Prevalence and severity of asthma, rhinitis, and eczema in Singapore schoolchildren

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Abstract

This study was part of an international effort to evaluate the epidemiology of asthma and allergic diseases around the world. The aim was to assess the prevalence and severity of these disorders in Singapore schoolchildren. The international study of asthma and allergies in childhood (ISAAC) written questionnaire was administered to 6238 schoolchildren. The respondents were parents of a 6–7 year cohort (n=2030), and schoolchildren aged 12–15 years (n=4208). The overall cumulative and 12 month prevalence of wheezing were 22% and 12%, respectively. The prevalence of doctor diagnosed asthma was 20%. Rhinitis was reported by 44% and chronic rashes by 12%. Multiple logistic regression analysis showed that a higher prevalence of wheezing and rhinitis was associated with males, and subjects of higher socioeconomic status (based on type of housing and total family income). More severe asthma related symptoms were present in Malays and Indians than in the Chinese. Allergic disorders are common in Singapore and prevalence is comparable to some populations in the West. Demographic and socioeconomic factors appear to influence the prevalence and severity of these disorders.

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The prevalence and severity of asthma is rising in many developed countries.[1–3] The economic impact is staggering, with treatment costs in 1990 amounting to US$6·4 billion of the US health bill,[4] and about one billion pounds sterling in the United Kingdom at the same period.[5] Eczema and rhinitis add substantially to this burden. Furthermore, there is the social cost with significant loss of school and work days.

Although it is known that the principal aetiological factor in asthma is atopy,[6] the factors responsible for this observed increase are uncertain. There has been speculation that changes in lifestyle and urbanisation in industrialised countries may be partly responsible.[7 8] This stems from the observation that the prevalence of asthma and allergic diseases appears to be lower in the Asian Pacific countries than in the West.[9–12] However, the prevalence of childhood asthma in Singapore is increasing similarly, with cumulative asthma prevalence in schoolchildren rising from 5·5% to 14·7% between 1969 and 1987.[13 14] Some of this increase may be explained by differences in survey methods and an increased awareness of asthma diagnosis.

It is therefore important that epidemiological surveys on asthma are standardised to enable international and temporal comparisons. Moreover, international studies of asthma prevalence and severity could provide insights into the risk factors responsible for this rising asthma burden. To this end, an international childhood asthma prevalence study, the international study of asthma and allergies in children (ISAAC) was formed in 1992.[15] In phase 1 of this ISAAC study, standardised written and video questionnaires were developed.

We have analysed the results of the ISAAC phase 1 written questionnaire survey of schoolchildren in Singapore. The population consists of Chinese (75%), Malays (15%), and Indians (10%), so racial differences in the prevalence and severity of asthma, rhinitis, and eczema were evaluated. We attempted to compare our results with those from other studies using the same ISAAC protocol.[16 17]

Methods

QUESTIONNAIRES

The ISAAC written questionnaire for asthma was identical to those used previously[16] (appendix). It concentrated on past and current wheezing episodes, wheezing frequency, sleep disturbance and speech limitation during attacks, exercise induced wheezing, persistent cough unrelated to respiratory infections, and a doctor's diagnosis of asthma. In addition, ISAAC core questions were included regarding the presence and severity of rhinitis and eczema (appendix). We assessed socioeconomic status by asking respondents for total family income and type of residence (public housing, condominium, or landed houses). The total family monthly income was categorised as <S$1000, S$1000–1999, S$2000–3999, and >S$4000, corresponding to the bottom 16th centile, bottom 16th–43rd centile, top 24th–57th centile, and top 24th centile, respectively, according to the Singapore population census in 1990.[18] The response rate for family income was only 47%, as most of the 12–15 year olds who completed the questionnaire were unable to provide the information.

DATA COLLECTION AND ANALYSIS

We studied two age groups of schoolchildren (6–7 years, and 12–15 years). Thirty schools from all parts of Singapore were randomly selected, of which 21 consented to participate. The parents of the 6–7 year olds were the

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Table 1 Demographic profile and socioeconomic categories of study population; values are number (%)

Variables	Age groups	
	6–7 Years	12–15 Years
Sex		
Male	1065 (52)	2335 (55)
Female	947 (47)	1866 (44)
Not stated	18 (1)	7 (1)
Racial groups		
Chinese	1722 (85)	3282 (78)
Malay	185 (9)	605 (14)
Indian	68 (3)	215 (5)
Not stated	55 (3)	106 (3)
Type of housing		
Public housing	1239 (61)	3411 (81)
Private condominium	276 (14)	319 (8)
Landed house	435 (21)	380 (9)
Not stated	80 (4)	98 (2)
Family income (S$/month)		
Less than 1000	130 (6)	119 (3)
Above or equal 1000 and less than 2000	403 (20)	387 (9)
Above or equal 2000 and less than 4000	485 (24)	393 (9)
Above or equal 4000	760 (37)	214 (5)
Not stated	252 (13)	3095 (74)
Total studied	2030	4208

respondents, while the 12–15 year olds self completed the questionnaire. The survey was conducted in English, only a small number of non-English speaking parents required Mandarin (4·7%) and Malay (0·3%) translations. This survey was carried out between the months of February and November 1994.

Data were analysed using the PROC FREQ and PROC LOGISTIC procedures of the statistical package SAS (version 6.08) for personal computers.

Results

There were 6238 responses, a rate of approximately 90%. The demographic profile and socioeconomic categories of respondents are shown in table 1. As a result of a mistake made in the initial part of the survey, 1331 6–7 year old respondents did not receive the core questions on eczema. Responses that were excluded from analysis included 69 with invalid (n=17) or missing (n=46) age, and those with inconsistent answers to stem questions on asthma (n=218), rhinitis (n=152), and eczema (n=104). As a result, the number of valid responses for asthma, rhinitis and eczema were 6020, 6086, and 4803, respectively, as shown in table 2.

PREVALENCE

The overall cumulative and current prevalences of self reported asthma, rhinitis and eczema, and their symptoms, are summarised in table 2. Reported symptoms of rhinitis had the highest cumulative prevalence (2710/6086, 44·5%), followed by asthma (ever had wheezing, wheezing with exercise, or persistent cough) (1856/6020, 30·8%), and eczema (578/4803, 12·0%). The data were also divided by age group, sex, ethnic group, and socioeconomic status (type of housing and family income) (table 2). Reported symptoms of wheezing were observed to be higher in the 6–7 year age group, males, and higher socioeconomic groups. Statistical comparisons of these differences were made using multiple logistic regression (see below).

Although persistent rhinitis was the most commonly reported atopic symptom, the frequency with which these respondents reported hayfever was extremely low (275/6086, 4·5%) (table 2) and 54·5% were not aware of this diagnosis. Moreover, 45/275 (16·4%) reported having hayfever without having symptoms of rhinitis, suggesting a lack of understanding of the condition in our population. This assumption was consistent with the observed lack of seasonal variation in reported rhinitis symptoms. More than half (1170/2258, 52·3%) of those currently having symptoms reported having them year round. In addition, analysis of the monthly frequency of reported symptoms showed little variation from month to month (range between 54·5 and 60·8%).

Table 2 Self reported prevalence (%) of asthma, rhinitis and eczema and their related symptoms – written questionnaire

Symptom	Age group (years)			Sex		Race			Type of housing			Family income (S$'000/month)			
	Overall	6–7	12–15	Male	Female	Chinese	Malay	Indian	Public	Condo*	Landed	<1	1–<2	2–<3	>4
Responses for asthma															
No	**6020**	**1918**	**4102**	**3284**	**2726**	**4869**	**747**	**267**	**4487**	**582**	**796**	**236**	**744**	**852**	**952**
Ever wheezed	21·8	28·6	18·6	24·2	18·9	22·4	17·4	22·8	18·5	30·1	34·2	19·1	16·3	22·9	37·0
Wheeze in the last year	12·0	16·5	9·9	13·1	10·7	12·2	10·0	13·5	10·2	16·3	19·3	11·4	8·9	13·1	20·4
Wheezing wt ex last year**	11·6	8·4	13·2	12·8	10·3	11·6	11·5	12·4	11·5	12·4	12·4	10·2	10·2	10·0	12·1
Persistent cough last year	12·5	14·9	11·4	13·4	11·5	11·9	15·4	14·6	12·1	13·9	13·3	14·8	12·2	12·8	16·4
Any wheezing***	30·8	34·8	29·0	33·8	27·3	31·1	28·6	28·8	28·4	37·8	39·9	30·1	25·5	30·6	42·9
Ever diagnosed asthma	20·0	18·5	20·7	22·1	17·5	19·9	21·3	17·2	18·8	22·2	24·7	17·4	17·7	20·5	24·9
Responses for rhinitis															
No	**6086**	**1936**	**4150**	**3328**	**2748**	**4914**	**761**	**269**	**4545**	**585**	**801**	**235**	**759**	**858**	**960**
Ever had rhinitis	44·5	30·8	50·9	47·3	41·2	45·4	42·0	34·9	43·7	48·2	47·4	30·2	39·9	42·1	43·1
Rhinitis in the last year	37·1	27·6	41·5	39·8	33·9	38·5	31·0	27·9	35·7	42·4	42·3	24·7	32·4	37·1	39·5
Associated itchy eye last year	13·4	9·0	15·4	13·8	13·0	13·1	14·7	12·6	12·9	14·5	16·4	7·7	11·9	13·3	14·5
Every diagnosed hayfever															
Yes	4·5	6·3	3·7	4·8	4·1	4·4	3·8	6·7	4·1	3·6	6·9	6·0	4·1	4·8	6·5
Don't know	54·5	24·3	68·7	52·1	57·6	52·8	65·8	55·8	57·6	45·3	45·2	51·9	50·1	43·4	32·5
Responses for eczema															
No	**4803**	**656**	**4147**	**2643**	**2153**	**3709**	**728**	**247**	**3904**	**332**	**444**	**213**	**634**	**557**	**297**
Chronic rash, ever	12·0	10·5	12·3	12·0	11·9	11·9	12·1	13·0	11·8	14·8	12·8	12·2	8·8	13·8	16·5
Chronic rash in the last year	9·4	8·8	9·5	9·4	9·4	9·4	9·3	8·9	9·2	10·8	10·4	8·9	7·4	11·0	12·8
Chr rash wt typ distr****	6·9	6·1	7·0	6·7	7·0	6·9	6·3	7·7	6·7	8·1	8·1	6·6	5·8	7·9	9·1
Ever diagnosed eczema															
Yes	3·9	3·0	4·1	3·8	4·1	4·3	1·6	4·9	3·5	6·0	6·3	4·2	2·8	3·9	6·7
Don't know	53·7	24·7	58·3	51·6	56·2	53·4	57·6	45·3	53·6	58·4	51·8	46·5	44·6	48·8	45·1

*Condo=condominium; **wt ex=with exercise; ***any wheezing=ever wheezed, wheeze with exercise or persistent cough;
****Chr rash wt typ distr=chronic rash with typical distribution.

Table 3 Prevalence (%) of reported symptoms indicating severity of asthma, rhinitis, and eczema

Symptom	Overall	Age group (years)		Sex		Race			Type of housing			Family income (S$'000/month)			
		6–7	12–15	Male	Female	Chinese	Malay	Indian	Public	Condo*	Landed	<1	1–<2	2–<3	>4
Wheeze in last year															
No	**723**	**316**	**407**	**430**	**292**	**594**	**75**	**36**	**456**	**95**	**154**	**27**	**66**	**112**	**194**
No of wheezing episodes															
1–3	77·8	76·8	78·6	76·8	79·3	78·5	82·4	62·9	77·5	79·3	77·4	75·0	72·9	76·1	81·1
4–12	16·5	18·8	14·8	16·2	17·0	15·8	16·2	25·7	16·1	19·6	17·1	20·8	25·4	15·6	14·6
>12	5·6	4·4	6·6	7·0	3·6	5·7	1·5	11·4	6·4	1·1	5·5	4·2	1·7	8·3	4·3
Woken by wheeze															
Nil	58·9	59·2	58·7	61·2	55·5	61·8	48·0	36·1	60·3	70·5	61·7	51·9	54·5	55·4	60·3
<1 Per week	29·9	30·4	29·5	26·7	34·6	29·1	36·0	30·6	32·0	20·0	29·2	25·9	36·4	31·3	32·5
>1 Per week	11·2	10·4	11·8	12·1	9·9	9·1	16·0	33·3	12·1	9·5	9·1	22·2	9·1	13·4	7·2
Limitation of speech during wheezing attack	17·3	9·2	23·6	19·1	14·7	14·5	36·0	27·8	20·2	12·6	11·7	18·5	21·2	14·3	7·2
Rhinitis in last year															
No	**2258**	**535**	**1723**	**1323**	**932**	**1894**	**236**	**75**	**1623**	**248**	**339**	**58**	**246**	**318**	**379**
Interfere with daily activity															
Not at all	37·3	42·4	35·8	36·9	37·9	38·7	30·1	36·0	35·7	40·7	42·5	36·2	31·3	36·2	40·1
Little	49·0	44·3	50·5	48·9	49·2	49·0	52·5	40·0	50·1	47·2	44·8	46·6	53·7	47·8	45·4
Moderate	10·4	11·8	9·9	10·7	9·9	9·5	11·9	14·7	10·7	9·7	9·7	15·5	12·2	12·9	11·9
A lot	3·3	1·5	3·8	3·5	3·0	2·8	5·5	9·3	3·5	2·4	3·0	1·7	2·8	3·1	2·6
Rashes in last year															
No	**452**	**58**	**394**	**248**	**202**	**347**	**68**	**22**	**361**	**36**	**46**	**19**	**47**	**61**	**38**
Persistent rash without clearing	42·3	46·6	41·6	42·7	41·6	41·5	47·1	50·0	42·1	44·4	39·1	47·4	34·0	39·3	42·1
Kept awake by rash															
Never	58·4	53·4	59·1	64·5	51·0	61·4	48·5	54·5	54·8	72·2	71·7	31·6	70·2	59·0	81·6
<1 Per week	30·3	36·2	29·4	26·6	35·1	26·8	41·2	31·8	33·5	16·7	19·6	57·9	25·5	27·9	18·4
>1 Per week	11·3	10·3	11·5	8·9	13·9	11·8	10·3	13·6	11·6	11·1	8·7	10·5	4·3	13·1	0·0

*Condo=condominium.

Eczema was the least commonly reported allergic disorder with 12·0% (578/4803) of the study population reporting ever having a chronic rash, and 9·4% (452/4803) reporting current symptoms. This was even lower (6·9%, 330/4803) when considering only chronic rash with a typical eczema distribution (table 2). As with hayfever, we noted a similar lack of understanding. More than half (2580/4803, 53·7%) were not aware of the diagnosis of eczema.

SEVERITY AND CHRONICITY

For respondents with current symptoms of asthma, rhinitis, or eczema, we assessed severity and chronicity by the number of wheezing episodes, severity of each attack, and interference of these symptoms with daily activities. Using these indicators, we observed that the older age group (12–15 years), males, Indians, Malays, and children in lower socioeconomic groups tended to have more severe atopic disease (table 3) (see below for statistical analysis). An exception was that females tended to have more severe eczema.

MULTIPLE LOGISTIC REGRESSION ANALYSIS

To evaluate the effects of each variable (age, sex, race, and socioeconomic status) on the prevalence and severity of these allergic disorders, we carried out multivariate analysis. This showed that the cumulative prevalence of wheezing was higher in the 6–7 year age group, male sex, and higher socioeconomic group (either by type of housing, or family income or both) (table 4). In contrast, Malay and Indian race was associated with more frequent and severe wheezing attacks. As expected, a positive response to wheezing was strongly associated with the presence of rhinitis or eczema (adjusted odds ratio=2·36, 95% confidence interval: 2·04 to 2·72) ($p<0·001$).

The older age group (12–15 years) and male sex had higher prevalence of rhinitis (table 4). The effect of race and socioeconomic status on rhinitis was less marked than on asthma. Eczema was not highly associated with any of the demographic data tested (table 4).

Discussion

Although the data obtained were not substantiated by procedures such as skin prick testing and exercise challenge, previous work in an English speaking population has found the ISAAC written questionnaire reasonably sensitive and specific for bronchial hyperresponsiveness.[19] Most of our survey was conducted in English, with only 312 (5%) children of non-English speaking parents who used Mandarin and Malay translations.

When our data were compared with those of two previous local surveys, there appeared to be a distinct increase in the cumulative prevalence of asthma over the last 27 years. The reported cumulative prevalence of asthma was 5·5% in 1967,[13] 13·7% in 1987,[14] and 20·0% in this survey. Although confounding factors such as differences in survey methods, and a possible increase in awareness of asthma diagnosis have to be considered, this trend is in accordance with those in developed countries,[1 3 21] and parallels the rapid urbanisation of the city state of Singapore.

Despite rising local asthma prevalence figures, it was also noted that the cumulative and current prevalences of wheezing in the 12–15 year olds (18·6% and 9·9%, respectively) were lower than in the West. Identical ISAAC surveys conducted recently on 12–15 year olds in Germany (Bochum), England (West Sussex), New Zealand (Wellington), and Australia (Adelaide and Sydney) reported cumulative and current prevalence of wheezing ranging from 33% to 45%, and 20% to 30%, respectively.[16]

Table 4 Effects of demographic, socioeconomic, and atopic status on the reported symptoms and diagnosis of asthma, rhinitis, and eczema (adjusted odds ratio (95% confidence interval))

Symptoms	*Age group*[a]	*Sex*[a]	*Race*[a]	*Housing*[a]	*Income*[a]	*@Atopy*[a]
Responses for asthma						
Diagnosed asthma, ever	1·08*** (1·04–1·13)	0·93*** (0·89–0·97)	NS	NS	>$K,1·12* (1·02–1·24)	2·10‡ (1·78–2·48)
Wheeze, ever[b]	0·96* (0·91–0·99)	0·93‡ (0·89–0·97)	NS	Condo, 1·10* (1·01–1·21); Landed, 1·11* (1·02–1·20)	>$4K,1·21‡ (1·09–1·35)	2·36‡ (2·04–2·72)
Woken by wheezing last year	NS	NS	Malay, 1·16* (1·01–1·37); Indian, 1·58‡ (1·10–2·28)	NS	NS	1·36* (1·02–1·79)
Wheezing attack which limits speech	1·19* (1·02–1·38)	NS	Malay, 1·28‡ (1·12–1·46); Indian, 1·16* (1·01–1·36)	NS	NS	1·94* (1·05–3·59)
Responses for rhinitis						
Diagnosed hayfever, ever	NS	NS	NS	Condo, 0·95* (0·91–0·99)	NS	2·44‡ (1·75–3·41)
Ever had rhinitis	1·67‡ (1·56–1·79)	0·91† (0·86–0·97)	Indian, 0·79† (0·68–0·92)	NS	$1–2K, 1·18† (1·06–1·31); $2–4K, 1·21† (1·08–1·35); >$4K, 1·25† (1·09–1·43)	2·11‡ (1·93–2·30)
Associated itchy eyes	1·12* (1·01–1·24)	NS	Malay, 1·24* (1·03–1·48)	NS	NS	1·45‡ (1·20–1·75)
Interfere with daily activity	1·35** (1·12–1·63)	NS	NS	Landed, 0·74* (0·57–0·96)	NS	1·33‡ (1·20–1·48)
Responses for eczema						
Diagnosed eczema, ever	1·07** (1·02–1·13)	NS	NS	NS	>$4K, 1·17* (1·01–1·36)	4·70‡ (2·84–7·80)
Chronic rash, ever	NS	NS	Indian, 1·12* (1·01–1·23)	NS	NS	2·83‡ (2·16–3·70)

[a]Reference categories for age group=6–7 years; sex=male; race=Chinese; housing=public housing; and family income=<S$1000/month; atopy=non-atopic.
[@]Atopy=show symptoms of other atopic diseases. Symptoms of rhinitis and eczema were used to define the atopic status (atopic) in the analysis for asthma, while symptoms of asthma and eczema were used for rhinitis).
[b]Ever wheeze was defined as a positive response for every wheezing, or wheezing with exercise in the written questionnaire.
*p<0·05, †p<0·01, ‡p<0·001.

Our figures are comparable with a recent nationwide ISAAC survey in Great Britain, which reported cumulative and current prevalence of wheezing of 23% and 15%.[17] The prevalence of diagnosed asthma was higher in our population (20·0%) than in the British study (13·1%). Thus our local prevalence figures probably lie somewhere between those of the West and developing countries. The reported cumulative and current prevalence of wheezing in southern China are reported to be as low as 1·9 and 1·1%.[21] Singaporean Chinese are of southern Chinese descent, suggesting that geographical differences in wheezing and asthma prevalence may be influenced more by environment than genetics.

As expected, there was a strong association between reported asthma symptoms and symptoms of other atopic disorders ($p<0·001$). Persistent rhinitis was found to be the most common symptom reported, with cumulative and current prevalence of 44·5% and 37·1%, respectively. When confined to those with concomitant symptoms of itchy eyes, a clinical indicator of allergic rhinitis, the current prevalence was 15·4%, slightly higher than the prevalence ranges of 6–12% in other populations.[22–24] The lack of seasonality of rhinitis symptoms in our population is consistent with the tropical climate and the high frequency of sensitivity to house dust mite allergens in our atopic subjects.[25] Eczema is the least common allergic disorder in our population, with a current prevalence of rashes of typical distribution of 6·9%, a figure comparable with reported prevalence of childhood eczema in Taiwan[26] and mainland China.[21]

Multiple logistic regression analysis, which adjusts for confounding variables, was used to evaluate the effects of age, sex, race, and socioeconomic status on the prevalence and severity of wheezing, rhinitis, and eczema (table 4). Higher prevalence of wheezing and other atopy related symptoms was observed in the higher socioeconomic group, but the lower income group experienced more severe disease. The former observation has also been reported in studies conducted in the United Kingdom.[27–30]

A previous survey on adult asthma in Singapore[31] showed increased prevalence in Indians and Malays compared to Chinese, but our data indicate that the prevalence is similar in all racial groups. The Indians and Malays, however, had more severe asthma than the Chinese. Although the reasons for this difference are not evident, previous work suggests that environmental factors such as smoking and rearing of pets are important.[31] Another possibility might be the smaller airways inherently present in Malay and Indian children.[32]

This study was part of an international effort to evaluate and compare the epidemiology of asthma and allergic disease around the world. Our results suggest that atopic disorders are an increasing problem not only in the West but also in an Asian population. It appears that demographic and socioeconomic factors both play a role in influencing the prevalence and severity of these disorders. The reasons behind these differences will be evaluated with the ISAAC phase II protocol which is currently being formulated.

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Appendix
Written questionnaire

CORE QUESTIONNAIRE FOR WHEEZING AND ASTHMA*:

1. Have you ever had wheezing or whistling in your chest at any time in the past? Yes/No. If 'no', skip to question 6.
2. Have you had wheezing or whistling in your chest in the last 12 months? Yes/No. If 'no', skip to question 6.
3. How many attacks of wheezing have you had in the last 12 months? None, 1–3, 4–12, >12.
4. In the last 12 months, how often, on the average, has your sleep been disturbed due to wheezing? Never woken with wheezing, Less than one night per week, One or more nights per week.
5. In the last 12 months, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths? Yes/No
6. Have you ever had asthma? Yes/No
7. In the last 12 months, has your chest sounded wheezy during or after excercise? Yes/No
8. In the last 12 months, have you had a dry cough associated with a cold or chest infection? Yes/No

CORE QUESTIONNAIRE FOR RHINITIS*:

1. Have you ever had a problem with sneezing, or blocked nose when you did not have a cold or flu? Yes/No. If 'no' skip to question 6.
2. In the past 12 months, have you had a problem with sneezing, or a runny or blocked nose when you did not have a flu? Yes/No. If 'no' skip to question 6.
3. In the past 12 months, has this nose problem been accompanied by itchy-watery eyes? Yes/No
4. In which of the past 12 months did this nose problem occur?
5. In the past 12 months, how much did this nose problem interfere with your activities? Not at all, A little, A moderate amount, A lot.
6. Have you ever had hayfever? Yes/No/Don't know.

CORE QUESTIONNAIRE FOR ECZEMA*:

1. Have you ever had an itchy rash that was coming and going for at least 6 months? Yes/No If 'no' skip to question 6.
2. Have you had an itchy rash at any time in the last 12 months? Yes/No. If 'no' skip to question 6.
3. Has this itchy rash at any time affected any of the following places: the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, around the neck, ears or eyes? Yes/No
4. Has this rash cleared completely at any time in the last 12 months? Yes/No.
5. In the last 12 months, how often, on average, have you been kept awake at night by this itchy rash? Never in the last 12 months, Less than one night per week, One or more nights per week.
6. Have you ever had eczema? Yes/No/Don't know.

*These questions were directed at 12–15 year olds who self completed the questionnaire; questions were modified for 6–7 years olds whose parents completed the questions.

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