people who are not born in the UK tend to be immigrants from populations other than white people (12). This may be related to their early living environment and/or lower SES in the UK. In this context, birth place was used to replace ethnicity in the pres-

Table 2 Social factors associated with prevalent asthma across age groups

	Asthma (<i>n</i> = 198, 11.2%)	Nonasthma (<i>N</i> = 1576, 88.8%)	<i>P</i> value	Crude OR	Adjusted OR	<i>P</i> value [*]
a) In the elderly aged 80 and above						
Sex						
Male	71 (9.8%)	653 (90.2%)	0.13	1.00	1.00	0.24
Female	127 (12.1%)	923 (87.9%)		1.27 (0.93–1.72)	1.28 (0.85–1.92)	
Birth place						
Born in England	148 (11.3%)	1163 (88.7%)	0.50	1.00	1.00	
Born in Scotland	14 (10.4%)	121 (89.6%)		0.91 (0.51–1.62)	0.75 (0.36–1.54)	
Born in Wales	16 (15.2%)	89 (84.8%)		1.41 (0.81–2.47)	0.81 (0.36–1.81)	
Born in Northern Ireland	5 (6.9%)	67 (93.1%)		0.59 (0.23–1.48)	0.62 (0.22–1.77)	
Not born in the UK	15 (9.9%)	136 (90.1%)		0.87 (0.50–0.52)	0.50 (0.18–1.41)	
Education						
≥ high school	18 (7.1%)	237 (92.9%)	0.02	1.00	1.00	0.05
<high school	180 (11.9%)	1336 (88.1%)		1.77 (1.07–2.94)	1.86 (1.00–3.45)	
Marital status						
Single/in civil partnership	11 (10.7%)	92 (89.3%)	0.18	1.00	1.00	
Married/registered ^a	53 (8.9%)	543 (91.1%)		0.82 (0.41–1.62)	0.86 (0.36–2.05)	
Separated but married	2 (15.4%)	11 (84.6%)		1.52 (0.30–7.77)	n/a	
Divorced/Widowed	131 (12.4%)	930 (87.7%)		1.18 (0.61–2.26)	1.02 (0.45–2.33)	
Neighborhood satisfaction						
Agree	123 (11.3%)	965 (88.7%)	0.84	1.00	1.00	
Neither agree or disagree	7 (9.1%)	70 (90.9%)		0.78 (0.35–1.74)	0.80 (0.36–1.79)	
Disagree	5 (11.4%)	39 (88.6%)		1.01 (0.39–2.60)	0.99 (0.38–2.59)	
	Asthma (<i>n</i> = 3132, 11.8%)	Nonasthma (<i>N</i> = 23 529, 88.2%)	<i>P</i> value	Crude OR	Adjusted OR	<i>P</i> value [*]
b) In middle-aged adults between 40 and 79						
Sex						
Male	1248 (10.5%)	10 684 (89.5%)	<0.001	1.00	1.00	0.34
Female	1884 (12.8%)	12 845 (87.2%)		1.26 (1.16–1.35)	0.93 (0.81–1.07)	
Birth place						
Born in England	2199 (12.3%)	15 707 (87.7%)	<0.001	1.00	1.00	
Born in Scotland	252 (11.3%)	1973 (88.7%)		0.91 (0.79–1.05)	0.94 (0.74–1.19)	
Born in Wales	167 (13.5%)	1066 (86.5%)		1.12 (0.94–1.33)	1.03 (0.75–2.43)	
Born in Northern Ireland	117 (10.2%)	1032 (89.8%)		0.81 (0.67–0.99)	0.60 (0.39–0.92)	
Not born in the UK	397 (9.6%)	3746 (90.4%)		0.76 (0.68–0.85)	0.72 (0.57–0.90)	
Education						
≥ high school	1067 (11.4%)	8273 (88.6%)	0.231	1.00	1.00	0.07
<high school	2063 (11.9%)	15 245 (88.1%)		1.05 (0.97–1.14)	0.88 (0.76–1.01)	
Marital status						
Single/in civil partnership	409 (12.8%)	2797 (87.2%)	<0.001	1.00	1.00	
Married/registered ^a	1825 (10.8%)	15 145 (89.3%)		0.82 (0.74–0.92)	0.85 (0.69–1.04)	
Separated but married	118 (13.4%)	763 (86.6%)		1.06 (0.85–1.32)	1.35 (0.95–1.92)	
Divorced/Widowed	780 (13.9%)	4811 (86.1%)		1.11 (0.98–1.26)	1.02 (0.80–1.30)	
Salary						
<20 000	94 (11.3%)	7333 (88.7%)	0.365	1.00	1.00	
20 000–49 999	115 (9.8%)	1065 (90.2%)		0.85 (0.69–1.04)	0.80 (0.64–1.00)	
50 000–99 999	29 (9.6%)	272 (90.4%)		0.84 (0.57–1.23)	0.75 (0.49–1.14)	
≥ 100 000	6 (11.5%)	46 (88.5%)		1.02 (0.44–2.40)	1.03 (0.40–2.63)	
Age gap with mother's	25.9 ± 5.1	26.2 ± 5.2	0.03	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.91
Age gap with father's	28.0 ± 5.2	28.3 ± 5.4	0.14	1.001 (1.0003–1.002)	1.00 (1.00–1.00)	0.18
Neighborhood satisfaction						
Agree	1946 (11.5%)	14 935 (88.5%)	0.01	1.00	1.00	
Neither agree or disagree	404 (12.1%)	2943 (87.9%)		1.05 (0.94–1.18)	1.07 (0.89–1.28)	
Disagree	269 (13.9%)	1668 (86.1%)		1.24 (1.08–1.42)	1.05 (0.84–1.32)	
	Asthma (<i>n</i> = 2939, 15.3%)	Nonasthma (<i>N</i> = 16 231, 84.7%)	<i>P</i> value	Crude OR	Adjusted OR	<i>P</i> value [*]
c) In young adults aged between 16 and 39						
Sex						
Male	1299 (15.6%)	7020 (84.4%)	0.34	1.00	1.00	0.2
Female	1640 (15.1%)	9211 (84.9%)		0.96 (0.89–1.04)	0.93 (0.82–1.04)	

Table 2 (continued)

	Asthma (<i>n</i> = 2939, 15.3%)	Nonasthma (<i>N</i> = 16 231, 84.7%)	<i>P</i> value	Crude OR	Adjusted OR	<i>P</i> value*
Birth place						
Born in England	2222 (18.5%)	9812 (81.5%)	<0.001	1.00	1.00	
Born in Scotland	196 (18.7%)	850 (81.3%)		1.02 (0.87–1.20)	0.92 (0.73–1.16)	0.48
Born in Wales	146 (20.7%)	561 (79.3%)		1.15 (0.95–1.39)	1.22 (0.95–1.58)	0.12
Born in Northern Ireland	84 (12.0%)	619 (88.0%)		0.60 (0.47–0.76)	0.53 (0.37–0.74)	<0.001
Not born in the UK	291 (6.2%)	4387 (93.8%)		0.29 (0.26–0.33)	0.34 (0.28–0.42)	<0.001
Education						
≥ high school	1345 (15.5%)	7953 (84.5%)	0.001	1.00	1.00	0.78
<high school	1593 (16.2%)	8270 (83.8%)		1.14 (1.05–1.23)	0.98 (0.87–1.11)	
Marital status						
Single/in civil partnership	1950 (16.8%)	9669 (83.2%)	<0.001	1.00	1.00	
Married/registered ^a	833 (12.7%)	5719 (87.3%)		0.72 (0.66–0.79)	0.79 (0.69–0.90)	0.001
Separated but married	60 (15.3%)	332 (84.7%)		0.90 (0.68–1.18)	0.97 (0.60–1.55)	0.89
Divorced/Widowed	94 (15.6%)	495 (84.0%)		0.94 (0.75–1.18)	1.04 (0.75–1.43)	0.83
Salary						
<20 000	1358 (15.9%)	7169 (84.1%)	0.252	1.00	1.00	
20 000–49 999	132 (14.2%)	799 (85.8%)		0.87 (0.72–1.06)	0.89 (0.72–1.09)	0.27
50 000–99 999	23 (20.2%)	91 (79.8%)		1.33 (0.84–2.16)	1.33 (0.81–2.18)	0.25
≥ 100 000	2 (10.0%)	18 (90.0%)		0.59 (0.14–2.53)	0.63 (0.14–2.75)	0.54
Age gap with mother's	26.4 ± 5.4	26.5 ± 5.6	0.58	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.47
Age gap with father's	26.2 ± 5.3	26.4 ± 5.4	0.14	1.002 (1.0003–1.003)	1.00 (1.00–1.00)	0.15
Neighborhood satisfaction						
Agree	1235 (15.6%)	6691 (84.4%)	0.002	1.00	1.00	0.96
Neither agree or disagree	623 (15.8%)	3333 (84.3%)		1.06 (0.97–1.38)	1.00 (0.86–1.15)	
Disagree	704 (18.0%)	3208 (82.0%)		1.22 (1.09–1.35)	1.12 (0.97–2.30)	0.12

**P* values denote those of adjusted ORs.

^aIncluding same sex couples.

All bold values are significant.

ent study. Salary was not able to be included for the analysis in the very old due to lack of information. Interestingly, being married was found to have slightly lowered risk of adult asthma for the middle aged. It is not clear whether it was due to a better marriage life lessening the risk effect of having asthma or more healthier people getting married. However, the effect disappeared after the full adjustments.

Moreover, maternal age seemed to play a role in the middle aged as well. Different from the previous observation showing higher risk from young mothers (13), in the current study, it was observed that the older the father's age, the higher risk it may pose on adult asthma. However, the complex biological pathway from maternal age to asthma is still unclear, and future research is encouraged to confirm the relationship, if at all. On the other hand, neighborhood context (area-level SES) was once hypothesized to be important for adult asthma as well. Similar to previous studies, both in the UK and the US, in the current study it was also observed that people with better perception on their neighborhoods had a lower risk of adult asthma, although the effect was not significant after full adjustments (9–11).

Strengths and limitations

This study has several strengths. First, it is in a national population-based setting with a representative sampling method in the very recent years. Moreover, the very old people were included for examination which gave an opportunity to

explore social predictors of asthma specifically for them. However, a few limitations still cannot be ignored. The present study did not include smoking variable, which to some extent could bias the effects from those social factors mentioned previously. Furthermore, data for new onset adult asthma as outcome were not enough (*n* = 91) for statistical multiple comparisons testing and can only be adjusted as a covariate for the prevalent asthma as the outcome. The interpretation of results needs to be carefully put in any context. Future research overcoming these limitations is strongly recommended.

In conclusion, birth place and education are social factors that are associated with risk of adult-prevalent asthma in the UK, but no geographic variance was found. Consistent with previous studies, low SES still plays a role in adult asthma, and public health intervention programs are suggested continuing focusing on this part.

Conflict of interest

None.

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