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# Socioeconomic status and prevalence of allergic rhinitis and atopic eczema symptoms in young adolescents

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Environmental factors are known to influence the development of allergic rhinitis and atopic eczema in genetically susceptible individuals. Socioeconomic status (SES) may be an important indicator of risk for these conditions. The International Study of Asthma and Allergies in Childhood (ISAAC) Phase 1 written questionnaire was used to determine the prevalence and severity of allergic rhinoconjunctivitis and atopic eczema symptoms in 4947 pupils aged 13–14 years attending 30 schools in socioeconomically diverse areas of Cape Town. Home addresses were used to stratify participants into five SES bands. Relationships between symptom prevalence and severity, and SES, recent urbanization and upward socioeconomic mobility were examined. Logistic regression was used to generate odds ratios (OR) and 95% confidence intervals (CI) in order to assess overall trends by SES. The prevalences of self-reported allergic rhinitis symptoms and recurrent itchy rash in the past year were 33.2% and 11.9% respectively. Girls had a significantly higher prevalence of all symptoms than boys. The prevalence of allergic rhinitis symptoms increased from lowest to highest SES (overall OR for rhinitis symptoms in past year = 1.16, 95% CI 1.11–1.21). There was no significant trend in reported eczema symptoms by SES other than for the question, 'Have you ever had eczema' (OR = 0.88, 95% CI 0.83–0.93). Longer period of urbanization was weakly associated only with recurrent itchy skin rash (OR = 1.05, 95% CI 1.01–1.09). 'Socially mobile' pupils, i.e. those resident in the lowest SES areas but attending highest SES schools showed significantly higher prevalences of eczema and some rhinitis symptoms than pupils attending lowest SES schools. These findings may reflect differences in reporting related to language, culture and access to medical care rather than real differences in prevalence.

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Although inheritance has been shown to be a primary risk factor, the recent rapid increase in prevalence of all forms of atopic disease, worldwide, suggests that environmental factors strongly influence disease expression (1, 2). In order to investigate these environmental influences, the International Study of Asthma and Allergies in Childhood (ISAAC) was commenced in 1992. The purpose of the study was to systematically compare prevalence estimates across populations in order to improve understanding of the aetiology of asthma, allergic rhinoconjunctivitis and atopic eczema and to identify major risk factors for these conditions (3). Early migrant studies of genetically similar groups of Chinese, Afro-Caribbean, South African Xhosa-speakers and New Zealand Tokelaun children showed that the prevalence of atopic disease more than doubled in children living in an urban, westernized environment compared with their rural counterparts (4–6). This led to the hypothesis that factors associated with a 'Western

lifestyle' contribute to the aetiology of these illnesses. Several more recent studies have supported this hypothesis (7, 8).

A strong social class gradient also has been observed in prevalence studies of atopic eczema and allergic rhinitis in urban population groups in Britain and the United States for many years (9, 10). Some recent studies have confirmed this finding (11, 12), while others have failed to do so (13). In Cape Town there are widely varying socioeconomic circumstances amongst the population. A rapid rate of migration from rural to urban areas, as well as some degree of socioeconomic mobility has occurred amongst black South Africans, particularly since the end of apartheid in 1994.

The aim of this study was to assess the prevalence and severity of allergic rhinoconjunctivitis and atopic eczema symptoms in young adolescents in Cape Town, South Africa, using the ISAAC Phase 1 data, and to examine their relationships to socioeconomic status (SES). This follows an asthma study using the same methods (14).

## Patients and methods

Thirty-three schools were selected by stratified random sampling from three socio-politically defined strata* to represent the demographic make-up of the greater Cape Town metropolis. Twenty schools were in black, Xhosa-speaking, very low income areas, seven in predominantly coloured, mainly Afrikaans-speaking, very low to low income areas, and six were integrated schools, situated in middle to high income areas where either English or Afrikaans was spoken. All of the schools were coeducational except for two of the integrated schools, which were girls' schools.

Consent was obtained from the Western Cape Provincial Department of Education as well as the school principals and teachers. In the selected schools all pupils aged 13 and 14 years were invited to participate in the study. An explanatory letter was sent to the children's parents, together with a reply slip. Parents were given the option of withdrawing their child from the study.

One week later, participating children completed the simple written questionnaire containing the six core ISAAC questions on symptoms of both rhinoconjunctivitis and eczema (Appendix 1), as well as questions on wheezing and asthma and a section on demographic data. The questionnaire was offered in the dominant language used at the school, English, Afrikaans or Xhosa. The survey was conducted between February and August 1995.

The SES of each child was defined by his or her residential address. Each child was located to a census enumerator area. Each enumerator area represented a certain SES according to a locally developed 'Levels of Living' index (15). The index uses five variables derived from the 1991 National Census to measure SES: income (the proportion of household heads earning less that R10,000 per annum – *c.* $2000 in 1995); education (the proportion of adults with less than 8th grade education); unemployment (the proportion of adults who are unemployed but actively seeking work); welfare (the proportion of household heads who are single mothers with three or more children); and overcrowding (the proportion of households with over 1.5 residents per habitable room). A composite score of 50 was used to rank the enumerator areas. The ranked distribution was divided into 10 quantiles to produce 10 SES bands. In order to smooth relationships and simplify presentation of the data we combined adjacent quantiles to produce five SES bands ranging from 1 (highest SES, i.e. richest) to 5 (lowest SES, i.e. poorest). For each ISAAC question prevalence (percentage) was calculated for each SES band.

As many families in black residential areas have migrated recently from the rural Eastern Cape, urbanization status was defined as the number of years pupils attending black schools had lived in Cape Town. An exploratory analysis of the effect of upward socioeconomic mobility on eczema and rhinitis was made using the largest gradient of socioeconomic difference, namely, attendance at formerly white, now integrated schools situated in highest income (SES band 1) areas by pupils living in the lowest income (SES band 5) areas. The prevalences of allergic rhinitis and eczema symptoms in this group were compared with those of pupils resident and attending schools in the SES band 5 areas, as well as those of all other pupils attending the integrated schools ('classmates') as reference groups.

*Under apartheid South Africans were classified into one of four racially defined groups: black (African ancestry), white (European ancestry), coloured (mixed ancestry from Africa, Europe and Asia) and Asian (Indian subcontinent ancestry). The first three of these groups predominate in Cape Town. Residential areas and schools were segregated accordingly. Blacks, mainly Xhosa-speakers, and coloureds were restricted to living and schooling in overcrowded, under-serviced areas. In the early 1990s formerly white state schools situated in affluent residential areas, both English- and Afrikaans-speaking, began to admit pupils from all groups, a process accelerated by the lifting of racial legislation in 1994. These schools are referred to as 'integrated'.

Results were summarized by frequencies and percentages. OR with 95% CI were calculated to describe the relationship between gender and outcome variables. To summarize the relationship between SES band and outcome variables, SES was treated as an ordinal variable on a 1 to 5 scale, using logistic regression. These results were verified by the Cochran-Armitage test for linear trend, and by logistic regression with SES band entered as a categorical variable.

Approval for the study was obtained from the Research Ethics Committee of the Medical Faculty of the University of Cape Town.

## Results

Replies were received from 5178 pupils, representing a response rate of 82.3%. Subsequently the questionnaires of 231 pupils from three black schools could not be found, leaving a sample of 4947 respondents. Of these 1826 (36.9%) responded in Xhosa, 1947 (39.4%) in Afrikaans and 1174 (23.7%) in English. There were 2692 (59.9%) female respondents, 1976 (39.9%) male, while in nine (0.2%), gender was not stated.

Of the 4947 respondents, 4706 (95.1%) could be placed in an SES band according to residential address. Sixty-two lived outside the study area, and in 179 a correct address could not be assigned. There were some inconsistencies in the data in the form of missing, inappropriate or inapplicable responses, which necessitated their exclusion from some of the analyses. This resulted in each question having a slightly different sample size. The responses to question 12 (see Appendix 1), on the association between rhinitis symptoms and calendar month, were of too poor a quality to be analysed.

Table 1 compares male and female responses to the written ISAAC questionnaire. Both rhinoconjunctivitis and eczema symptoms were more prevalent in girls for all questions. There were two severity questions: both rhinitis interfering moderately or a lot with daily activities, and an itchy skin rash causing night waking more than once a week, were more prevalent in girls.

The associations between self-reported rhinitis and eczema symptoms and SES are shown in Tables 2 and 3. There was a clear positive association between the prevalence of allergic rhinitis symptoms and higher SES (Table 2). Only in the highest stratum of the question dealing with severity of rhinitis (interfering a lot with daily activities) was the association reversed, i.e. the lowest SES pupils had the highest prevalence of this effect on daily activities.

There was no statistically significant association between prevalence of eczema symptoms and SES (Table 3). However, a significantly higher percentage of pupils from the higher SES strata replied in the affirmative to the final question, 'Have you ever had eczema?'

Among pupils attending black schools (n = 1746), no association was found between

Table 1. Self-reported prevalences of hayfever and eczema, and related symptoms, among boys and girls aged 13–14 years

| | All (%) (n = 4336–4663) | Boys (%) (n = 1671–1839) | Girls (%) (n = 2587–2819) | OR (male vs. female) (95% CI) |
|---|---|---|---|---|
| Rhinitis | | | | |
| Ever had rhinitis symptoms | 40.8 | 39.0 | 42.0 | 0.88 (0.78–0.99) |
| Rhinitis symptoms in past year | 33.2 | 30.2 | 35.2 | 0.80 (0.70–0.91) |
| Associated itchy eyes in past year | 17.1 | 12.4 | 20.1 | 0.56 (0.47–0.67) |
| Effect on daily activities | | | | |
| None | 75.0 | 78.0 | 73.0 | *0.76 (0.66–0.67) |
| Little | 15.7 | 14.2 | 16.7 | |
| Moderate | 5.6 | 3.8 | 6.7 | |
| A lot | 3.7 | 4.0 | 3.6 | |
| Ever had hayfever | 31.6 | 27.5 | 34.2 | 0.73 (0.64–0.83) |
| Eczema | | | | |
| Ever had recurrent itchy rash | 17.3 | 14.3 | 19.2 | 0.70 (0.60–0.82) |
| Itchy rash in past year | 11.9 | 9.1 | 13.8 | 0.63 (0.52–0.76) |
| Ever had this rash in flexures | 8.9 | 6.5 | 10.5 | 0.59 (0.47–0.74) |
| Rash cleared in past year | 7.7 | 6.0 | 8.9 | 0.66 (0.52–0.83) |
| Night waking by rash | | | | |
| Never | 92.7 | 94.6 | 91.3 | *0.60 (0.46–0.77) |
| <1 times a week | 4.2 | 3.0 | 5.1 | |
| >1 times a week | 3.1 | 2.4 | 3.6 | |
| Ever had eczema | 10.5 | 8.3 | 11.9 | 0.68 (0.55–0.83) |

*OR for presence of any effect vs none.
OR, odds ratio; CI, confidence interval.

Table 2. Association between SES and self-reported hayfever and related symptoms among pupils aged 13–14 years

| | | SES band (1 – highest SES to 5 – lowest SES) | | | | |
|---|---|---|---|---|---|---|
| | OR (95% CI) | 1(%) (n = 462–487) | 2(%) (n = 428–455) | 3(%) (n = 410–449) | 4(%) (n = 639–714) | 5(%) (n = 2108–2326) |
| Ever had rhinitis symptoms | 0.86 (0.83–0.91) | 51.4 | 52.1 | 41.1 | 33.9 | 38.4† |
| Rhinitis symptoms in past year | 0.86 (0.83–0.90) | 43.7 | 43.5 | 32.9 | 26.0 | 31.2† |
| Associated itchy eyes in past year | 0.88 (0.83–0.93) | 22.8 | 24.2 | 15.6 | 14.1 | 15.7† |
| Effect on daily activities | | | | | | |
| None | | 64.5 | 66.4 | 76.6 | 80.5 | 77.2 |
| Little | *0.85 (0.81–0.89) | 24.7 | 23.1 | 15.0 | 11.9 | 13.4 |
| Moderate | | 8.6 | 8.2 | 5.8 | 3.8 | 4.7 |
| Severe | | 2.2 | 2.3 | 2.6 | 3.8 | 4.7† |
| Ever had hayfever | 0.75 (0.71–0.78) | 53.2 | 44.4 | 32.7 | 25.5 | 25.7† |

*OR for the presence of any effect on daily activities vs none.
†Cochran-Armitage test for trend: $p < 0.0001$.
SES, socioeconomic status; OR, odds ratio; CI, confidence interval.

Table 3. Association between SES and self-reported eczema and related symptoms, among pupils aged 13–14 years

| | | SES band (1 – highest SES to 5 – lowest SES) | | | | |
|---|---|---|---|---|---|---|
| | OR (95% CI) | 1(%) (n = 433–481) | 2(%) (n = 430–453) | 3(%) (n = 427–445) | 4(%) (n = 659–702) | 5(%) (n = 2162–2339) |
| Ever had recurrent itchy rash | 0.98 (0.93–1.03) | 17.6 | 19.1 | 16.5 | 16.9 | 16.8 |
| Itchy rash in past year | 0.96 (0.90–1.02) | 12.1 | 14.6 | 12.4 | 11.7 | 11.4 |
| Ever had this rash in flexures | 1.00 (0.93–1.08) | 8.7 | 9.7 | 8.2 | 9.0 | 8.9 |
| Rash cleared in past year | 0.98 (0.91–1.06) | 7.4 | 10.0 | 7.5 | 7.0 | 7.8 |
| Night waking by rash | | | | | | |
| Never | | 93.8 | 92.1 | 90.9 | 91.2 | 92.8 |
| <1 times a week | *1.03 (0.95–1.12) | 3.5 | 5.1 | 5.6 | 3.8 | 4.2 |
| >1 times a week | | 1.7 | 2.8 | 3.5 | 5.0 | 3.0 |
| Ever had eczema | 0.88 (0.83–0.93) | 13.9 | 14.1 | 11.5 | 8.8 | 9.4† |

*OR for presence of any night waking vs none.
†Cochran-Armitage test for trend: $p < 0.0001$.
SES, socioeconomic status; OR, odds ratio; CI, confidence interval.

the number of years spent living in Cape Town and the prevalence of any of the rhinitis symptoms. There was a positive association (OR = 1.05 for each additional year of residence, 95% CI 1.01–1.09) between number of years spent living in Cape Town and ever having a recurrent itchy rash.

The possible effect of upward socioeconomic mobility is shown in Table 4. For many symptoms, pupils resident in SES band 5 areas attending integrated schools had higher prevalences than pupils resident in SES band 5 areas attending SES band 5 schools. CI were wide because the number of these 'commuting' pupils was small. The prevalence differences were much greater for eczema symptoms than for rhinitis symptoms, among which only 'rhinitis ever' showed a statistically significant difference. In the case of eczema symptoms SES band 5 resident pupils attending integrated schools had even higher prevalences than all other pupils ('classmates') attending integrated schools.

## Discussion

The 12-month prevalences of allergic rhinoconjunctivitis (33.2%) and atopic eczema symptoms (11.9%) shown in our study of young adolescents in Cape Town both are slightly higher than the worldwide medians found in the ISAAC Phase 1 study (16, 17). The results of this study showed extremely wide variations in 12-month prevalences, for eczema ranging from 0.6% at Pune to 20.5% at Kottayam, both in India, and, for rhinitis, from 3.2% at Jima in Ethiopia to 66.6% at Asuncion in Paraguay. There were wide variations in prevalence within similar ethnic groups, confirming the importance of environmental determinants of atopic disease.

Table 4. Relative prevalences of self-reported hayfever and eczema and related symptoms, among pupils resident in SES band 5 (poorest) areas attending integrated schools

| | Reference group: pupils residing in SES band 5, attending SES band 5 schools OR (n = 2181–2422) | SES band 5 resident pupils, attending integrated schools OR (95% CI) (n = 82–101) | All other pupils, attending integrated schools OR (95% CI) (n = 998–1050) |
|---|---|---|---|
| Rhinitis | | | |
| Ever had rhinitis symptoms | 1.00 | 1.94 (1.28–2.93) | 2.08 (1.80–2.41) |
| Rhinitis symptoms in past year | 1.00 | 1.40 (0.89–2.20) | 2.05 (1.76–2.39) |
| Associated itchy eyes in past year | 1.00 | 1.07 (0.58–1.95) | 1.84 (1.53–2.22) |
| Effect on daily activities* | 1.00 | 1.47 (0.90–2.39) | 2.01 (1.71–2.37) |
| Ever had hayfever | 1.00 | 1.30 (0.84–2.01) | 3.28 (2.81–3.82) |
| Eczema | | | |
| Ever had recurrent itchy rash | 1.00 | 2.05 (1.27–3.29) | 1.21 (1.00–1.46) |
| Itchy rash in past year | 1.00 | 2.13 (1.23–3.69) | 1.36 (1.09–1.71) |
| Ever had this rash in flexures | 1.00 | 2.00 (1.09–3.67) | 1.10 (0.84–1.43) |
| Rash cleared in past year | 1.00 | 1.75 (0.89–3.46) | 1.25 (0.96–1.64) |
| Night waking by rash* | 1.00 | 2.12 (1.10–4.07) | 0.99 (0.73–1.34) |
| Ever had eczema | 1.00 | 1.02 (0.51–2.06) | 1.76 (1.41–2,19) |

*OR for presence of any effect vs none.
SES, socioeconomic status; OR, odds ratio; CI, confidence interval.

The finding of a female symptom predominance, which contrasts with the generally accepted view that atopy is more prevalent in males, is in accordance with the overall results of the ISAAC atopic eczema study (16), and with some other ISAAC rhinitis studies (18). This has been thought possibly to reflect over-statement of symptoms by girls and under-statement by boys (18). However, some authors recently have concluded that gender does not make a significant independent contribution to the risk of developing atopy, allergic rhinoconjunctivitis, or eczema (19, 20).

The major finding of this study is the positive association between SES and prevalence of symptoms of allergic rhinoconjunctivitis. A similar finding regarding prevalence (but not severity) of asthma has been made in this population (14). The results fail to show an association between SES and the prevalence of atopic eczema symptoms.

Reporting and diagnostic bias may have contributed to these findings. A variety of cultural, educational, psychological and language factors are thought to influence the results of self-reporting questionnaire studies (16, 17). In this study population, language may have been a significant factor, in that the terms 'hayfever' and 'eczema' (Afrikaans equivalents 'hooikoors' and 'ekseem') do not have direct translations into Xhosa. This may account partially for the lower prevalences found in the responses to the two questions in which the terms 'hayfever' and 'eczema' featured. However, there generally was poor agreement between the symptom and the diagnostic term. In the highest SES band 1 (1.2% Xhosa-speakers), of all those who answered yes to either the question on occurrence of sneezing, runny or blocked nose when one did not have a cold or that on having 'hayfever', only 52.1% answered yes to both. This suggests that the term 'hayfever' was imperfectly understood to imply the symptoms described. In SES band 5 (69.6% Xhosa-speakers), concordance was even lower at 42.7%, suggesting that the term 'hayfever' was even less well-known. In the case of eczema, the agreement between 'recurrent itchy rash' and 'eczema' was equally poor in both highest and lowest SES bands (27.9% and 30.3% respectively). A similar phenomenon has been noted in other rhinitis symptom questionnaire studies with concordance frequencies of between 60 and 80% (21, 22). In an attempt to circumvent the problem of diagnostic terminology, some translated ISAAC Phase 1 questionnaires substituted words such as 'neurodermatitis' (Germany) and 'rhinitis' (Brazil) which are better known, more specific terms in these countries than the direct translations of 'eczema' and 'hayfever' (21, 23).

Responses to questions describing actual symptoms are less likely to be biased than those using diagnostic terms. It has been shown, however, that symptoms occurring more than a year prior to a study may be reported inconsistently in nearly 50% of cases (24). Responses to questions regarding symptoms occurring in the past year are likely to be most accurate.

Other factors which may have impaired awareness and reporting of atopic symptoms amongst lower SES pupils in this study include poorer health education and knowledge, and restricted

access to the type of medical care able to provide a more informed diagnosis. Also, against a background of frequent respiratory and dermatological symptoms, occasional mild skin, nasal and eye symptoms may be accepted as normal. As philosopher, Amartya Sen, said 'a population that has little experience of medical care and widespread health problems as a standard condition of existence can have a very low perception of being medically ill' (25). Consistent underreporting of mild disease would lead to a bias towards greater disease severity in this group, as well as an accentuation of the social class symptom gradient.

No SES gradient was found in the reporting of atopic eczema symptoms. However, the frequent occurrence of other itchy dermatoses in lower SES populations, particularly papular urticaria related to insect bites, fungal infections, impetigo and scabies, many of which have been shown to be far commoner in black South African adolescents than in whites (26), may have led to false reporting of a recurrent itchy rash as atopic eczema. This may account for the failure to show an SES gradient in the prevalence of atopic eczema in this study. In Kenya, the translated ISAAC Phase 1 questionnaire asked respondents specifically to exclude scabies when answering questions on 'recurrent itchy rash' in order to eliminate this as a confounding factor (27).

Other specific social class factors may have influenced the true prevalence and severity of atopic symptoms in the current study. Exposure to indoor pollutants such as particulates and oxides of nitrogen released during the burning of paraffin (domestic grade kerosene), a cheaper and sometimes more accessible source of heating than electricity, may have been significant in the winter months in low SES homes (20, 28). Smoking habits are known to differ substantially between the races, and therefore the social classes, in Cape Town (29). A recent review by Strachan, however, failed to show that passive smoking has any association with skin test positivity, total serum IgE concentration or allergic rhinitis or eczema (30). Poorer hygiene among many pupils living in very deprived circumstances may have led to greater exposure to skin irritants, and to more secondary viral and bacterial infections, while poorer health care access may have resulted in greater severity or persistence of atopic diseases. All of the above factors may have flattened an SES gradient.

In contrast, the particularly high prevalence of tuberculosis among lower income groups in Cape Town (31), as well as helminth parasitic infestation, known to be commoner in poorer communities (32), both may have exerted a protective effect against atopy (33, 34). This would have served to accentuate an SES gradient.

The current study failed to show a significantly higher prevalence of allergic rhinitis symptoms among township children with longer residence in Cape Town than those with shorter residence, contrary to what might have been expected from other migration studies (5, 35). The positive association of years of residence with a recurrent itchy rash may reflect an urban crowding effect related to the range of skin conditions mentioned above. The absence of a control group of rural schoolchildren in this study prevents further analysis.

Socioeconomic mobility, defined by attendance at formerly white, now integrated schools by pupils residing in the lowest income areas, was shown to be a risk factor for the reporting of symptoms of hayfever and particularly atopic eczema. Both the prevalence and severity of these symptoms were higher among this group of pupils than among pupils attending local, lowest SES schools, and for atopic eczema higher than their classmates at the integrated schools. A similar marked excess of asthma symptoms in this group was found in the companion study (14). The number of these 'mobile' pupils was small and the factors that played a role in this finding must remain speculative. Rapid exposure to new, or increased concentrations of allergens in the more affluent school environment may have triggered or enhanced the development of atopic symptoms. This exposure to new allergens is thought to underlie the recent finding in Scotland that children living in more than one house during their lifetime are at higher risk of developing atopic eczema and asthma (36). The effect of increased allergen exposure may have been intensified by adjuvant factors such as pollutants from motor vehicle exhausts (37), and even by latex particles from abraded tyre fragments (38), to which these pupils may have been exposed during time spent commuting long distances to and from school. Overestimation of respiratory and skin symptoms may have been part of a stress response to a new social environment, while pre-existing atopic eczema may have been exacerbated by such stress (39).

The significance of the findings of this study rests upon the validity of the questionnaire research methodology in the diagnosis of atopic eczema and allergic rhinitis. Validation studies carried out in several countries have shown low to moderate specificity and uniformly low sensitivity of the ISAAC Phase 1 core questions

for these conditions (21, 40, 41). The reasons for this low sensitivity are not clear, but social and cultural factors as well as translation difficulties, as discussed above, are likely to be important. Validation of the questionnaire in each country of use, and in each population sample, is desirable, and necessary if meaningful international comparisons are to be made (42).

In conclusion, this study has shown a positive association between self-reported allergic rhinitis and SES in an urban adolescent population, although variation in factors associated with SES such as language, culture and access to medical care cannot be excluded as a primary explanation. No association was found with atopic eczema, but the ISAAC questionnaire may be unable to distinguish this from other symptomatic skin conditions among lower SES pupils. A possible effect of rapid upward social mobility on the reporting or prevalence of atopic eczema, and to a lesser extent allergic rhinitis merits further study.

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## Appendix 1

All questions on this page are about problems which occur when you DO NOT have a cold or flu.

9. Have you ever had a problem with sneezing, or a runny, or blocked nose when you DID NOT have a cold or the flu? Yes/No

If you have answered 'No' please go to question 14.

10. In the past 12 months, have you had a problem with sneezing, or a runny, or blocked nose when you DID NOT have a cold or the flu? Yes/No

If you have answered 'No' please go to question 14.

11. In the past 12 months, has this nose problem been accompanied by itchy-watery eyes? Yes/No

12. In which of the past 12 months did this nose problem occur? January; February; March; April; May; June; July; August; September; October; November; December

13. In the past 12 months, how much did this nose problem interfere with your daily activities? Not at all A little A moderate amount A lot

14. Have you ever had hayfever? Yes/No

15. Have you ever had an itchy rash, which was coming and going for at least 6 months? Yes/No

If you have answered 'No' please go to question 20.

16. Have you had this itchy rash at any time in the last 12 months? Yes/No

If you have answered 'No' please go to question 20.

17. Has this 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

18. Has this rash cleared completely at any time during the last 12 months? Yes/No

19. 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

20. Have you ever had eczema? Yes/No