ABSTRACT • INTRODUCTION : Childhood asthma is one of the most important diseases of childhood. There is no known prevalence of asthma and allergic diseases in Lebanon. This study was conducted with a primary objective of finding the prevalence of asthma, allergic rhinitis and eczema in Lebanese children.

MATERIAL AND METHODS : It is a descriptive cross-sectional study on children in Lebanese public and private schools. A sample of 22 schools participated in the study, where standardized ISAAC written core questionnaires were distributed. 13-14-year-old students filled in the questionnaires in class.

RESULTS : 1613 individuals were analyzed. The prevalence of diagnosed asthma (5.6%) is the lowest in Lebanon compared to the eastern Mediterranean countries. Prevalence of • ever wheezing (21.4%) • last 12 months wheezing (19.9%) • wheezing on effort (12.7%) • night cough (22.8%) • allergic rhinitis (32.7%) and • eczema (11.5%) is on the medium prevalence trend noted all over the world, referring to ISAAC study. It also showed marked variations and differences across the governates in Lebanon, the lowest prevalence of diagnosed asthma (1.9%) but the highest prevalence of asthma symptoms like ever wheezing being in the Bekaa governate (26.8%).

CONCLUSION : Undiagnosed asthma, rhinitis and eczema have medium prevalence in Lebanon. Differences exist between Lebanese governates. Further studies are needed to understand the environmental, climate and socioeconomic causes of these discrepancies.
International Study of Asthma and Allergies in Childhood (ISAAC) has been developed to provide an accepted method of measuring the prevalence and other atopic diseases in children [1-2, 6]. An application of the ISAAC has been performed in 1998 on schoolchildren in Beirut, aged 12 to 14 years [7]. It reported a prevalence of 11.9% for asthma in Beirut. However, these results cannot be extrapolated to all Lebanese children. Asthma is also one of the most common chronic diseases treated in primary health care in Lebanon (2% in 1993) [8].

Our study had a primary objective of finding the prevalence of asthma, allergic rhinitis and eczema in Lebanese children aged 13 to 14 years old, and to compare the results with those of other countries in the region and the world.

**METHODS**

**Study design**

Our study is a descriptive cross-sectional study applied on school children in Lebanon. The dependent variables are physician-diagnosed asthma (PDA), asthma symptoms such as: wheezing ever, last 12 months wheezing, wheezing on exercise, and night cough without physician diagnosis; allergic rhinitis and atopic eczema; and also chronic productive cough ever, 12 months chronic cough.

Independent variables are school type, sex, dwelling governate and geography.

**Sampling methods**

Since there is no available sampling frame of individuals in Lebanon, the sampling unit was a cluster of individuals: a school. Thirty schools were randomly selected from a list of schools provided by the Ministry of Education; this number was chosen to allow for 6000 questionnaires to be distributed if we were to obtain a 66.7% response rate of schools. A permission of the Ministry of Education permitted an easy access to public schools, while private ones were free to participate or not. Contacts were made with the schools’ directors to explain the objective of the study and its procedure.

Thirteen public schools were contacted: one in Beirut; 2 in South Lebanon; one in Nabatieh; 3 in Mount Lebanon; 5 in North Lebanon; one in Bekaa. For private schools, 17 were contacted: 6 in Beirut; 6 in Mount Lebanon; 2 in North Lebanon; one in Nabatieh; 2 in Bekaa. Eight schools (1 public and 7 private) refused to participate, while 22 out of 30 (73.3%) agreed to distribute the questionnaires to their students. The study was carried out during the month of May 2005.

Standardized questionnaires were distributed to children aged 13 to 14 years who would fill the questionnaire at school, supervised by the enquirer. Absent students were given the questionnaire later on and returned to the school director. A 100% response rate was obtained because children filled the questionnaires on the spot. Inquirers were instructed not to interfere with students during data collection.

<table>
<thead>
<tr>
<th>Disease status</th>
<th>PDA*</th>
<th>p-value</th>
<th>Allergic rhinitis</th>
<th>p-value</th>
<th>Atopic eczema</th>
<th>p-value</th>
<th>Total N (100%)</th>
</tr>
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<tbody>
<tr>
<td><strong>GOVERNATE</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bekaa</td>
<td>4 (1.9%)</td>
<td>0.04</td>
<td>83 (39.2%)</td>
<td>0.008</td>
<td>38 (17.8%)</td>
<td>0.003</td>
<td>214</td>
</tr>
<tr>
<td>Beirut</td>
<td>11 (7.0%)</td>
<td></td>
<td>44 (27.8%)</td>
<td></td>
<td>10 (6.4%)</td>
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<tr>
<td>Mount Lebanon</td>
<td>35 (5.4%)</td>
<td></td>
<td>199 (30.5%)</td>
<td></td>
<td>65 (10.1%)</td>
<td></td>
<td>654</td>
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<tr>
<td>El Nabatieh</td>
<td>6 (6.4%)</td>
<td></td>
<td>27 (29.0%)</td>
<td></td>
<td>12 (12.9%)</td>
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<tr>
<td>North Lebanon</td>
<td>22 (6.7%)</td>
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<td>127 (39.1%)</td>
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<td>45 (13.9%)</td>
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<td>327</td>
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<tr>
<td>South Lebanon</td>
<td>8 (4.8%)</td>
<td></td>
<td>46 (27.5%)</td>
<td></td>
<td>13 (7.8%)</td>
<td></td>
<td>167</td>
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<td><strong>GEOGRAPHY</strong></td>
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<tr>
<td>Sea coast</td>
<td>59 (6.2%)</td>
<td>0.01</td>
<td>290 (30.5%)</td>
<td>0.007</td>
<td>100 (10.6%)</td>
<td>0.006</td>
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<tr>
<td>Mountain</td>
<td>21 (5.4%)</td>
<td></td>
<td>129 (32.9%)</td>
<td></td>
<td>38 (9.7%)</td>
<td></td>
<td>393</td>
</tr>
<tr>
<td>Flat country</td>
<td>6 (2.3%)</td>
<td></td>
<td>107 (40.7%)</td>
<td></td>
<td>45 (17.1%)</td>
<td></td>
<td>265</td>
</tr>
<tr>
<td><strong>SCHOOL TYPE</strong></td>
<td></td>
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</tr>
<tr>
<td>Private</td>
<td>51 (5.2%)</td>
<td>0.28</td>
<td>321 (32.9%)</td>
<td>0.87</td>
<td>116 (12.0%)</td>
<td>0.43</td>
<td>980</td>
</tr>
<tr>
<td>Public</td>
<td>35 (5.5%)</td>
<td></td>
<td>205 (32.5%)</td>
<td></td>
<td>67 (10.7%)</td>
<td></td>
<td>634</td>
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<tr>
<td><strong>SEX</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>55 (6.6%)</td>
<td>0.005</td>
<td>265 (32.0%)</td>
<td>0.55</td>
<td>84 (10.2%)</td>
<td>0.10</td>
<td>834</td>
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<tr>
<td>Females</td>
<td>31 (4.0%)</td>
<td></td>
<td>260 (33.4%)</td>
<td></td>
<td>99 (12.8%)</td>
<td></td>
<td>779</td>
</tr>
<tr>
<td>Weighted*</td>
<td>86</td>
<td>526</td>
<td>183</td>
<td>1613</td>
<td>95% CI [4.6-6.0]</td>
<td>[30.4%-35.0]</td>
<td>[9.9-13.1]</td>
</tr>
</tbody>
</table>

a: PDA = Physician diagnosed asthma  
b: Weighting was performed according to population distribution by age group, sex and governate in Lebanon by the Central Administration of Statistics [9].

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**TABLE I**

GOVERNATES DISTRIBUTION OF ASTHMA STATUS AND RESPIRATORY SYMPTOMS
RESULTS

In 22 schools, 1611 questionnaires were distributed and collected back in the schools to 13-14-year-old adolescents: 268 (16.6%) in the Bekaa, 75 (4.7%) in Beirut, 570 (35.4%) in Mount Lebanon, 175 (10.9%) in Nabati, 375 (23.5%) in North Lebanon and 144 (8.9%) in the South. After weighting, the numbers became as follows: 214 (13.3%), 157 (9.7%), 654 (40.5%), 94 (5.8%), 327 (20.3%) and 167 (10.3%) respectively, making a total of 1613 (100%).

Prevalence of asthma, asthma symptoms, rhinitis and eczema

The prevalence of PDA overall Lebanon was of 5.3% in 13-14-y-old schoolchildren. The highest prevalence was found in Beirut (7.0%) and Northern Lebanon (6.7%), while it was the lowest in the Bekaa plain (1.9%) (p = 0.04) (Table I). We find a much higher prevalence of asthma symptoms overall Lebanon: ever wheezing (21.4%); last 12 months wheezing (19.9%); wheezing on effort (12.7%); night cough (22.8%). The highest prevalence of ever wheezing and last 12 months wheezing is noted in the Bekaa governate: respectively 26.8% and 25.4%; the lowest being for North Lebanon for ever wheezing (17.2%) and the lowest for 12 months wheezing (15.6%) is in Mount Lebanon. Regarding allergic rhinitis, the overall prevalence was of 32.7%. The highest prevalence was in North Lebanon (39.2%) and Bekaa (39.1%), versus 27.8% in Beirut (p = 0.008). For atopic eczema, the overall prevalence was of 11.5%, and the highest prevalence was in Bekaa (17.8%) versus 6.4% in Beirut (p = 0.003).

Flat countries adolescents present the highest rates of wheezing, allergic rhinitis and eczema, but the lowest rate of PDA. The mountain and the seacoast share almost equal distribution of allergic rhinitis and eczema, while wheezing symptoms and diagnosis of asthma are slightly lower in the mountain. There is also a higher rate of wheezing in public schools compared with private schools, and almost equal rates of PDA. Prevalence of wheezing, night cough, rhinitis, and eczema are not different between males and females (Table I) but PDA was more frequent in males (6.6% versus 4.0% ; p = 0.005). Concerning chronic productive cough ever, no difference was found but 12 months productive cough was found more frequent in males (22.2% versus 16.0% ; p = 0.002).

Subgroup analysis

In individuals with PDA, the most frequent symptom was ever wheezing compared to 12 months wheezing (100% versus 70.8%). Night cough was less frequent (58.5%), but productive cough for more than 4 days/week and more than 3 months/year was the less frequent (39.2%). In this group, allergic rhinitis was as frequent (59.1%) as the wheezing on effort (61.3%). Atopic eczema was reported by 26.7% of those with PDA. In the non PDA group, ever wheezing (21.4%), 12 months...
wheezing (19.9%) and night cough (22.8%) were almost equally frequent (Table II).

In wheezers, the most cited triggers were: effort (66.9%), the weather change (42.9%), upper respiratory tract infections (38.8%), dust (33.2%) and cigarette smoke (28.2%); smells and odors (18.8%) and nervousness (16.10%) were cited less frequently. The time variation of allergic rhinitis was mainly seasonal with two peaks: in April-May (9.7%-8.1%) and in February (5.5%); a slight increase is also observed at the beginning of the winter in December (2.6%), in comparison with July nadir (2.1%).

Multivariate analysis

The governates of Bekaa and North Lebanon have the highest associations to allergic rhinitis, eczema, asthma symptoms, chronic productive cough ever and 12 months productive cough, in comparison with Beirut and other governates. For PDA, the seacoast and the mountain present the highest rates versus flat countries. Geographic location is also important for night cough, with the seacoast carrying a higher risk than other locations. Male sex increases the risk of PDA and last 12 months productive cough, while public schools are associated with higher rates of wheezing on effort, chronic productive cough ever and last 12 months chronic productive cough (Tables III & IV).

DISCUSSION

This study provides, for the first time, the prevalence of asthma, asthma symptoms, allergic rhinitis and eczema in a nationwide sample of schoolchildren in Lebanon. The prevalence of diagnosed asthma in 13-14-y-old school children was of 5.3%, whereas prevalence of asthma symptoms was 20.3% including ever wheezing, 12 months wheezing and wheezing on effort and night cough.

The use of the standard ISAAC questionnaire, a valid instrument [2], permits comparison of Lebanon with other countries. An application of the ISAAC has been performed in 1998 on schoolchildren in Beirut, aged 12 to 14 years [7]. It reported in Beirut a prevalence rate of 11.9% of asthma, 23.1% of wheezy children, 25.5% of allergic rhinitis, and 11% of eczema. However, those results could not be extrapolated to all Lebanese children. In the present study, we found in Beirut, almost the same overall prevalence of wheezing ever (20.5%) and allergic rhinitis (27.8%), but a lower prevalence of diag-
nosed asthma (7.0%) and eczema (6.4%). We note that our results are reported 7 years later, which could explain the observed differences. Another explanation would be that the low number of the 13-14 years category within Beirut in our study may account for large confidence intervals within subgroups, and this is why point estimates comparison may not be adequate. International comparisons are thus more adequate.

On an international basis, marked variations of asthma prevalence were reported from phase I of the ISAAC [2, 12]. The prevalence in older age for wheezing in the last 12 months ranged between 2.1-32.2%. We obtained a high prevalence of this symptom (19.9%), in addition to 5.3% of PDA. Lebanon harbors the lowest PDA prevalence compared to eastern Mediterranean countries except Iran. Definitely prevalence of PDA was lower than English speaking countries and Latin America [2, 12]. On the other hand, last 12 months wheezing was the highest in Lebanon compared to eastern Mediterranean countries. Intermediate prevalence for night cough was found in Lebanon compared to eastern Mediterranean countries [12]. In a recent study published about prevalence of asthma in Israel in 13-14-y-old schoolchildren [13], they found slightly the same prevalence for asthma (7.0%), wheezing ever (23.8%) and wheezing in the last 12 months (17.9%). We note that observed differences of PDA between countries could also be due to non unified diagnosis criteria used by different physicians [14]. On the other hand, the variability in the perception and interpretation of asthma symptoms among practitioners can also partially explain the difference between the percentages of PDA and asthma symptoms [14]. This difference can also be related to the fact that Lebanese physicians may prefer not to announce the diagnosis of asthma in order not to alarm the children’s parents.

We found in Beirut the highest PDA prevalence. Beirut is urbanized and has its load of outdoor pollution. Urban atmosphere can be a factor increasing the prevalence of asthma in children [4, 15]. Another explanation would be a higher access for health care in the capital than within remote regions, causing a higher diagnosis of asthma. However, in a cross-sectional study performed in Lebanon public schools, the analysis of urban versus rural area association with respiratory diseases and symptoms gave no significant results [16]. And yet the association between air pollution and asthma is not well established, and pollinosis prevalence is not higher in rural than urban areas [17]. This could underline other causes that might explain this difference.

Moreover, ISAAC study outlined the additional importance of climate, humidity, altitude and latitude on prevalence of asthma, allergic rhinitis and eczema [5]. Lebanon being known to contain variable climates by geographical location, the highest rates of allergic diseases found in flat countries can be explained by agricultural activity of Bekaa and the North plains, with special climates. In addition to climate, differences of socioeconomic status can further explain the found results: the seacoast is characterized by a higher socioeconomic status in comparison with the flat country. Differences between public and private schools further confirm the fact that a low socioeconomic status is a risk factor for asthma, particularly for symptoms with no PDA. In the multivariate analysis, the flat country was associated with lower PDA, but a low socioeconomic status was only associated with wheezing on effort and productive cough. These issues remain to be established by further geographic, climatic and weather variations data, and urbanization data of all regions in specific study designs.

Diagnosis of asthma by a physician was more frequently done in males compared to females in the 13-14-year-old schoolchildren. This is consistent with studies show-
ing the male preponderance for asthma in the first
decade [18]. Nevertheless, the absence of sex difference
for wheezing could also be explained by the fact that at
this age the preponderance is inversed in favor of
females. The only difference was for the significantly
higher frequency of 12 months productive cough in
males (22.2% versus 16% ; p = 0.002). This could be
explained by social habits in Lebanon: due to old tradi-
tions, boys may be more taken care of than girls leading
to higher diagnosis rates, and possibly more prone to
early smoking behavior, causing productive cough [19].
Another issue to be taken into account is the higher rate
of productive cough and wheezing on effort in public
schools, the reasons of which may be the public schools
possible unhealthy buildings, or the socioeconomic sta-
tus and its associated behavioral and environmental fac-
tors. This remains also to be investigated by more spe-
cific studies.

In asthma diagnosed by a physician, wheezing was
the most frequent symptom: it seems highly suggestive
for asthma and clinicians rely mainly on it to diagnose
asthma, but less on wheezing on effort and night cough
[3]. The value of night cough as an indication for asthma
proper diagnosis should be more emphasized especially
that this may lead to under diagnosis with serious
health consequences [20]. The triggers for wheezing
were as classically reported by patients [4, 5, 15]: effort,
weather variations, upper respiratory tract infections,
dust and cigarette smoke.

Studying the prevalence of allergic rhinitis is an indi-
direct reflection of the atopic status of the defined popula-
tion. Epidemiologic studies support the results of patho-
physiological and clinical studies showing an associa-
tion between asthma and allergic rhinitis, demonstrating
that among patients with asthma, 60% to 80% also have
allergic rhinitis [21–22]; this confirms our results, where
59.1% of physician diagnosed asthmatics have allergic
rhinitis. These associations reflect the shared atopy un-
derlying allergic rhinitis and asthma, explaining at least
partially, the frequent coexistence of these disorders.
This might also explain results in ISAAC studies finding
the same prevalence pattern for asthma and allergic
rhinitis [12]. In our study, the prevalence rate for allergic
rhinitis was of 32.7%, which is on the high range of
international prevalences [2, 12]. It was also interesting
to know that the overall prevalence of allergic rhinitis in
Lebanon, was reported to be 11.5%, especially in Beirut and
Mount Lebanon [13]. It is also interesting to know that the
total prevalence rate for atopic dermatitis in the popula-
tion, was 7.5%, which is significantly higher than in the rest
of the world [13]. Time variability of allergic rhinitis with a peak in
spring pointed out the responsibility of pollen. The correla-
tion between asthma and allergic rhinitis is an indication
of the importance of this condition in Lebanon. Proper
management of allergic rhinitis is essential for the control
of the condition, as it can lead to a significant reduction in
the number of exacerbations and hospitalizations. Proper
management of allergic rhinitis can also help in preventing
the development of asthma. The role of allergen avoidance
in the management of allergic rhinitis is crucial, and it
should be emphasized in educational programs for patients
and their families. The use of medications, such as:
antihistamines, decongestants, and corticosteroids, can
help in controlling the symptoms and preventing compli-
cations. Counseling and education about the importance of
allergic rhinitis in the prevention of asthma should be
emphasized in public health campaigns and educational pro-
grams for schools and communities. The importance of
early diagnosis and treatment of allergic rhinitis cannot be
overemphasized, as it can help in preventing the develop-
mant of asthma and its associated complications. This
remains also to be investigated by more specific
studies.

We are aware of the possible biases introduced by the
study design. A selection bias is possible because of the
differing age of the schools that were included in the study.
We would expect this to have caused the underestimation of
diagnosed asthma or the overestimation of undiagnosed
asthma in our study. An underestimation of undiagnosed
disease is more likely to occur in our study.
This is a study done across Lebanon on 13-14-y-old schoolchildren addressing prevalence of asthma, asthma symptoms, allergic rhinitis and eczema. It is the first of its kind for the whole country. It enabled us to compare Lebanon to other countries. The prevalence of diagnosed asthma was the lowest in Lebanon compared to the eastern Mediterranean countries. Prevalence of the symptoms of asthma, of allergic rhinitis and eczema is on the medium prevalence trend noted all over the world, referring to ISAAC study. It also showed marked variations and differences across the governates in Lebanon, the lowest prevalence of diagnosed asthma but the highest prevalence of asthma symptoms being in the Bekaa governate. Further studies are needed to understand the environmental, climate and socioeconomic causes of these discrepancies. Further efforts are needed not to leave asthma underdiagnosed, and to avoid consequently serious health consequences.

ACKNOWLEDGEMENT

We thank the Merck, Sharp & Dohme (MSD) Drug Company for funding this research.

REFERENCES

APPENDIX

QUESTIONNAIRE 13-14 YEARS

Thank you for taking part in our study that interests your health and that of all children and adults in Lebanon. The information you would give us will only be used for scientific purposes. Please answer the questions with precision and honesty.

General questions

1. Name: .................................................................
2. Address: .............................................................
3. Telephone: .........................................................
4. Actual weight: ..........kg
5. Actual height: ...........cm
6. Sex:                       Boy                       Girl
7. Nationality:     Lebanese Other than Lebanese
8. Birth date: ............../...../.....
9. Place of birth: ..........................................................
10. Age: .................................................................
11. Class: ...............................................................
12. How many rooms are there in your house, except the kitchen and bathrooms? .......... rooms
13. How many people live in your house, including you? .......... persons
15. Is there anybody in your house that suffers from a chronic respiratory disease?
   Yes □ No □
   If yes, specify the problem and the person: .................................................................
16. Do you have a pet at home?          Yes □ No □
   If yes, specify the pet: .................................................................

Questions about your health

17. Have you ever had wheezing in your chest?        Yes □ No □
    If your answer is NO, please go to question number 21
    If your answer is YES, continue to answer the following questions.

18. How many times did you have chest wheezing during the last 12 months?
   None □ once-3 times □ 4-12 times □ more than 12 times □
19. Did your doctor ever tell you that you had asthma? Yes □ No □
20. During the last 12 months, have you ever had chest wheezing during or after physical activity
   (sports, jogging, etc.)? No □ Yes □

22 مدرسة شارك 5، هذه الدراسة واستبيانات قياسية نمط "الزكاة" ملتئم من قبل التلاميذ في سن 13 - 14 عاما.

النتائج - درست 1123 حالة وشخص انتشار الربو 0.1% وهي أدنى نسبة مقارنة مع نتائج بلاد البحر المتوسط. أنتشار العياء المثير للريبكة مثيرة للريبكة وانتشر الاحتكار 12، حيث أن 12% من الربو وانتشر الاحتكا 11.2% وانتشر الربو 22.8% وانتشر الربو 11.5% والتي تختلف حسب الدراسة، ولكنها تختلف حسب الأقتصادية والانتشار الادنى للربو الذي يعيش من قبل الطيب 11.9%.

وانتشر الأقتصادي للسحب خلال الحياه 21.8% لوحظت هذه النتيجة في البنان.

الخلاصة - الربو وانتشر الربو الاحتكار 11.2% وانتشر الأقتصاد العامل للربو 22.8% وانتشر الأقتصاد 11.5% والتي تختلف حسب الدراسة، وننصح أن يجري دراسات متعمقة لفهم دور البيئة والنظام على المستوى الاقتصادي لبسبب الاختلاف.

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21. During the last 12 months, have you ever had dry cough by night, without having a cold or acute bronchitis?  
   Yes ☐  No ☐

22. During the last 12 months, have you had chest expectorations, without having a cold?  
   Yes ☐  No ☐

23. Did you have these expectorations for more than 4 days a week, and for more than 3 months a year?  
   No ☐  Yes ☐
   If yes, for how many years did you have this problem? .......... years

24. During the last 12 months, what were the factors that made you suffer from chest wheezing or that exacerbated your chest wheezing?  
   Climate ☐  Pollen ☐  Stress ☐  Smoke ☐  Dust ☐
   Pets ☐  Wool ☐  Cold ☐  Cigarette smoke ☐
   Sports ☐  Some foods or drinks ☐  Soap or detergents ☐
   Other ☐ …………………. I never had this problem ☐

25. In the last 12 months, have you ever used any medications for wheezing or asthma treatment, such as pills or sprays?  
   No ☐  Yes ☐
   If yes, specify: ……………………………………………….................................................................................

26. Have you ever had sneezing, a runny or a congested nose without having a cold?  
   Yes ☐  No ☐
   If your answer is NO, please go to question number 29.

27. During the past 12 months, did you have any watery or disturbed eyes, concomitant with your nose problem?  
   No ☐  Yes ☐

28. In the past 12 months, when did you have your nose problem?  
   January ☐  February ☐  March ☐  April ☐  May ☐  June ☐  July ☐
   August ☐  September ☐  October ☐  November ☐  December ☐

29. Did you have any skin rash on skin folds of your elbow, behind your knees, in front of your ankles, beneath your thighs, or around the neck, the ear or eye?  
   No ☐  Yes ☐
   If YES, what was your age when it appeared? ……………….years

30. Have your doctor ever told you that you had eczema?  
   No ☐  Yes ☐

The following questions regard periods where YOU DO NOT HAVE A COLD.

31. What was your weight at birth? .......... g  I do not know ☐
32. Were you born within 3 weeks of the birth due date specified by the doctor?  
   Yes ☐  No ☐
   No, before 3 weeks of the due date ☐
   No, after 3 weeks of the due date ☐  I do not know ☐
33. Did your mother breast feed you during infancy?  
   Yes ☐  No ☐
34. Did your mother take you to a daycare during infancy?  
   Yes ☐  No ☐
   If YES, at what age did you start to go to daycare? ……………….years
35. Have you ever had the following problems:  
   Measles: No ☐  Yes ☐  Age: .......... Do not know ☐
   Diphtheria: No ☐  Yes ☐  Age: .......... Do not know ☐
36. Did you have recurrent otitis during your childhood?  
   No ☐  Yes ☐
37. Did you have recurrent pharyngitis during your childhood?  
   No ☐  Yes ☐
38. Did you have a surgery for removing your tonsils?  
   No ☐  Yes ☐
39. Do you have any heart problem?  
   No ☐  Yes ☐
40. At your birth, did you need to stay in the hospital for a period longer than usual?  
   No ☐  Yes ☐
   If yes, why? ………………………………………………………………………………………………………………….
### Questions regarding your home and parents

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>41. Is there a servant at home?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. Is there an electrical vacuum cleaner at home?</td>
<td></td>
<td></td>
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<tr>
<td>43. Is there a permanent carpet in your bedroom?</td>
<td></td>
<td></td>
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<tr>
<td>44. Do you sleep in your own bed?</td>
<td></td>
<td></td>
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<tr>
<td>45. How do you heat your house?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaz</td>
<td>Electrical heater</td>
<td>Mazout</td>
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<td></td>
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<tr>
<td>46. Is there any mold visible on your bedroom walls?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47. What type of pillow do you use for sleeping?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spongy</td>
<td>Feathers</td>
<td>Cotton</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>48. What type of mattress do you sleep on?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>Cotton</td>
<td>Industrial (Sleep Comfort, etc.)</td>
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<tr>
<td></td>
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<tr>
<td>49. Did you have to change anything in your house because you had asthma?</td>
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<td></td>
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<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>50. Is your father alive?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father educational level: Illiterate</td>
<td>School for less than 8 years</td>
<td>School for more than 8 years</td>
</tr>
<tr>
<td>Does he smoke regularly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>If yes, what does he smoke: Cigarettes</td>
<td>Narguileh</td>
<td>Other</td>
</tr>
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<td></td>
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<tr>
<td>Did the doctor ever tell him he had a respiratory problem?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>If yes, what respiratory problem?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51. Is your mother alive?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother educational level: Illiterate</td>
<td>School for less than 8 years</td>
<td>School for more than 8 years</td>
</tr>
<tr>
<td>Does she smoke regularly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>If yes, what does she smoke: Cigarettes</td>
<td>Narguileh</td>
<td>Other</td>
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