The Effect of Season-of-Response to ISAAC questions about Asthma, Rhinitis and Eczema in Children

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Background. To examine whether responses to questions about the lifetime prevalence and 12–month period prevalence of symptoms of asthma and allergies are affected by the season in which the questions are asked.

Methods. The International Study of Asthma and Allergies in Childhood (ISAAC) Phase One was undertaken in six New Zealand centres; in three centres the effect of season was studied. Over three school terms at least 3000 children were studied in each of two age groups per centre (6–7 years; 13–14 years), one-third in each term respectively. The ISAAC standardized written questionnaires were used to identify asthma, rhinitis and eczema symptoms. The written questionnaire in the younger age group was completed by the parent/guardian. The older age group self-completed the written questionnaire and also a video questionnaire about asthma symptoms.

Results. The total number of respondents was 21 437, approximately half in each age group. The season of responding had no effect on the level of response to eczema questions. For the written asthma questionnaire no season-of-response effect was present for 6–7 year olds; for 13–14 year olds there was a trend to a higher rate of positive responses by those responding in winter, but in only one question did this reach statistical significance. With the video questionnaire there was a similar trend for a higher rate of positive responses when questions were asked in winter, but this did not reach statistical significance. For rhinitis symptoms there was a statistically significant season-of-response effect in both age groups with two questions; the fewest positive responses by the winter responders.

Conclusions. There was no significant effect of season-of-response to questions on eczema symptoms, and most questions on asthma symptoms. There was a season-of-response effect on responses to questions on rhinitis symptoms suggesting a recall bias relating to recency of symptoms.

Keywords: allergies, asthma, children, eczema, hay fever, questionnaire, rhinitis, season-of-response, video, wheeze

Questionnaires are widely used in population studies to determine the prevalence of asthma and allergic disease. Responses to the questions have been used to estimate the prevalence of symptoms in a community of interest. However, there has been some concern that distant recall of symptoms may be unreliable. Because of this, recent studies have concentrated on questions about symptoms in the last 12 months, which are believed to be less prone to problems of recall.

Most population studies have been cross-sectional, and the questionnaire is answered by individuals or their care givers at one moment in time. Logically, the time of the year in which the questionnaire is answered should not alter responses to questions about lifetime symptoms, or those in the last 12 months. However, recall of symptoms might be biased in favour of recent months. For this reason many comparative studies have been confined to winter months to standardize for season, but this may not be feasible for international comparisons where seasonal temperatures and other climatic factors differ between countries.

The manifestations of asthma and allergic diseases can vary over a 12–month period. This is illustrated by the marked seasonal variation of hospital admissions for asthma which are more common in autumn and spring in New Zealand, Australia and England and Wales. Asthma attacks in France are more frequent in summer...
and winter. Also deaths from asthma in 5–14 year olds in England and Wales most frequently occur in summer. In addition bronchial hyper responsiveness increases during the pollen season. Allergic rhinitis symptoms most commonly occur in the pollen season. There is little known about the relationship of eczema fluctuations with season.

Given these seasonal variations in symptoms, responses might vary depending upon how long ago the respondent had experienced symptoms. In particular, respondents may clearly recall recent symptoms and may have poorer recall of mild symptoms occurring many months previously.

Examination of this issue is important to the International Study of Asthma and Allergies in Childhood (ISAAC) which has been developed to measure the prevalence of these conditions in different populations throughout the world and to undertake studies to examine aetiological factors. The ISAAC study uses core questionnaires for self-completion (13–14 year olds) and completion by parent (6–7 year olds). A very large number of comparisons will be made between populations, and the season of study may vary between participating centres. Concern about this variation in prevalence due to the season studied has been raised, but it is thought to be unlikely that the effect would be significant.

In New Zealand an aim of the ISAAC Phase One study was to examine the season-of-response effect on responses to questions about asthma, rhinitis and eczema among 6–7 and 13–14 year old children.

METHODS
The International Study of Asthma and Allergies in Childhood (ISAAC) Phase One was undertaken in six New Zealand centres. In the three largest centres, data was collected during the three school terms from October 1992 to August 1993 with the explicit aim of studying the effect of season. This study is reported here.

Study Areas
The three centres were Auckland, Christchurch and Wellington, all coastal cities. The Auckland centre is the geographical area known as the Auckland District of the Ministry of Education, the largest centre of population in New Zealand. Its latitude is 36°; mean annual rainfall 1185 mm (range 669–1917 mm), mean temperature 15.3°C (range 2.8–27.5°C) and average relative humidity 78% (Albert Park Climatological Station). The Christchurch centre is the geographical area known as Christchurch City. Its latitude is 43°, mean annual rainfall 666 mm (range 376–1010 mm), mean temperature 11.6°C (range –4.0–31.9°C) and average relative humidity 78% (Christchurch Climatological Station). The Wellington centre is the geographical area known as Wellington, Lower Hutt and Porirua Cities. Its latitude is 41°, mean annual rainfall 1240 mm (range 707–1795 mm), mean temperature 12.5°C (range 0.5–26.5°C) and average relative humidity 81% (Kelburn Climatological Station).

Sample and Subjects
Within each of the three centres schools with children in the 6–7 year age group and schools with children in the 13–14 year age group were independently randomly sampled to obtain at least 3000 per age group per centre.

Season
In New Zealand the school year begins in February and ends in December and has three school terms. Within each centre for each school term, schools were randomly selected from a list of all schools such that approximately one-third of children were studied in each term. Term one, labelled late summer-autumn, is the months of March and April with a week from February and May; term two, labelled winter, consists of June, July and August; and term three, labelled spring-early summer, is late October, November and early December. Each of these terms has a distinct interval between them.

Questionnaire
A standardized written questionnaire and video questionnaire was completed in the schools by the 13–14 year olds (Appendix). A similar written questionnaire, modified for parent/guardian completion, was delivered to the parents/guardians of the 6–7 year old children through the schools. The written questionnaires asked eight questions about wheezing and asthma, six questions about nasal symptoms and hay fever, and six questions about skin rash and eczema; the video questionnaire showed five different scenes of young people with wheezing or coughing. Additional questions were used to ascertain the sex and the ethnic identity of the child, using four ethnic identities from the national census format at the time: European/Pakeha, New Zealand Maori, Pacific Islander and Other.

Data Analysis
The study uses a cluster sampling methodology where the unit of sampling (schools) is not the unit of analysis (children). A consequence of cluster sampling is that the variation of the sample is generally less than would
occur in an equivalent simple random sample. A measure of the reduction in variation is the design effect, a correction for cluster sampling which is applied to the data. The design effect is a factor by which the actual sample size can be reduced to an effective sample size, which is then used for calculation of confidence intervals and tests of significance. In our study, tests of significance and confidence limits for the data were calculated using sample sizes appropriately adjusted for cluster sampling, using the design effect, prior to analysis.

Multiple analyses were undertaken and therefore a stringent significance level of $P \leq 0.01$ was chosen so as to be confident of statistical significance. The two age groups were treated separately. For each question all respondents were separated into one of two categories according to whether there were any symptoms: either a positive response or a negative or missing response. The effect of season-of-response was studied with logistic regression models using season, gender, centre, and the interaction between season and centre as the independent variables. These analyses were performed with all ethnic groups combined and then subsequently for each ethnic group separately.

The first model used included the season by centre interaction to look for inconsistencies in the way the children in the centres responded in each of the three seasons. For questions where there was no interaction the model was re-run leaving the interaction term out so the effect of season-of-response could be assessed. The effect of season was modelled stratifying for centre and gender and the probability value from the test for equality of seasons is given in Tables 3a and 3b. These analyses were first performed with all ethnic groups combined and then subsequently for each ethnic group separately.

As each respondent is expected to answer most questions, the results from each are not independent. To account for this association between proportions, a multivariate comparison was made of questions in each of the three sections, asthma and wheezing, rhinitis, and eczema. For each section, the cross-tabulation of responses to each question was modelled, by weighted least squares of the marginal proportions, using sex, centre and season.

RESULTS

Participants

The study sample totalled 11 821 6–7 year olds and 11 532 13–14 year olds. Completed questionnaires were available on 10 652 6–7 year old children giving a final participation rate of 90% (49.7% girls and 50.3% boys) and on 10 785 13–14 year old children (55.4% girls and 44.6% boys) giving a final participation rate of 94%.

The sample and participant children are described in Table 1. Participation in each term is described in Table 2.
between centres. Therefore all subsequent analyses were performed without the season-centre interaction in the model, so that data from the three centres was combined. Results are presented in Tables 3a and 3b.

Relationship between Wheezing, Asthma and Season

Written questionnaire—whole sample. There was no season-of-response effect on responses to questions seen among 6–7 year olds, regardless of ethnic group and gender.

Among 13–14 year olds there was no significant season-of-response effect on responses to questions asked in the winter months. The one question in this section where the responses showed a statistically significant variation with season was: ‘In the last 12 months how often, on average, has your sleep been disturbed due to wheezing?’ (P = 0.004): The percentage of positive responses was lowest when answered in spring-early summer (10.0%), higher when answered in late summer-autumn (11.2%) and highest when answered in winter (13.3%).

Written questionnaire—findings by ethnic group. Responses to most of the questions showed no significant season-of-response effect within each ethnic group. However the sleep disturbance question among 13–14 year olds showed a significant season-of-response effect among European children (P = 0.004) and Maori children (P = 0.007) with positive responses highest when answered in winter. In contrast to the pattern of responses found for the whole sample, the Maori children had the lowest rate of positive responses when answered in late summer-autumn rather than spring-early summer. Among Pacific Island children a significant season-of-response effect was seen in responses to the questions ‘Have you ever had wheezing or whistling in the chest at any time in the past?’ (P = 0.001) and ‘Have you ever had asthma?’ (P = 0.008), with winter responses being higher than the other seasons.

Video Questionnaire

There was a trend for the positive responses to all questions to be higher when questions were asked in the winter months. However there was no significant season-of-response effect on responses to questions observed, regardless of ethnic group and gender, with one exception. The Pacific Island ethnic group showed a significant season-of-response effect on the video scene of wheezing at rest ‘Has your breathing ever been like this ... in the last year?’. Pacific Island children responding in spring-early summer reported the lowest prevalence (13.9%), followed by late summer-autumn responders (17.9%) with winter responders showing the highest positive responses (22.6%).

Relationship between Rhinitis, Nose Symptoms and Season

Whole sample. Among 6–7 year olds there was a significant season-of-response effect on two questions: ‘In the past 12 months has your child had a problem with sneezing or a runny or blocked nose when he/she did not have a
cold or the flu?'; the percentage of positive responses was lowest in winter responders (23.0%), higher in late summer-autumn responders (25.6%) and highest in spring-early summer responders (26.2%) (\(P = 0.008\)); and

"In the past 12 months was this nose problem accompanied by itchy-watery eyes?"; the percentage of positive responses was lowest in winter responders (9.0%), higher in late summer-autumn responders (11.1%) and highest in spring-early summer responders (12.3%) (\(P < 0.001\)).

Among 13–14 year olds there was a significant season-of-response effect for 'itchy-watery eyes'; the percentage of positive responses was lowest in winter responders (17.1%), higher in late summer-autumn responders (20.9%) and highest in spring-early summer responders (22.6%) (\(P < 0.001\)).

The question 'In which of the past 12 months did this nose problem occur?' where the respondent could choose from none up to all 12 months, produced unreliable
### Table 3B: Season-of-response effect on responses to questions among 13–14 year olds

<table>
<thead>
<tr>
<th>Questions</th>
<th>Spring—Early Summer</th>
<th>Late Summer—Autumn</th>
<th>Winter</th>
<th>Prevalence (%)</th>
<th>95% Confidence interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheezing—written</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheezing ever</td>
<td>41.8</td>
<td>42.9</td>
<td>46.5</td>
<td>0.19</td>
<td>(38.4–45.3)</td>
<td>(43.5–49.6)</td>
</tr>
<tr>
<td>Wheezing in the last 12 months</td>
<td>28.4</td>
<td>27.9</td>
<td>31.9</td>
<td>0.13</td>
<td>(25.5–31.4)</td>
<td>(29.2–34.6)</td>
</tr>
<tr>
<td>Attacks of wheeze in the last 12 months</td>
<td>26.1</td>
<td>25.2</td>
<td>29.5</td>
<td>0.048</td>
<td>(23.6–28.2)</td>
<td>(27.5–31.5)</td>
</tr>
<tr>
<td>Sleep disturbance in the last 12 months</td>
<td>10.0</td>
<td>11.2</td>
<td>13.3</td>
<td>0.004</td>
<td>(8.5–11.5)</td>
<td>(10.8–14.8)</td>
</tr>
<tr>
<td>Severe wheeze in the last 12 months</td>
<td>7.5</td>
<td>8.2</td>
<td>8.2</td>
<td>0.64</td>
<td>(6.3–8.7)</td>
<td>(7.1–9.3)</td>
</tr>
<tr>
<td>Asthma ever</td>
<td>13.2</td>
<td>25.2</td>
<td>26.7</td>
<td>0.12</td>
<td>(21.4–25.0)</td>
<td>(25.0–28.4)</td>
</tr>
<tr>
<td>Wheeze with exercise in the last 12 months</td>
<td>38.6</td>
<td>39.8</td>
<td>39.6</td>
<td>0.92</td>
<td>(35.4–41.8)</td>
<td>(36.7–42.4)</td>
</tr>
<tr>
<td>Night cough in the last 12 months</td>
<td>28.2</td>
<td>29.1</td>
<td>30.1</td>
<td>0.43</td>
<td>(25.5–30.9)</td>
<td>(27.7–32.5)</td>
</tr>
<tr>
<td><strong>Wheezing—video</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheezing ever</td>
<td>27.2</td>
<td>27.9</td>
<td>30.5</td>
<td>0.14</td>
<td>(24.6–29.7)</td>
<td>(28.2–32.8)</td>
</tr>
<tr>
<td>Wheezing in the last 12 months</td>
<td>16.6</td>
<td>17.5</td>
<td>19.2</td>
<td>0.09</td>
<td>(14.8–18.3)</td>
<td>(17.6–20.9)</td>
</tr>
<tr>
<td>Wheeze with exercise ever</td>
<td>38.5</td>
<td>41.7</td>
<td>42.6</td>
<td>0.17</td>
<td>(35.0–42.0)</td>
<td>(39.5–45.8)</td>
</tr>
<tr>
<td>Wheeze with exercise in the last 12 months</td>
<td>28.6</td>
<td>31.2</td>
<td>31.3</td>
<td>0.32</td>
<td>(25.5–31.9)</td>
<td>(28.3–34.3)</td>
</tr>
<tr>
<td>Sleep disturbance in the last 12 months</td>
<td>19.0</td>
<td>19.6</td>
<td>21.3</td>
<td>0.16</td>
<td>(17.1–21.0)</td>
<td>(19.5–23.1)</td>
</tr>
<tr>
<td>Sleep disturbance in the last 12 months</td>
<td>10.7</td>
<td>11.2</td>
<td>12.7</td>
<td>0.043</td>
<td>(9.4–12.0)</td>
<td>(11.5–14.0)</td>
</tr>
<tr>
<td>Night cough ever</td>
<td>33.1</td>
<td>34.1</td>
<td>36.8</td>
<td>0.053</td>
<td>(29.9–36.3)</td>
<td>(33.9–39.8)</td>
</tr>
<tr>
<td>Night cough in the last 12 months</td>
<td>21.6</td>
<td>20.3</td>
<td>24.3</td>
<td>0.031</td>
<td>(18.6–24.5)</td>
<td>(21.6–27.0)</td>
</tr>
<tr>
<td>Severe wheeze ever</td>
<td>19.8</td>
<td>21.5</td>
<td>22.2</td>
<td>0.31</td>
<td>(18.0–21.7)</td>
<td>(20.5–23.9)</td>
</tr>
<tr>
<td>Severe wheeze in the last 12 months</td>
<td>13.1</td>
<td>13.3</td>
<td>13.4</td>
<td>1.00</td>
<td>(11.5–14.8)</td>
<td>(12.0–14.9)</td>
</tr>
<tr>
<td><strong>Rhinitis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nose symptoms ever</td>
<td>47.2</td>
<td>46.6</td>
<td>44.6</td>
<td>0.20</td>
<td>(43.7–50.7)</td>
<td>(41.5–47.7)</td>
</tr>
<tr>
<td>Nose symptoms in the last 12 months</td>
<td>41.0</td>
<td>39.6</td>
<td>37.5</td>
<td>0.13</td>
<td>(37.7–44.3)</td>
<td>(34.6–40.4)</td>
</tr>
<tr>
<td>Itchy watery eyes</td>
<td>22.6</td>
<td>20.9</td>
<td>17.0</td>
<td>&lt; 0.001</td>
<td>(19.7–25.5)</td>
<td>(14.7–19.3)</td>
</tr>
<tr>
<td>Interference with activities</td>
<td>27.1</td>
<td>27.4</td>
<td>25.5</td>
<td>0.38</td>
<td>(24.4–29.8)</td>
<td>(23.1–27.9)</td>
</tr>
<tr>
<td>Hayfever ever</td>
<td>37.6</td>
<td>37.8</td>
<td>36.2</td>
<td>0.56</td>
<td>(35.3–40.0)</td>
<td>(34.1–38.2)</td>
</tr>
<tr>
<td><strong>Eczema</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rash ever</td>
<td>21.3</td>
<td>21.5</td>
<td>22.3</td>
<td>0.82</td>
<td>(18.8–23.9)</td>
<td>(20.0–24.6)</td>
</tr>
<tr>
<td>Rash in the last 12 months</td>
<td>17.6</td>
<td>17.4</td>
<td>18.2</td>
<td>0.83</td>
<td>(15.2–19.9)</td>
<td>(16.1–20.3)</td>
</tr>
<tr>
<td>Flexural areas</td>
<td>14.1</td>
<td>12.9</td>
<td>13.1</td>
<td>0.18</td>
<td>(11.9–16.3)</td>
<td>(11.2–15.0)</td>
</tr>
<tr>
<td>Rash cleared</td>
<td>13.3</td>
<td>13.3</td>
<td>13.0</td>
<td>0.97</td>
<td>(11.7–15.0)</td>
<td>(11.6–14.5)</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>7.3</td>
<td>9.0</td>
<td>8.8</td>
<td>0.17</td>
<td>(5.6–9.0)</td>
<td>(7.2–10.5)</td>
</tr>
<tr>
<td>Eczema ever</td>
<td>25.0</td>
<td>25.3</td>
<td>26.5</td>
<td>0.85</td>
<td>(22.5–27.6)</td>
<td>(24.2–28.7)</td>
</tr>
</tbody>
</table>
answers at all times of the year. In each month surveyed the positive responses for the immediately previous month were higher, and for the following month lower, regardless of the time of the year when the question was asked (Figure 1). The lower bar for the month of interview is probably because the responses apply, on average, to half a month. This effect was found for each of the centres. Therefore analysis by season-of-response was not undertaken for this question.

Findings by ethnic group. No season-of-response effect was seen among Maori and Pacific Islander children or Other ethnic groups, in both age groups. However among European children responses to the ‘itchy watery eyes’ question differed significantly with season-of-response, with the percentage of positive responses lowest in winter responders, higher in late summer-autumn responders and highest in spring-early summer responders: 6–7 year olds \( P < 0.001 \); 13–14 year olds \( P < 0.001 \).

Relationship between Eczema and Season
There was no season-of-response effect on responses to questions seen in either age group, regardless of ethnic group.

Multivariate Analyses
For each of the three conditions the joint effect of each of the variables was assessed. For asthma and wheezing questions there was no effect of season-of-response for 6–7 year olds but for 13–14 year olds there was a significant season-of-response effect \( (\chi^2 = 7.9, \ d.f. = 2, \ P = 0.02) \) with winter responders having an excess of positive responses. For rhinitis there was a significant season-of-response effect in both the 6–7 year olds \( (\chi^2 = 13.7, \ d.f. = 2, \ P = 0.001) \) and the 13–14 year olds: \( (\chi^2 = 7.9, \ d.f. = 2, \ P = 0.02) \) with fewer positive responses from winter responders. For the eczema questions there was no indication of any season-of-response effect in either age group.

DISCUSSION
A large population of children (21,437) of two age groups in three regions of New Zealand have been studied over three seasons of a year to determine whether responses to questions about asthma and allergies are affected by the season in which the questions are asked. This is the first published study describing the effects of season-of-response on the questionnaires used in the ISAAC project.

This analysis has incorporated adjustment for cluster sampling using the design effect, which is important for studies such as ISAAC where clusters of different size may be used in different regions. The large size of the whole sample means the power of our study design was strong enough to detect small differences. It was very reassuring that, in all the data studied, the pattern of effect over the three seasons was consistent across the

![Figure 1](image-url)
three centres. Had there been significant interactions it would have been necessary to analyse centres separately and consequently suffer reduction in power. The consistency in the pattern of the results lends strength to the findings. The large sample size could result in achieving statistical significance for comparisons between seasons-of-response when the difference is not large enough to be considered important. However, the conclusions drawn in this paper are based on groups of comparisons and not individual tests of significance and so only a regular pattern is highlighted. What constitutes an important difference is a subjective assessment and so Tables 3a and 3b present the prevalence levels for the reader to judge.

The wheezing and asthma questions showed some effect of season-of-response on some of the responses but the magnitude of differences between seasons was always small. For the written wheezing questions no effect was seen at all among 6–7 year olds. There was a trend for 13–14 year olds to have a greater number of positive responses to questions about wheezing and asthma when answering in winter, which became significant for the written question about sleep disturbance at night in the last 12 months. The magnitude of the season-of-response effect was greatest among Maori children (range of prevalence 11.9–18.2%). The Pacific Island children’s responses to two written questions relating to wheeze and asthma ever, were highest when answering in winter, but the 12–month period prevalence questions did not show an effect in this ethnic group. The Pacific Island children showed a large season-of-response difference on the video question about wheezing at rest (13.9–22.6%). The smaller number of Other ethnic group respondents make it difficult to determine whether the absence of significant effect for these questions was true or the result of a lack of power to detect significance. Different interpretation of the questions by the different ethnic groups could be an explanation for the differences seen. However the effect was seen only in the older age group and only in some questions indicating that these season-of-response variations may not be real.

These New Zealand findings are a little different to those of 13–14 year olds in Surrey and Sussex where there was no season-of-response effect on wheezing and asthma questions (D Strachan, personal communication). The high positive responses in winter responders are in contrast to the asthma hospital admission data which peaks in autumn and spring. Perhaps the winter high reflects memory of higher symptomatology in the autumn just passed. On the other hand it may be a chance finding, despite the high level of statistical significance. The 13–14 year olds self-reported symptoms whereas in the younger age group the parent answered the questions. Adolescent perception of symptoms might be more easily skewed by recent events than adults who may have a more accurate concept of a given time period. Caution will be required when interpreting analyses of questions about wheezing and asthma in the 13–14 year age group where the season of data collection is not the same.

The rhinitis questionnaire showed an effect of season-of-response in both age groups on several questions. There was a consistent pattern with positive responses being lowest when questions were answered in winter, the months when children experience fewer symptoms. In New Zealand the limited information about the pollen season shows the season is long, stretching from August to March (although some plants flower in winter or throughout the year) because of the warm moist climate, with a summer peak.17 Studies in Auckland have shown that the highest fungal spore counts are in summer and autumn.18 Other researchers have shown that rhinitis symptoms are most prevalent with the pollen season but other factors such as maximum and minimum temperature, rainfall, indoor relative humidity, diet, and viral infections, as well as mites and fungal spore counts might also be important. Our results suggest that experience of current or recent nasal symptoms influence the reporting of the 12-month period prevalence of some rhinitis symptoms. Similar results have been found in 13–14 year olds in Surrey and Sussex (D Strachan, personal communication).

The rhinitis question identifying in which months the nose problem occurred proved to be consistently unreliable, and therefore unusable for analysis of the effect of season-of-response. We found the same pattern in the other three New Zealand ISAAC centres, Bay of Plenty, Hawkes Bay and Nelson, which studied children in winter only. This question was designed to separate subjects with rhinitis into those with seasonal symptoms and those with a perennial problem. The number of months that were identified could then be used as a quantitative measure of severity.19 On the basis of our findings we believe this question is invalid.

The questionnaire on eczema used questions which have been validated in the UK and have been shown to be highly specific for eczema.20–22 Our findings of no season-of-response effect on the eczema questions suggests that there is little effect of season on eczema symptoms, at least in temperate climates. Little has been published about this: a Birmingham study of out-patient presentations for eczema suggested little seasonal pattern23 and a Swedish study of adolescent school children showed no seasonal differences in atopic dermatitis.24

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Overall these results are reassuring. Although the results of this study apply to New Zealand, they should be applicable to countries with similar climates. Furthermore, as there was no interaction with the centre, and the centres were climatically dissimilar, these results may also be applicable to countries with climates that are dissimilar to New Zealand. For eczema questions there is no season-of-response effect on responses. For wheezing and asthma, in the older age group only, there is a tendency for more positive responses by the winter responders, but this is not a strong effect and generally did not reach statistical significance. There is a season-of-response effect on some rhinitis responses and as the questions all apply to the situation over 12 months or much longer this suggests some recall bias. That this recall bias could exist for the rhinitis questions and not for the eczema questions may arise because there is a true season effect for rhinitis and not for eczema and recent episodes are more easily remembered. Rhinitis may be more easily remembered as it is often quite debilitating. These results provide support for the recommendation of the ISAAC Manual that: ‘the date of data collection must be documented and at least half of the study population should be investigated before the main pollen season of the study area’.10

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REFERENCES


(Revised version received June 1996)
APPENDIX
Core questionnaire wheezing module for 13–14 year olds
1. Have you ever had wheezing or whistling in the chest at any time in the past? Yes □ No □
   IF YOU HAVE ANSWERED ‘NO’ PLEASE SKIP TO QUESTION 6
2. Have you had wheezing or whistling in the chest in the last 12 months? Yes □ No □
   IF YOU HAVE ANSWERED ‘NO’ PLEASE SKIP TO QUESTION 6
3. How many attacks of wheezing have you had in the last 12 months? None □ 1–3 □ 4–12 □ >12 □
   Never woken with wheezing □
   Less than one night per week □
   One or more nights per week □
4. In the last 12 months, how often, on average, has your sleep been disturbed due to wheezing?
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 exercise? Yes □ No □
8. In the last 12 months, have you had a dry cough at night, apart from a cough associated with a cold or a chest infection? Yes □ No □
Core questionnaire rhinitis module for 13–14 year olds
All questions are about problems which occur when you DO NOT have a cold or the flu.
1. Have you ever had a problem with sneezing, or a runny, or a blocked nose when you DID NOT have a cold or the flu? Yes □ No □
   IF YOU HAVE ANSWERED ‘NO’ PLEASE SKIP TO QUESTION 6
2. In the past 12 months, have you had a problem with sneezing, or a runny, or a blocked nose when you DID NOT have a cold or the flu? Yes □ No □
   IF YOU HAVE ANSWERED ‘NO’ PLEASE 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?
   (please tick any which apply)
   January □ February □ March □
   April □ May □ June □
   July □ August □ September □
   October □ November □ December □
5. 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 □
6. Have you ever had hayfever? Yes □ No □
Core questionnaire eczema module for 13–14 year olds
1. 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 SKIP TO QUESTION 6
2. Have you had this itchy rash at any time in the last 12 months? Yes □ No □
   IF YOU HAVE ANSWERED ‘NO’ PLEASE 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, or around the neck, ears or eyes? Yes □ No □
4. Has this rash cleared completely at any time during 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 □
Video Questionnaire

1. **Sequence: A young person wheezing (while at rest)**
   Has your breathing ever been like this:
   at any time in your life?  Yes/No
   If YES: in the last year?  Yes/No
   If YES: one or more times a month?  Yes/No

2. **Sequence: Wheezing after exercise**
   Has your breathing been like the girl’s in the video following exercise?
   at any time in your life?  Yes/No
   If YES: in the last year?  Yes/No
   If YES: one or more times a month?  Yes/No

3. **Sequence: Waking at night with wheezing**
   Have you been woken like this at night:
   at any time in your life?  Yes/No
   If YES: in the last year?  Yes/No
   If YES: one or more times a month?  Yes/No

4. **Sequence: Waking at night with coughing**
   Have you been woken at night like this:
   at any time in your life?  Yes/No
   If YES: in the last year?  Yes/No
   If YES: one or more times a month?  Yes/No

5. **Sequence: A severe attack of asthma, involving difficulty breathing at rest.**
   Has your breathing been like this:
   at any time in your life?  Yes/No
   If YES: in the last year?  Yes/No
   If YES: one or more times a month?  Yes/No