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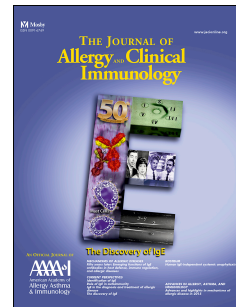
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1 Incidence and sociodemographic characteristics of eczema diagnosis in children: a cohort
2 study

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30 Capsule Summary:

31 The incidence of childhood eczema is approximately 14% in the first year of life and
32 decreases substantially in later childhood; early onset is significantly associated with
33 gender, ethnicity and socioeconomic status.

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34 To the Editor:

35 We report the results of a large population-based cohort study examining the incidence
36 of clinically diagnosed eczema in children and the variations by sociodemographic
37 characteristics. Eczema (also known as atopic eczema/dermatitis¹) affects up to 1 in 5
38 children² and is associated with high morbidity.³

39 There are limited estimates on the incidence of eczema and how the incidence varies by
40 sociodemographic factors, which is important for generating hypotheses regarding the
41 disease aetiology and for health service planning. To address this issue, we examined
42 the incidence of eczema diagnosis in children aged 0-17 years between 1st April 1997
43 and 31st March 2015 using the Clinical Practice Research Datalink (CPRD).⁴ CPRD is a
44 routinely collected primary care database in the United Kingdom (UK) covering
45 approximately 7% of the UK population.⁴ CPRD has been linked to the Hospital Episode
46 Statistics (HES), a secondary healthcare administrative database in England, and is
47 broadly representative of the general UK population regarding age, gender and life-style
48 related factors.^{4,5}

49 We defined a child as having eczema if he/she had one diagnostic code for eczema with
50 at least two eczema-related treatment codes on separate days within three months
51 before or one year after the eczema diagnosis (see Online Repository, for additional
52 details). The earliest date of an eczema diagnosis was defined as the incidence date.
53 Previous research⁶ has shown that the combination of one eczema diagnostic code with
54 two eczema-related treatment codes on separate days at any time gives a 90% (95%
55 confidence interval (95%CI) 83-96%) positive predictive value for identifying prevalent
56 eczema in children. We excluded children registered with their current primary care
57 practice after three months of birth or children with a history of eczema before the start
58 of the study to minimise the risk of misclassifying recurrent eczema events as first
59 events (see Figure E1, Online Repository, for additional details).

60 We calculated incidence rates per 100 person-years and adjusted rate ratios (aRR) for
61 age (< 1 year old, 1-4 years old, 5-17 years old), gender, socioeconomic status (defined
62 as quintiles of the patient-level English Index of Multiple Deprivation⁷), and ethnicity
63 (when available) using Poisson regression modelling with mutual adjustment (see Table
64 1). Since people with different socio-demographic characteristics could have different
65 health seeking behaviours, we also adjusted for the number of annual consultations in
66 the study follow-up period to minimise potential ascertainment bias. We also examined
67 the incidence rate and aRR for calendar year adjusted for age, gender and socioeconomic
68 status. We examined whether there was evidence of statistical interaction between age
69 and gender, socioeconomic status and ethnicity using the likelihood ratio test ($p < 0.05$).
70 Since the quality of ethnicity recording in the HES-linked CPRD population is only
71 comparable to the UK population for people registered after 2006⁸, for any analysis using
72 ethnicity data we excluded children registered before 1st April 2006 and conducted a
73 complete case analysis. To test the robustness of our results, we conducted four
74 sensitivity analyses (Online Repository). The study protocol was approved by the
75 Independent Scientific Advisory Committee (Protocol No: 16_056) and published here:
76 https://www.cprd.com/isac/Protocol_16_056.asp.

77 The study population consisted of 675,087 children of which 98,082 (14.5%) had a first
78 clinical diagnosis of eczema. Compared to children without eczema, children with eczema
79 had a slightly longer follow-up period and a higher annual consultation rate (Table E1,
80 Online Repository).

81 The incidence rate by calendar year remained stable in 1997-2015 (Figure E2, Online
82 Repository) and the aRR for each additional calendar year was 1.0 (95%CI 1.0-1.0). The
83 incidence rate of eczema was highest in the first year of life (13.8 per 100 person-years,
84 95%CI 13.7-13.9) and decreased substantially afterwards (Figure 1). We found
85 statistically significant interaction between age and other sociodemographic factors
86 ($p < 0.001$). There was a 30% higher incidence rate in boys than in girls in children <1
87 year old (aRR=1.3, 95%CI 1.3-1.4) and a 20% lower rate in boys than in girls for

88 children ≥ 5 years old (aRR=0.8, 95%CI 0.7-0.8) (Table 1). Comparing the incidence
89 rate in children of the lowest socioeconomic status, children of the highest socioeconomic
90 status had a 20% higher incidence rate in the younger age groups (aRR=1.2, 95%CI
91 1.2-1.3 in <1 year old and 1.2, 1.1-1.3 in 1-4 years old); such difference however was
92 not observed in children ≥ 5 years old (Table 1). Moreover, the incidence of clinically
93 diagnosed eczema in the first year of life was 2 to 3-fold higher in Chinese children
94 (aRR=3.4, 95%CI 3.0-3.8), Bangladeshi children (aRR=2.5, 95%CI 2.3-2.8) and Black
95 Caribbean children (aRR=2.5, 95%CI 2.3-2.9) compared to white children (Table 1). The
96 incidence decreased by age for all ethnic groups but generally remained higher in non-
97 white children than white children (Table E2, Online Repository). Results from the
98 sensitivity analyses were all similar compared to the main analysis (see Tables E3, E4
99 and E5, Online Repository).

100 Our study shows that the incidence of eczema varies substantially by age and is highest
101 in the first year of life, especially in boys, Chinese, Bangladeshi and Black Caribbean
102 children and children of high socioeconomic status. The study confirms the previously
103 reported link between high socioeconomic status and the occurrence of eczema,⁹ and
104 also reports novel findings on ethnic group and gender differences. The former could be
105 due to different environmental risk factors such as diet, living conditions at home or
106 decreased exposure to ultraviolet light.^{E1-E3} The latter may be potentially due to different
107 immune responses of boys and girls in early childhood,^{E4} but different environment
108 exposures such as differing exposures to soap/shampoo products^{E5} at older age .

109 The main strength of our study is the large sample size, which has allowed us to
110 examine interactions with age. A potential limitation is ascertainment bias but we have
111 tried to minimise this by adjusting for the number of annual consultations during the
112 study follow-up period in all the analyses.

113 In conclusion, our findings highlight the early onset of eczema in children, with higher
114 incidence found in boys, Chinese, Bangladeshi and Black Caribbean children, and those

115 with high socio-economic status. With new prevention approaches potentially available^{E6}
116 and early intervention trials currently underway,^{E7} our study may help policy makers
117 identify high risk children and better allocate limited healthcare resources.

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Figure Legends

Figure 1 Incidence rate (per 100 person-years) of eczema by age and sex, N=675,087 (dotted lines showing 95% confidence intervals)

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Table 1 Incidence rates and rate ratios of eczema by different sociodemographic factors stratified by age (N=675,087)

| | < 1 year old | | 1-4 years old | | 5-17 years | |
|---|--------------------|----------------------------|--------------------|----------------------------|-------------------|----------------------------|
| | n of eczema=55,525 | | n of eczema=34,729 | | n of eczema=7,828 | |
| | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) |
| Sex | | | | | | |
| Male | 15.9 (15.7-16.1) | 1.3 (1.3-1.4) [£] | 2.9 (2.9-3.0) | 0.9 (0.9-1.0) | 0.4 (0.3-0.4) | 0.8 (0.7-0.8) [£] |
| Female | 11.7 (11.5-11.8) | Reference | 3.0 (2.9-3.0) | Reference | 0.5 (0.5-0.5) | Reference |
| Index of Multiple Deprivation | | | | | | |
| 1 (least deprived) | 15.5 (15.3-15.8) | 1.2 (1.2-1.3) [£] | 3.2 (3.2-3.3) | 1.2 (1.1-1.3) [£] | 0.4 (0.4-0.4) | 1.0 (0.9-1.1) |
| 2 | 13.7 (13.5-14.0) | 1.1 (1.0-1.1) | 3.0 (2.9-3.1) | 1.1 (1.0-1.1) | 0.4 (0.4-0.4) | 1.0 (0.9-1.1) |
| 3 | 13.5 (13.3-13.8) | 1.0 (1.0-1.1) | 2.9 (2.8-3.0) | 1.0 (0.9-1.1) | 0.4 (0.4-0.4) | 1.0 (0.9-1.1) |
| 4 | 13.1 (12.8-13.3) | 1.0 (1.0-1.1) | 2.8 (2.8-2.9) | 1.0 (0.9-1.1) | 0.4 (0.4-0.5) | 1.0 (1.0-1.1) |
| 5 (most deprived) | 12.9 (12.6-13.2) | Reference | 2.8 (2.7-2.9) | Reference | 0.4 (0.4-0.5) | Reference |
| Ethnicity** | | | | | | |
| | n of eczema=25,593 | | n of eczema=12,862 | | n of eczema=391 | |
| White | 12.4 (12.2-12.6) | Reference | 3.3 (3.2-3.3) | Reference | 0.5 (0.4-0.5) | Reference |
| Black Caribbean | 28.8 (25.6-32.4) | 2.5 (2.3-2.9) [£] | 5.4 (4.5-6.6) | 2.0 (1.6-2.4) [£] | 1.5 (0.6-4.0) | 3.5 (1.3-9.3) [£] |
| Bangladeshi | 30.4 (27.2-34.1) | 2.5 (2.3-2.8) [£] | 5.3 (4.3-6.5) | 1.4 (1.1-1.7) [£] | 1.0 (0.3-3.0) | 1.6 (0.5-5.1) |
| Chinese | 41.7 (36.9-47.2) | 3.4 (3.0-3.8) [£] | 4.6 (3.4-6.2) | 1.6 (1.2-2.2) [£] | 0.7 (0.1-5.1) | 1.9 (0.3-13.3) |
| All other ethnic groups combined ^{&} | 20.8 (20.2-21.4) | 1.7 (1.6-1.8) [£] | 3.9 (3.8-4.1) | 1.1 (1.0-1.2) | 1.0 (0.8-1.2) | 1.9 (1.5-2.5) [£] |

aRR=adjusted rate ratio

95% CI=95% confidence interval

*Rate per 100 person-years

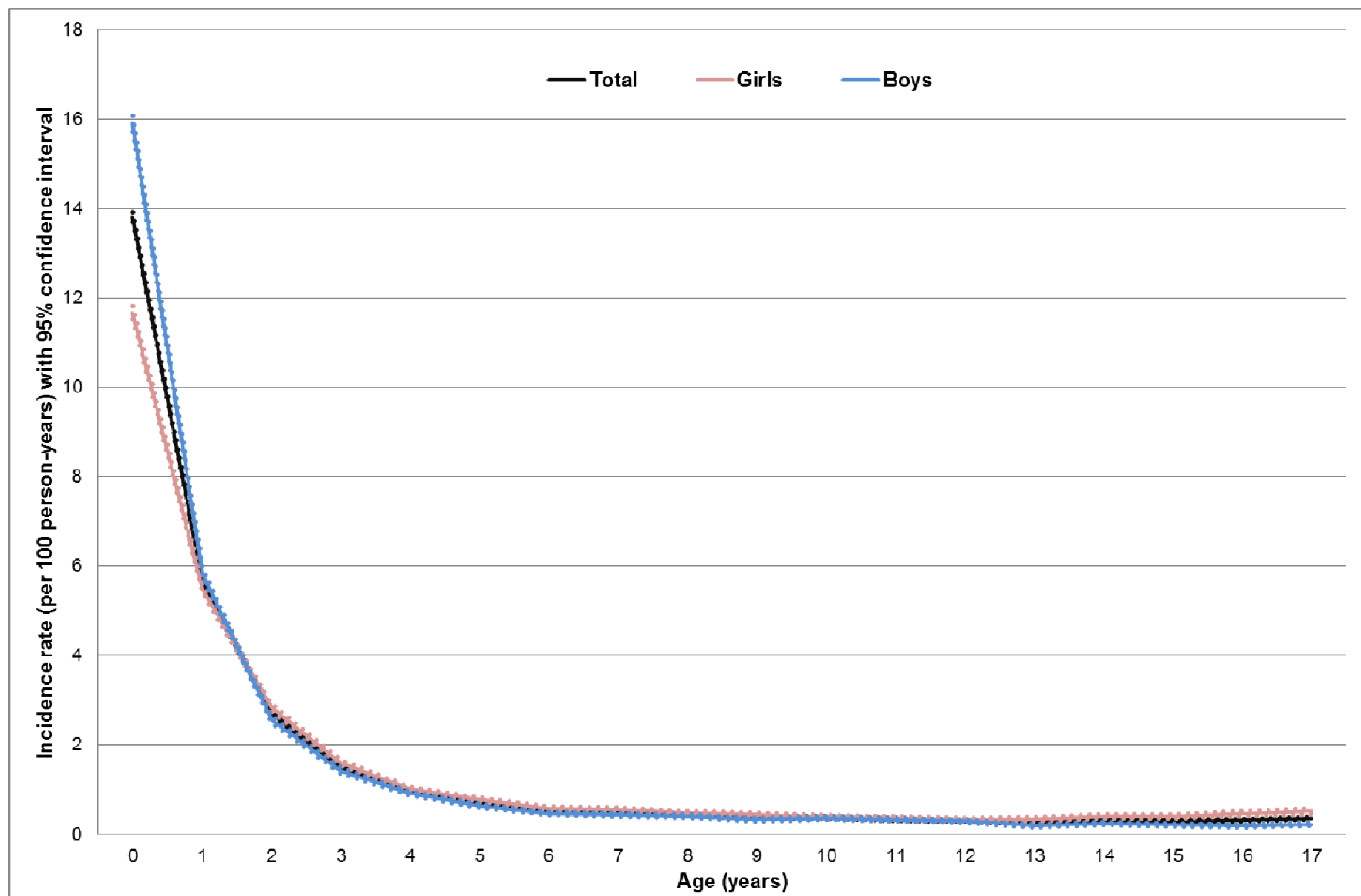
**Restricted to children with current registration dates on or after April 1st 2006 (N=303,327 of which 48,301 with eczema) and a complete case analysis was conducted first by excluding 55,529 (18.3%) children with missing ethnicity (N=247,798)

\$For sex, model adjusted for Index of Multiple Deprivation and the number of annual consultations during the study follow-up period; for Index of Multiple Deprivation, model adjusted for sex and the number of annual consultations during the study follow-up period; for ethnicity (only available for children registered after 2006), model adjusted for sex, Index of Multiple Deprivation and the number of annual consultations during the study follow-up period

£ $p < 0.05$

&including mixed, black African, black other, Indian, Pakistani, Asian other and other children (e.g. Egyptian)

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1 **Supplementary Methods**

2 **Defining eczema**

3 Diagnoses in the CPRD are coded using the Read code system, which is based on a
4 hierarchal clinical classification system and can be cross referenced to the International
5 Classification of Disease (ICD).^{E8} We defined a child as having eczema if he/she had one
6 diagnostic code for eczema (Read codes M111.00 Atopic dermatitis/eczema, M112.00
7 Infantile eczema, M113.00 Flexural eczema, M114.00 Allergic intrinsic eczema, M12z100
8 Eczema NOS) with at least two eczema-related treatment codes on separate days within
9 three months before or one year after the diagnosis. The following eczema-related
10 treatments were used: prescriptions of emollients, topical steroids, topical calcineurin
11 inhibitors (including pimecrolimus and tacrolimus), systemic steroids, systemic
12 immunomodulatory agents (including methotrexate, cyclosporine, azathioprine and
13 mycophenolate mofetil) and ultraviolet light therapy. Drug prescriptions were identified
14 from the CPRD using drug codes based on the British National Formulary chapters.
15 Ultraviolet light therapy treatments were identified from both the CPRD and HES using
16 Read and OPCS4 codes, respectively.

17 **Sensitivity analyses**

18 To test the robustness of our results, we conducted four sensitivity analyses and
19 compared the results to the main analysis.

20 1. Missing ethnicity data: Since 18.3% children had missing information on ethnicity, we
21 used multiple imputation to replace missing values for ethnicity by using multinomial
22 logistic regression and created 10 imputed datasets. We combined estimates using
23 Rubin's rule to obtain final estimates and compared the results to the complete case
24 analysis.

25 2. More inclusive eczema definition: We defined a child as having eczema if he/she had
26 one diagnostic code for eczema with at least one eczema-related treatment within three
27 months before or after the eczema diagnosis.

28 3. More restrictive eczema definition for the first year of life: To minimise the potential
29 misclassification of eczema diagnosis in the first year of life, we defined a child as having
30 eczema in the first year if he/she had eczema in the first year and prescribed any
31 eczema-related treatment in the second year of life also.

32 4. Alternative study population: As we excluded a large proportion of children, i.e. those
33 registered with their current primary care physician after the first three months of birth
34 (1,097,638 out of 1,838,877; 59.7%), our study population could be less representative
35 of the general paediatric population. Therefore we re-ran our analysis on the total
36 population identified from the HES-linked CPRD. For this sensitivity analysis, to ensure
37 we only included incident diagnoses and not prevalent ones in children registered after
38 the first year of life, we excluded the first 12 months after the current registration date
39 and children whose first eczema diagnosis was within this first 12 months period were
40 also excluded.

Supplementary References

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Table E1 Characteristic of children without and with eczema (N=675,087)

| | Children without eczema | Children with eczema |
|--|-------------------------|---------------------------------|
| | n=577,005 | n=98,082 |
| | n (%) | n (%) |
| Age at registration with current GP months, median (IQR) | 0.77 (0.20-1.40) | 0.80 (0.37-1.33) |
| Age at start of prospective follow-up months, median (IQR) | 1.30 (0.63-16.67) | 0.90 (0.47-1.57) |
| Average length of prospective follow-up months, median (IQR) | 54.73 (20.22-112.00) | 74.27 (37.53-125.93) |
| Sex, male | 293,828 (50.92) | 53,124 (54.16) [£] |
| Index of Multiple Deprivation | | |
| 1 (Least deprived) | 123,060 (21.33) | 24,334 (24.81) [£] |
| 2 | 120,913 (20.96) | 20,646 (21.05) |
| 3 | 110,121 (19.08) | 18,019 (18.37) |
| 4 | 117,033 (20.28) | 18,442 (18.80) |
| 5 (most deprived) | 105,878 (18.35) | 16,641 (16.97) |
| Ethnicity* | n=255,026 | n=48,301 |
| White | 176,964 (84.69) | 30,761 (79.19) [£] |
| Mixed | 7,824 (3.74) | 1,604 (4.13) |
| Black Caribbean | 1,094 (0.52) | 378 (0.97) |
| Black African | 4,779 (2.29) | 1,172 (3.02) |
| Black Other | 1,030 (0.49) | 323 (0.83) |
| Indian | 4,560 (2.18) | 1,319 (3.40) |
| Bangladeshi | 1,084 (0.52) | 396 (1.02) |
| Pakistani | 4,265 (2.04) | 1,114 (2.87) |
| Chinese | 704 (0.34) | 294 (0.76) |
| Asian Other | 2,961 (1.42) | 790 (2.03) |
| Other | 3,687 (1.76) | 695 (1.79) |
| Missing | 46,074 | 9,455 |
| Annual consultation rate[§], median (IQR) | 3.50 (1.84-6.36) | 10.29 (5.92-16.23) [£] |

IQR=interquartile range

*Restricted to children with current registration dates on or after April 1st 2006 (N=303,327 of which 48,301 with eczema) and a complete case analysis was conducted first by excluding 55,529 (18.3%) children with missing ethnicity (N=247,798)[§]Number of consultations per year during the study follow-up period[£]p<0.05

Table E2 Incidence rates and rate ratios of eczema by ethnicity stratified by age (N=247,798 with complete data on ethnicity)

| Ethnicity | < 1 year old | | 1-4 years old | | 5-17 years old | |
|-----------------------|--------------------|--------------------------------|--------------------|---------------------------|-----------------|--------------------------------|
| | n of eczema=25,593 | | n of eczema=12,862 | | n of eczema=391 | |
| | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) |
| White | 12.4 (12.2-12.6) | Reference | 3.3 (3.2-3.3) | Reference | 0.5 (0.4-0.5) | Reference |
| Mixed | 17.7 (16.7-18.8) | 1.5 (1.4-1.6) | 3.7 (3.3-4.0) | 1.1 (1.0-1.3) | 0.6 (0.3-1.0) | 1.2 (0.7-2.3) |
| Black Caribbean | 28.8 (25.6-32.4) | 2.6 (2.3-2.9) ^{&} | 5.4 (4.5-6.6) | 2.0 (1.6-2.4) | 1.5 (0.6-4.0) | 3.5 (1.3-9.4) ^{&} |
| Black African | 22.3 (20.8-23.8) | 2.0 (1.8-2.1) | 3.9 (3.5-4.4) | 1.3 (1.2-1.5) | 1.1 (0.6-1.9) | 2.6 (1.5-4.5) |
| Black Other | 29.6 (26.1-33.5) | 2.6 (2.3-3.0) | 4.0 (3.1-5.1) | 1.4 (1.1-1.8) | 2.4 (1.2-4.8) | 5.8 (2.8-11.8) |
| Indian | 24.3 (22.9-25.9) | 1.8 (1.6-2.0) | 4.2 (3.7-4.6) | 1.2 (1.1-1.4) | 0.9 (0.6-1.6) | 1.8 (1.1-3.1) |
| Bangladeshi | 30.4 (27.2-34.1) | 2.5 (2.3-2.8) | 5.3 (4.3-6.5) | 1.4 (1.1-1.7) | 1.0 (0.3-3.0) | 1.6 (0.5-5.1) |
| Pakistani | 20.6 (19.2-22.1) | 1.7 (1.5-1.9) | 4.1 (3.7-4.6) | 0.7 (0.5-1.2) | 0.8 (0.5-1.4) | 1.4 (0.8-2.5) |
| Chinese | 41.7 (36.9-47.2) | 3.4 (3.0-3.8) | 4.6 (3.4-6.2) | 1.6 (1.2-2.2) | 0.7 (0.1-5.1) | 1.9 (0.3-13.3) |
| Asian Other | 23.6 (21.8-25.6) | 2.0 (1.8-2.1) | 4.4 (3.8-5.1) | 1.2 (1.1-1.4) | 1.8 (1.0-3.3) | 3.3 (1.8-6.1) |
| Other (e.g. Egyptian) | 16.4 (15.0-17.9) | 1.3 (1.1-1.5) | 3.6 (3.1-4.2) | 1.2 (1.0-1.4) | 0.7 (0.3-1.8) | 1.6 (0.6-3.8) |

aRR=adjusted rate ratio

95% CI=95% confidence interval

*Rate per 100 person-years

§Model adjusted for sex, Index of Multiple Deprivation and the number of annual consultations during the study follow-up period

&compared to Table 1 these estimates changed slightly due to a different number of covariates included in the regression model

Table E3 Results after using a more inclusive eczema definition: Incidence rates and rate ratios of eczema by sociodemographic factors stratified by age (N=675,087 for analysis on sex and Index of Multiple Deprivation and N=247,798 for analysis on ethnicity)

| | < 1 year old | | 1-4 years old | | 5-17 years old | |
|--------------------------------------|--------------------|---------------------------|--------------------|---------------------------|--------------------|---------------------------|
| | n of eczema=70,425 | | n of eczema=57,809 | | n of eczema=18,247 | |
| | Rate* (95% CI) | aRR [‡] (95% CI) | Rate* (95% CI) | aRR [‡] (95% CI) | Rate* (95% CI) | aRR [‡] (95% CI) |
| Sex | | | | | | |
| Male | 20.3 (20.1-20.5) | 1.3 (1.3-1.3) | 5.3 (5.2-5.3) | 1.0 (0.9-1.0) | 0.9 (0.9-0.9) | 0.7 (0.7-0.8) |
| Female | 15.3 (15.1-15.5) | Reference | 5.4 (5.4-5.4) | Reference | 1.2 (1.2-1.3) | Reference |
| Index of Multiple Deprivation | | | | | | |
| 1 (least deprived) | 20.0 (19.7-20.3) | 1.2 (1.2-1.2) | 5.9 (5.8-6.0) | 1.1 (1.1-1.2) | 1.1 (1.1-1.1) | 1.0 (1.0-1.1) |
| 2 | 17.8 (17.5-18.1) | 1.1 (1.1-1.1) | 5.4 (5.3-5.5) | 1.1 (1.1-1.1) | 1.1 (1.0-1.1) | 1.0 (1.0-1.1) |
| 3 | 17.5 (17.2-17.8) | 1.1 (1.0-1.1) | 5.2 (5.1-5.3) | 1.1 (1.0-1.1) | 1.1 (1.0-1.1) | 1.0 (1.0-1.1) |
| 4 | 16.9 (16.6-17.2) | 1.0 (1.0-1.1) | 5.0 (4.9-5.1) | 1.0 (1.0-1.1) | 1.0 (1.0-1.1) | 1.0 (0.9-1.0) |
| 5 (most deprived) | 16.5 (16.2-16.8) | Reference | 4.9 (4.8-5.0) | Reference | 1.1 (1.0-1.1) | Reference |
| Ethnicity | | | | | | |
| | n of eczema=32,215 | | n of eczema=20,476 | | n of eczema=893 | |
| White | 16.2 (16.0-16.4) | Reference | 5.7 (5.6-5.8) | Reference | 1.3 (1.2-1.3) | Reference |
| Mixed | 22.1 (21.0-23.3) | 1.4 (1.3-1.5) | 6.0 (5.6-6.5) | 1.1 (1.0-1.2) | 1.5 (1.0-2.2) | 1.2 (0.8-1.8) |
| Black Caribbean | 33.6 (30.1-37.5) | 2.3 (2.0-2.5) | 7.1 (6.0-8.5) | 1.3 (1.1-1.6) | 2.4 (1.1-5.3) | 2.0 (0.9-4.6) |
| Black African | 26.2 (24.6-27.9) | 1.8 (1.7-1.9) | 5.5 (5.0-6.1) | 1.0 (0.9-1.1) | 1.8 (1.2-2.8) | 1.4 (0.9-2.3) |
| Black Other | 33.1 (29.5-37.3) | 2.2 (2.0-2.5) | 5.7 (4.6-7.0) | 1.1 (0.9-1.3) | 3.9 (2.2-6.9) | 3.5 (2.0-6.3) |
| Indian | 28.8 (27.1-30.5) | 1.7 (1.5-1.8) | 6.4 (5.9-7.0) | 1.1 (1.0-1.2) | 1.5 (1.0-2.4) | 1.1 (0.7-1.8) |
| Bangladeshi | 34.1 (30.6-38.0) | 2.2 (1.9-2.4) | 7.8 (6.5-9.2) | 1.3 (1.1-1.6) | 3.4 (1.7-6.4) | 2.3 (1.2-4.5) |
| Pakistani | 23.5 (22.0-25.1) | 1.5 (1.4-1.6) | 5.9 (5.4-6.5) | 1.0 (0.9-1.1) | 1.8 (1.2-2.7) | 1.3 (0.9-2.0) |

| | | | | | | |
|-------------|------------------|---------------|---------------|---------------|---------------|---------------|
| Chinese | 51.0 (45.5-57.1) | 3.1 (2.8-3.5) | 7.6 (5.9-9.7) | 1.4 (1.1-1.8) | 0.8 (0.1-6.0) | 0.8 (0.1-5.5) |
| Asian Other | 28.0 (26.0-30.2) | 1.8 (1.6-1.9) | 6.2 (5.5-7.1) | 1.1 (1.0-1.2) | 2.5 (1.5-4.2) | 1.9 (1.1-3.2) |
| Other | 21.2 (19.6-22.9) | 1.3 (1.1-1.4) | 5.7 (5.1-6.4) | 1.0 (0.9-1.2) | 1.8 (1.0-3.2) | 1.5 (0.8-2.6) |

aRR=adjusted rate ratio

95% CI=95% confidence interval

*Rate per 100 person-years

\$Model adjusted for sex, Index of Multiple Deprivation and the number of annual consultations during the study follow-up period

Table E4 Results after using a more strict eczema definition for the first year of life: Incidence rates and rate ratios of eczema by sociodemographic factors stratified by age (N=675,087 for analysis on sex and Index of Multiple Deprivation and N=247,798 for analysis on ethnicity)

| | < 1 year old | | 1-4 years old | | 5-17 years old | |
|--------------------------------------|--------------------|---------------------------|--------------------|---------------------------|-------------------|---------------------------|
| | n of eczema=39,579 | | n of eczema=34,729 | | n of eczema=7,828 | |
| | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) |
| Sex | | | | | | |
| Male | 11.0 (10.9-11.2) | 1.3 (1.3-1.3) | 2.9 (2.8-2.9) | 1.0 (0.9-1.0) | 0.4 (0.3-0.4) | 0.7 (0.7-0.9) |
| Female | 8.2 (8.1-8.3) | Reference | 2.9 (2.9-3.0) | Reference | 0.5 (0.5-0.5) | Reference |
| Index of Multiple Deprivation | | | | | | |
| 1 (least deprived) | 11.2 (11.0-11.4) | 1.3 (1.2-1.4) | 3.1 (3.1-3.2) | 1.2 (1.1-1.2) | 0.4 (0.4-0.4) | 0.9 (0.9-1.0) |
| 2 | 9.7 (9.5-9.9) | 1.1 (1.1-1.2) | 2.9 (2.9-3.0) | 1.1 (1.0-1.1) | 0.4 (0.4-0.4) | 0.9 (0.9-1.0) |
| 3 | 9.4 (9.2-9.6) | 1.0 (0.9-1.1) | 2.8 (2.7-2.9) | 1.0 (1.0-1.0) | 0.4 (0.4-0.4) | 0.9 (0.9-1.0) |
| 4 | 8.9 (8.7-9.1) | 1.1 (1.0-1.1) | 2.8 (2.7-2.8) | 1.0 (1.0-1.1) | 0.4 (0.4-0.4) | 1.0 (0.9-1.1) |
| 5 (most deprived) | 8.7 (8.5-8.9) | Reference | 2.7 (2.6-2.8) | Reference | 0.4 (0.4-0.5) | Reference |
| Ethnicity | | | | | | |
| | n of eczema=18,583 | | n of eczema=12,862 | | n of eczema=391 | |
| White | 8.6 (8.4-8.7) | Reference | 3.2 (3.1-3.2) | Reference | 0.4 (0.4-0.5) | Reference |
| Mixed | 11.9 (11.2-12.8) | 1.4 (1.3-1.5) | 3.5 (3.2-3.9) | 1.1 (1.0-1.2) | 0.5 (0.3-1.0) | 1.2 (0.6-2.3) |
| Black Caribbean | 20.6 (18.0-23.6) | 2.7 (2.4-3.1) | 5.3 (4.3-6.4) | 1.8 (1.4-2.2) | 1.5 (0.6-3.9) | 3.2 (1.2-8.7) |
| Black African | 15.3 (14.1-16.6) | 2.0 (1.8-2.2) | 3.8 (3.4-4.3) | 1.3 (1.1-1.4) | 1.1 (0.6-1.8) | 2.3 (1.3-4.1) |
| Black Other | 18.6 (16.0-21.7) | 2.4 (2.1-2.8) | 3.8 (3.0-4.9) | 1.3 (1.0-1.6) | 2.4 (1.2-4.7) | 5.2 (2.5-10.5) |
| Indian | 17.3 (16.0-18.6) | 1.7 (1.3-2.3) | 4.0 (3.6-4.4) | 1.3 (1.1-1.4) | 0.9 (0.5-1.5) | 2.0 (1.2-3.4) |

| | | | | | | |
|-------------|------------------|---------------|---------------|---------------|---------------|----------------|
| Bangladeshi | 23.4 (20.6-26.5) | 2.9 (2.6-3.3) | 5.1 (4.1-6.2) | 1.6 (1.3-2.0) | 0.9 (0.3-2.9) | 2.0 (0.6-6.1) |
| Pakistani | 14.1 (13.0-15.3) | 1.8 (1.6-1.9) | 4.0 (3.5-4.4) | 1.3 (1.1-1.4) | 0.8 (0.4-1.4) | 1.7 (0.9-3.0) |
| Chinese | 24.4 (20.9-28.5) | 2.8 (2.4-3.3) | 4.2 (3.1-5.7) | 1.3 (1.0-1.8) | 0.7 (0.1-4.6) | 1.5 (0.2-10.5) |
| Asian Other | 15.1 (13.7-16.7) | 1.8 (1.6-2.0) | 4.2 (3.6-4.8) | 1.3 (1.1-1.5) | 1.7 (0.9-3.1) | 3.7 (2.0-6.8) |
| Other | 9.9 (8.8-11.0) | 1.2 (1.1-1.4) | 3.4 (3.0-4.0) | 1.1 (1.0-1.3) | 0.7 (0.3-1.7) | 1.5 (0.6-3.7) |

aRR=adjusted rate ratio

95% CI=95% confidence interval

*Rate per 100 person-years

\$Model adjusted for sex, Index of Multiple Deprivation and the number of annual consultations during the study follow-up period

Table E5 Results in the overall child population regardless of the GP registration date related to birth: Incidence rates and rate ratios of eczema by sociodemographic factors stratified by age (N=1,472,337 for analysis on sex and Index of Multiple Deprivation and N=392,830 for analysis on ethnicity)

| | < 1 year old | | 1-4 years old | | 5-17 years old | |
|--------------------------------------|--------------------|---------------------------|--------------------|---------------------------|--------------------|---------------------------|
| | n of eczema=59,840 | | n of eczema=44,111 | | n of eczema=22,527 | |
| | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) | Rate* (95% CI) | aRR [§] (95% CI) |
| Sex | | | | | | |
| Male | 15.9 (15.7-16.1) | 1.3 (1.3-1.4) | 2.8 (2.8-2.9) | 1.0 (1.0-1.0) | 0.4 (0.4-0.4) | 0.7 (0.7-0.7) |
| Female | 11.7 (11.6-11.8) | Reference | 2.9 (2.8-2.9) | Reference | 0.5 (0.5-0.5) | Reference |
| Index of Multiple Deprivation | | | | | | |
| 1 (least deprived) | 15.6 (15.4-15.9) | 1.2 (1.2-1.3) | 3.1 (3.1-3.2) | 1.3 (1.2-1.3) | 0.4 (0.4-0.4) | 0.9 (0.9-1.0) |
| 2 | 13.8 (13.5-14.0) | 1.1 (1.0-1.1) | 2.9 (2.8-2.9) | 1.2 (1.1-1.2) | 0.4 (0.4-0.4) | 0.9 (0.9-0.9) |
| 3 | 13.6 (13.3-13.8) | 1.1 (1.0-1.1) | 2.8 (2.7-2.9) | 1.1 (1.1-1.2) | 0.4 (0.4-0.5) | 0.9 (0.9-1.0) |
| 4 | 13.1 (12.9-13.3) | 1.0 (1.0-1.1) | 2.7 (2.7-2.8) | 1.1 (1.1-1.1) | 0.5 (0.5-0.5) | 1.0 (1.0-1.0) |
| 5 (most deprived) | 12.9 (12.6-13.1) | Reference | 2.7 (2.6-2.7) | Reference | 0.5 (0.5-0.5) | Reference |
| Ethnicity | | | | | | |
| | n of eczema=26,958 | | n of eczema=15,269 | | n of eczema=1,824 | |
| White | 12.4 (12.2-12.5) | Reference | 3.1 (3.1-3.2) | Reference | 0.5 (0.5-0.5) | Reference |
| Mixed | 17.8 (16.8-18.8) | 1.5 (1.4-1.6) | 3.6 (3.3-3.9) | 1.2 (1.1-1.4) | 0.7 (0.5-0.9) | 1.4 (1.0-1.9) |
| Black Caribbean | 28.6 (25.5-32.0) | 2.5 (2.3-2.8) | 5.3 (4.4-6.4) | 2.1 (1.7-2.5) | 1.7 (1.1-2.5) | 3.5 (2.4-5.2) |
| Black African | 21.9 (20.6-23.4) | 1.9 (1.8-2.1) | 3.9 (3.5-4.3) | 1.5 (1.3-1.6) | 1.0 (0.8-1.2) | 2.1 (1.7-2.6) |
| Black Other | 28.5 (25.2-32.2) | 2.5 (2.2-2.8) | 3.9 (3.2-4.9) | 1.4 (1.1-1.8) | 1.8 (1.3-2.5) | 3.7 (2.6-5.3) |
| Indian | 24.1 (22.7-25.6) | 1.9 (1.7-2.0) | 4.0 (3.7-4.4) | 1.3 (1.2-1.4) | 1.0 (0.9-1.3) | 2.2 (1.8-2.7) |

| | | | | | | |
|-------------|------------------|---------------|---------------|---------------|---------------|---------------|
| Bangladeshi | 31.2 (28.0-34.8) | 2.4 (2.1-2.9) | 5.3 (4.4-6.3) | 1.6 (1.3-1.9) | 1.2 (0.7-2.1) | 2.3 (1.3-4.0) |
| Pakistani | 20.1 (18.7-21.5) | 1.6 (1.5-1.8) | 3.8 (3.5-4.2) | 1.1 (0.9-1.3) | 1.0 (0.8-1.2) | 1.8 (1.5-2.3) |
| Chinese | 41.8 (37.1-41.1) | 3.4 (3.0-3.8) | 4.6 (3.5-5.9) | 1.7 (1.3-2.2) | 0.5 (0.2-1.6) | 1.1 (0.3-3.3) |
| Asian Other | 23.6 (21.8-25.5) | 2.0 (1.8-2.1) | 4.3 (3.8-4.9) | 1.3 (1.2-1.5) | 1.2 (0.8-1.6) | 2.3 (1.6-3.2) |
| Other | 16.7 (15.4-18.2) | 1.3 (1.2-1.5) | 3.2 (2.8-3.6) | 1.1 (1.0-1.3) | 0.9 (0.7-1.2) | 1.9 (1.4-2.6) |

aRR=adjusted rate ratio

95% CI=95% confidence interval

*Rate per 100 person-years

\$Model adjusted for sex, Index of Multiple Deprivation and the number of annual consultations during the study follow-up period

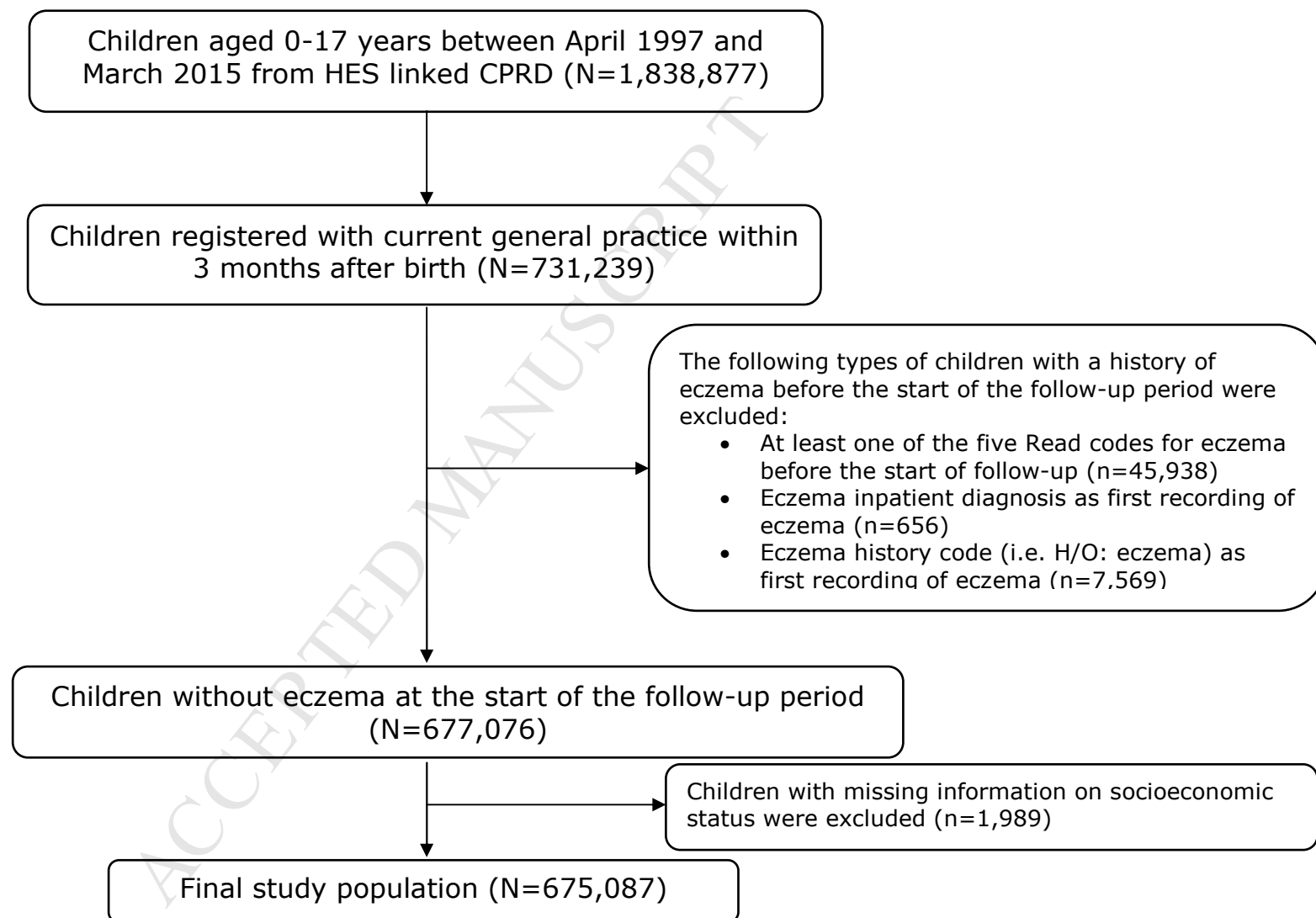


Figure E1 Constructing the final study population (N=675,087)

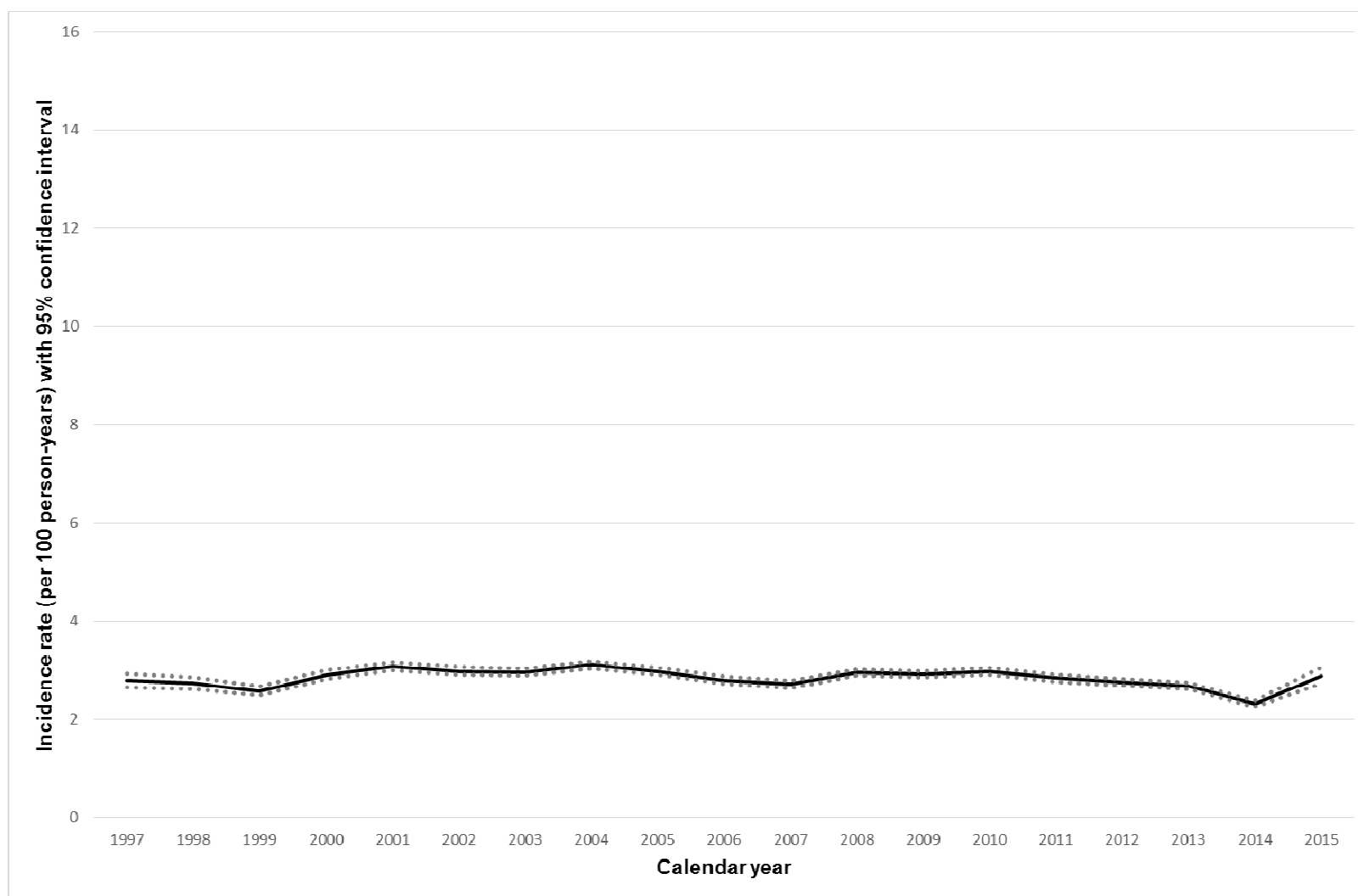


Figure E2 Incidence rate (per 100 person-years) of eczema by calendar year, N=675,087