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Original Article

Smoking-Related Respiratory Symptoms in Tehran: A Cross-Sectional Study

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Background: Active smoking and passive exposure to environmental tobacco smoke cause respiratory symptoms as well as long-term complications. We know little about the sources of exposure to tobacco smoke in our population and the symptoms that can be related to smoking in adults and children.

Methods: A survey on the range of symptoms relevant to smoke exposure was conducted. Residents of Tehran were interviewed by telephone through random digit dialing. Exposure to tobacco smoke and other environmental pollutants were sought at individual level. A geographical information system was used to determine the levels of the pollutants corresponding to addresses of the participants.

Results: We interviewed 34,121 individuals. Of the male and female adults, 21.3% and 3.4% were current smokers, respectively. About one third of the children and teenagers were exposed to smoking in one way or the other. In regression analysis, respiratory symptoms such as cough, phlegm, breathlessness, chest tightness, and throat discomfort were consistently associated with smoking in adults. In teenage group, cough and phlegm were related to habitual smoking. We failed to find a significant relation between passive smoking and symptoms in children.

Conclusion: The range of respiratory symptoms associated with smoking is different in various age groups. The high percentage of children exposed to passive smoking expedites rigorous educational measures.

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Keywords: Epidemiology • respiratory symptoms • tobacco smoke

Introduction

A range of symptoms and long-term complications is related to active and passive smoking in population.[1] There are differences in symptoms associated with smoking according to the age and sex of the exposed subjects. Cigarette smoking and environmental tobacco smoke (ETS) exposure result in more respiratory symptoms in women than men.[2,3]

Passive smoking is associated with a number of complaints both in children and adults. It was associated with nocturnal chest tightness, nocturnal breathlessness, breathlessness after activity, increased bronchial responsiveness, wheezing apart from colds, bronchitis symptoms, dyspnea, and physician-diagnosed asthma in adults.[4,5] In children the average number of upper respiratory tract infections, otitis media, and asthma episodes was reported to be significantly higher in those exposed to ETS.[6] Significant trends were found between the number of smokers living with the children and throat and nose problems, cough, phlegm, and recent wheezing.[7]

The numbers of large scale population-based studies on smoking in Iran are limited; therefore,

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we know little about the consequences of smoking across the age and gender groups in our population. This report uses the data from a large survey on health outcomes of air pollution in the capital city, Tehran.[8] In this article, data on smoking habits of a large random sample from the city residents in conjunction with the possible associated respiratory symptoms have been gathered and analyzed.

Tehran is the largest city of the Middle East with an estimated population of more than 10 million based on the results of the last census in 1996. Much like any large metropolitan area in the world, in Tehran heavy traffic and urban air pollution are sources of health hazards. Unlike western societies where people mostly socialize in pubs and clubs, in Iranian culture families and relatives gather together at houses. This difference in social habits in conjunction with the careless behavior among smokers may result in higher prevalence of passive exposure among non-smokers. We hypothesize that the smoking- related symptoms among nonsmokers exposed to environmental smoke might be diverse and prevalent in our population.

Materials and Methods

Design

A survey of the symptoms and background characteristics of the general population was performed for a 10-month period from July 2003 through April 2004. The participants were interviewed on the phone after random digit dialing. A total of 150 interviews were conducted by eight interviewers each day except for holidays.

Participants

The study population were residents of Tehran who aged more than four years at the time of the interview. Children less than four years old are not able to express and communicate different symptoms reliably. After contacting the house and getting the verbal consent, a family member whose birthday was closer to the interview date was selected and interviewed; hence, simple random sampling. In case the line connected did not belong to a home, there was no answer to phone call, or the family did not agree to take part in the study the phone number was replaced with the next random phone number. Symptoms of children aged four to 12 years were asked from their mothers. Three subgroups of participants; children aged four – 12 years, teenagers (aged 13 – 19 years), and adults (>19 years old) were considered in the study population.

Data gathering

The participants were interviewed on the phone and they were asked whether they smoked habitually (one who smokes a relatively fixed number of cigarettes during the day) or occasionally (one who smokes from time to time and mostly when socializing), used to smoke in the past (ex-smoker), or were generally exposed to environmental smoke at home or in the workplace (passive smoker). Data regarding the symptoms were also gathered by telephone interview. The participants were asked whether they had any of the symptoms of breathlessness (dyspnea), cough, phlegm, chest tightness, and throat discomfort in the same day. The questions were adapted from American Thoracic Society respiratory symptoms questionnaire (ATS-DLD-77).

The interviews were conducted between 4 and 8 pm, which was shown to be the best time for the highest chance to access the family members at home according to the results of a preliminary pilot study. This also indicated the acceptable reliability of the questionnaire in repeated interviews and across the members of the interview team.

Air pollution data as confounding variables were obtained from Tehran Air Quality Control Company, which is affiliated to Tehran Municipality. Mean 24-hour concentration of particulate matter less than 10 micron in aerodynamic diameter (PM10) measured by gravimetric, mean 24-hour SO2 level measured by UV fluorescence, mean 24-hour CO level measured by spectrophotometer, mean 24-hour NO2 level measured by chemiluminescence, and maximum moving average for 8-hour concentration of O3 measured by UV photometry were used for analysis.

Levels of air pollution corresponding to the addresses of the participants were extracted from a geographic information system (GIS) which incorporates meteorologic data with measurements from four air quality monitoring stations. The effect of indoor air pollution was roughly estimated by an ordinal variable defining the heating method of the house as three categories of central heating systems with the least pollution, indoor heating appliance with a chimney, and finally indoor appliance without a chimney which is supposed to cause the highest indoor pollution.

Data quality control

The interview team was supervised by a research assistant who checked the accuracy of the data gathering by reinterviewing 7% of the interviewees in each day.

Air pollution levels corresponding to addresses of the participants were extracted from the GIS according to the latitude and longitude of the points on the city map. Data entry was performed by a team of six clerks in SPSS data sheets. A random sample of 100 cases was selected from each clerk's work and rechecked. Up to three errors were considered acceptable.

Statistical methods

The associations between respiratory symptoms and smoking were tested by Chi-square and Fisher's exact test where appropriate. Backward logistic regression models were used to determine the predictors of symptoms and adjusting for the confounders.

Flu syndrome affecting the person or members of the family, levels of air pollutants individuals were exposed to, method of heating at home, occupational exposure to dust or fume, smoking, age, and gender were introduced into the model. Hosmer-Lemeshow test was performed to test for fitness of the regression model and analysis of the residuals was conducted as necessary. Level of significance was considered as 0.05 and calculations were performed by SPSS® version 11.5.

Results

A total of 34,121 participants were interviewed. They were acceptably evenly distributed in all residential districts of the city. Overall, 93% of homes connected agreed to take part in the study and this rate was also consistently similar in all 22 districts of Tehran. The mean age of the participants was 33.7 (standard deviation: 16.8, range: 5 – 98). The study group included 69.2% females and 30.8% males. The prevalence of habitual smoking among male adult population older than 19 years old was 21.3%. The figure for adult females was significantly lower at the level of 3.4%. Surprisingly, about one third of the children as well as the teenagers were exposed to smoking in one way or the other. Specifically, 31.6% of the children less than 13 years old were exposed to environmental smoke. Table 1 demonstrates the prevalence of the active and passive smoking among children, teenagers, and adults in the sample population.

Among the respiratory symptoms evaluated, cough and phlegm had the highest prevalence and about 40% of adult habitual smokers reported each symptom. While symptoms of cough, phlegm, breathlessness, chest tightness, and throat discomfort were consistently associated with smoking in adults, the associations were not so constant among children and teenagers across the range of symptoms (Table 2).

Active and passive smokers had more respiratory symptoms in comparison with those not exposed, when potential confounding variables of individual exposure to urban air pollutants (PM10, SO2, NO2, O3, and CO), heating method of home, age, sex, occupational exposure, and flu syndrome affecting person or someone in the family were adjusted for.

Table 1. Prevalence of smoking in different age and sex groups in the sample population.

Age (year)	Smoking					Total
	Never (%)	Ex-smoker (%)	Passive (%)	Occasional (%)	Habitual (%)	
Less than 13						
Male	1044 (65.5)	11 (0.7)	520 (32.6)	11 (0.7)	8(0.5)	1594
Female	1096 (67.9)	12 (.7)	495 (30.7)	4 (.2)	8(.5)	1615
Total	2140 (66.7)	23 (.7)	1015 (31.6)	15 (.5)	16(.5)	3209
13 – 19						
Male	1078 (65.9)	20 (1.2)	484 (29.6)	25(1.5)	28 (1.7)	1635
Female	1727 (66.1)	23 (.9)	847 (32.4)	7(.3)	10 (.4)	2614
Total	2805(66.0)	43(1.0)	1331 (31.3)	32(.8)	38(0.9)	4249
More than 19						
Male	3833 (52.8)	829 (11.4)	521 (7.2)	528(7.3)	1545 (21.3)	7256
Female	13119 (68.0)	437 (2.3)	4629 (24.0)	448(2.3)	646 (3.4)	19279
Total	16952 (63.9)	1266 (4.8)	5150 (19.4)	976(3.7)	2191(8.3)	26535

Table 2. Association between respiratory symptoms and smoking in different age groups.

Age(year)	Smoking	Sample	Symptoms				
			Cough	Phlegm	Breathlessness	Chest tightness	Throat discomfort
Less than 13							
	Never	2140	559	271	55	39	195
			26.0%	12.6%	2.6%	1.8%	9.1%
	Ex-smoker	23	4	2	2	0	0
			17.4%	8.7%	8.7%		
	Passive	1015	280	136	39	37	91
			27.4%	13.3%	3.8%	3.6%	8.9%
	Occasional	15	2	0	0	0	0
			13.3%				
	Habitual	16	5	5	3	1	3
			29.4%	29.4%	17.6%	5.9%	17.6%
	Total	3209	850	414	99	77	289
			26.4%	12.8%	3.1%	2.4%	9.0%
	P value*		0.592	0.161	0.005	0.024	0.279
13 – 19							
	Never	2805	739	552	243	167	432
			26.3%	19.7%	8.7%	5.9%	15.4%
	Ex-smoker	43	12	8	4	6	9
			27.9%	18.6%	9.3%	14.0%	20.9%
	Passive	1331	333	281	134	87	201
			25.0%	21.1%	10.1%	6.5%	15.1%
	Occasional	32	13	16	5	5	9
			40.6%	50.0%	15.6%	15.6%	28.1%
	Habitual	38	18	18	2	5	8
			47.4%	47.4%	5.3%	13.2%	21.1%
	Total	4249	1115	875	388	270	659
			26.2%	20.6%	9.1%	6.3%	15.5%
	P value*		0.013	<0.001	0.327	0.013	0.182
More than 19							
	Never	16952	4009	3125	2073	1381	2667
			23.6%	18.4%	12.2%	8.1%	15.7%
	Ex-smoker	1266	383	311	234	151	221
			30.2%	24.5%	18.5%	11.9%	17.5%
	Passive	5150	1268	981	767	471	869
			24.6%	19.0%	14.9%	9.1%	16.8%
	Occasional	976	326	321	169	103	181
			33.4%	32.8%	17.3%	10.5%	18.5%
	Habitual	2191	918	889	414	233	373
			41.8%	40.5%	18.9%	10.6%	17.0%
	Total	26535	6904	5627	3657	2339	4311
			26.0%	21.2%	13.8%	8.8%	16.2%
	P value		<0.001	<0.001	<0.001	<0.001	0.030

* Results of Fisher's exact test; † Results of Chi-square test.

In children, ETS was no longer a predictor of respiratory symptoms by applying the logistic regression equation (Table 3). However, in teenagers cough and phlegm were still related to smoking at presence of other covariates (Table 4). Similarly, as shown in Table 5 (A and B), cough, phlegm, breathlessness, chest tightness, and throat discomfort were related to smoking in adults. In comparison with nonsmokers, those adults exposed to ETS had higher chances of having symptoms of breathlessness and chest tightness. Although habitual smokers had the highest odds for respiratory symptoms, ex-smokers and occasional smokers also continued to be more likely to have symptoms (Table 5A and 5B).

Discussion

Different figures are reported for prevalence of smoking in various societies. In Iran, according to

Table 3. Predictors of respiratory symptoms associated with smoking in children five to 12 years old.

Symptoms	Variable	*P* value	Odds ratio	95% Confidence interval
Breathlessness				
	Flu syndrome	0.002	2.067	1.307 – 3.270
	Age	<0.001	1.260	1.136 – 1.399
Chest tightness				
	O3	0.050	0.957	0.916 – 1.000
	Flu syndrome	<0.001	4.653	2.833 – 7.642
	Age	0.011	1.151	1.032 – 1.284

a survey from Shiraz, 26% of the men and 3.6% of the women were current smokers.[9] A major nationwide survey, conducted by National Research Center of Medical Sciences in 1999 reports 23.9% of men and 1.7% of women to be current smokers in Iran. The figures of the same study for Tehran were 25.7% and 2.5% for men and women, respectively.[10] All Iranian surveys have found remarkably lower prevalence for women in comparison with men. This may be due to the social stigma of smoking for women in Iranian culture. Although smoking is generally considered an unhealthy behavior, people are more concerned about female smokers and they may face strong criticism from peers and relatives. The cross-gender difference in smoking prevalence is in place when teenage boys and girls are compared as well. Likewise, families and general public strongly oppose smoking behavior in teenage girls. It may be argued that adult men should be the focus of attention in educational campaigns addressing the smoking habits in the population of Tehran because smoking in men is about six times more common than in women.

The association between children's exposure to ETS and respiratory symptoms or diseases is well established in literature. Studies with various designs from different cultures and geographic regions have found associations of a wide range of complaints and illnesses with smoking of parents and guardians. Throat and nose problems, cough, phlegm, wheezing, symptoms of asthma and

Table 4. Predictors of respiratory symptoms associated with smoking in teenage group.

Symptoms	Variable	Categories	P value	Odds ratio	95%CI
Cough					
	Smoking		0.012		
		Never*			
		Ex-smoker	0.568		
		Passive	0.194		
		Occasional	0.223		
		Habitual	0.003	2.926	1.434 – 5.972
	Occupational exposure		0.040	1.808	1.027 – 3.182
	Flu syndrome		<0.001	4.641	3.922 – 5.493
	Flu syndrome in family		0.015	1.256	1.045 – 1.510
	SO2		0.017	0.997	0.994 – 0.999
	Age		0.024	0.953	0.914 – 0.994
Phlegm					
	Smoking		<0.001		
		Never*			
		Ex-smoker	0.653		
		Passive	0.364		
		Occasional	0.001	3.466	1.615 – 7.438
		Habitual	0.001	3.213	1.590 – 6.496
	Flu syndrome		<0.001	3.905	3.275 – 4.655
	Flu syndrome in family		0.044	1.222	1.005 – 1.487
	Sex (m/f*)		<0.001	1.505	1.272 – 1.781
Chest tightness					
	Heating appliance		0.018		
		Central*			
		With chimney	0.009	1.483	1.102 – 1.996
		Without chimney	0.096		
	Age		0.042	1.078	1.003 – 1.159

*References group.

Table 5(A). Predictors of respiratory symptoms in adult group.

Symptoms	Variable	Categories	*P* value	OR	95%CI
Cough					
	Smoking		<0.001		
		Never*			
		Ex-smoker	<0.001	1.316	1.148 –1.508
		Passive	0.060	1.079	0.997 – 1.167
		Occasional	<0.001	1.593	1.373 - 1.849
		Habitual	<0.001	2.271	2.054 –2.511
	Occupational exposure		<0.001	1.289	1.156 – 1.436
	Heating appliance		<0.001		
		Central*			
		With chimney	<0.001	1.152	1.083 – 1.225
		Without chimney	0.030	1.348	1.029 –1.765
	Flu syndrome		<0.001	4.857	4.490 –5.254
	Flu syndrome in family		0.005	1.119	1.035 – 1.209
	NO2		<0.001	1.002	1.001 – 1.003
	SO2		<0.001	0.998	0.997 –0.999
	O3		<0.001	0.994	0.988–0.999
	Age		<0.001	1.007	1.005 –1.009
Phlegm					
	Smoking		<0.001		
		Never*			
		Ex-smoker	<0.001	1.451	1.243 – 1.695
		Passive	0.086		
		Occasional	<0.001	2.048	1.748 – 2.400
		Habitual	<0.001	2.906	2.596 – 3.252
	Occupational exposure		0.003	1.197	1.062 – 1.350
	Heating appliance		0.068		
		Central*			
		With chimney	0.143		
		Without chimney	0.047	1.345	1.004 –1.801
	Flu syndrome		<0.001	4.338	4.004 – 4.701
	Flu syndrome in family		<0.001	1.189	1.096 – 1.29
	NO2		0.001	1.002	1.001 – 1.003
	O3		0.002	0.992	0.987 – 0.997
	Age		<0.001	0.994	0.991 –0.996
	Sex (m/f*)		<0.001	1.369	1.263 –1.483
Breathlessness					
	Smoking		<0.001		
		Never*			
		Ex-smoker	<0.001	1.692	1.430 – 2.003
		Passive	<0.001	1.273	1.154 – 1.404
		Occasional	<0.001	1.585	1.309 – 1.919
		Habitual	<0.001	1.886	1.647 –2.159
	Occupational exposure		<0.001	1.315	1.142 – 1.514
	Heating appliance		<0.001		
		Central*			
		With chimney	<0.001	1.228	1.135 – 1.328
		Without chimney	0.428		
	Flu syndrome		<0.001	1.903	1.730 – 2.094
	Flu syndrome in family		0.001	1.166	1.062–1.281
	Age		<0.001	1.013	1.010 – 1.016
	Sex (m/f*)		<0.001	0.734	0.665 –0.811

*References group.

rhinitis, upper respiratory tract infections, and otitis media are reported to be associated with ETS exposure in children.[6,7,11] In five to 12-year-old group we discovered a relationship between passive smoking and symptoms of breathlessness and chest tightness, which was no longer significant when adjusting for confounding variables. This might be due to the limited reliability of the data on symptoms for this group. Children were not interviewed for symptoms and instead their mothers were asked about their children's complaints on the phone. This restricts the reliability of the answers. In the teenage group, on the other hand, smoking was associated with

Table 5(B). Predictors of respiratory symptoms in adult group.

Symptoms	Variable	Categories	*P* value	OR	95%CI
Chest tightness					
	Smoking		<0.001		
		Never*			
		Ex-smoker	<0.001	1.565	1.281 –1.911
		Passive	<0.013	1.164	1.032 – 1.313
		Occasional	<0.003	1.419	1.124 – 1.793
		Habitual	<0.001	1.416	1.194 – 1.678
	Occupational exposure		0.015	1.239	1.043 – 1.473
	Heating appliance				
		Central*	<0.001		
		With chimney	<0.001	1.326	1.204 – 1.461
		Without chimney	<0.001	1.923	1.334 – 2.772
	Flu syndrome		<0.001	2.239	2.005 – 2.500
	Flu syndrome in family		<0.001	1.220	1.091 – 1.364
	Age		<0.001	1.016	1.013 – 1.020
	Sex (m/f*)		<0.001	0.809	0.718 – 0.911
	PM10		0.001	1.009	1.004 – 1.014
Throat discomfort					
	Smoking		0.025		
		Never*			
		Ex-smoker	0.005	1.276	1.077 – 1.511
		Passive	0.168		
		Occasional	0.306		
		Habitual	0.061	1.143	0.994 –1.314
	Occupational exposure		<0.001	1.285	1.125 – 1.468
	Flu syndrome		<0.001	4.218	3.881 – 4.584
	Flu syndrome in family		<0.001	1.181	1.083 – 1.288
	Sex (m/f*)		0.015	0.892	0.814 – 0.978
	PM10		0.008	1.004	1.001 – 1.008
	O3		0.023	0.994	0.988 – 0.999

*References group.

cough and phlegm much like the findings in adults.

In adult population, a range of symptoms such as chest tightness, breathlessness, bronchial responsiveness, and bronchitis symptoms are reported to be related to passive smoking in different epidemiologic studies.[4,5] This study found significant associations for breathlessness and chest tightness in Tehran's population. Studies have reported ETS and outdoor air pollution having independent adverse effects on respiratory health of nonsmokers.[12–14] Based on our regression equations, we can also claim that there were independent effects of smoking and air pollutants on respiratory symptoms because they both remained in the equations.

The associations found in the study would probably be stronger in regression analysis if smoking burden and the estimated amount of ETS that passive smokers were exposed to were asked in detail. As the data used in this report were primarily gathered for the purpose of analyzing the adverse effects of air pollutants, we did not have this kind of data. This must be balanced against the important positive aspect of not focusing on smoking in the telephone interviews that decreases the possibility of social desirability bias. That is to say, study population were primarily interviewed about the symptoms referable to air pollution and possible confounders as well as smoking. In current Iranian culture smoking retains its taboo among most of the social classes; consequently, studies on prevalence of smoking in Iranian population would be flawed unless appropriate measures to eliminate this effect are undertaken. Although the sample of this study cannot be regarded as a representative for the society at large, this does not limit the validity of the findings for comparison of symptoms between exposed and unexposed individuals. The major factor limiting the representativeness of our sample is the fact that the interviews were conducted between 4 and 8 pm, when some people are still at work. In Iranian society more men are employed at jobs that involve working in the evening hours than women. Therefore, at these hours more women were accessible for interviews and were included in the sample.

In conclusion, a range of respiratory symptoms,

in different age groups, are associated with active and passive smoking and having a positive history of smoking. The high percentage of children exposed to ETS expedites rigorous educational measures to address the incautious behavior among adult smokers.

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References

1 Eagan T, Bakke P, Eide G, Gulsvik A. Incidence of asthma and respiratory symptoms by sex, age, and smoking in a community study. *Eur Respir J*. 2003; **19:** 599 – 605.

2 Langhammer A, Johnsen R, Holmen J, Gulsvik A, Bjermer L. Cigarette smoking gives more respiratory symptoms among women than among men. The Nord-Trondelag Health Study (HUNT). *J Epidemiol Commun Health*. 2000; **54:** 917 – 922.

3 Larsson M, Loit H, Meren M, Polluste J, Magnusson A, Larsson K, et al. Passive smoking and respiratory symptoms in the FinEsS Study. *Eur Respir J*. 2003; **21:** 672 – 676.

4 Janson C, Chinn S, Jarvis D, Zock J, Toren K, Burney P. Effect of passive smoking on respiratory symptoms, bronchial responsiveness, lung function, and total serum IgE in the European Community Respiratory Health Survey: a cross-sectional study. *Lancet*. 2001; **358:** 2103 – 2109.

5 Leuenberger P, Schwartz J, Ackermann-Liebrich U, Blaser K, Bolognini G, Bongard J, et al. Passive smoking exposure in adults and chronic respiratory symptoms (SAPALDIA Study). Swiss Study on Air Pollution and Lung Diseases in Adults, SAPALDIA Team. *Am J Respir Crit Care Med*. 1994; **150:** 1222 – 1228.

6 Shiva F, Nasiri M, Sadeghi B, Padyab M. Effects of passive smoking on common respiratory symptoms in young children. *Acta Paediatr*. 2003; **92:** 1394 – 1397.

7 Lam T, Chung S, Betson C, Wong C, Hedley A. Respiratory symptoms due to active and passive smoking in junior secondary school students in Hong Kong. *Int J Epidemiolo*. 1998; **27:** 41 – 48.

8 Yunesian M, Asghari F, Vash JH, Forouzanfar M, Farhud D. Acute symptoms related to air pollution in urban areas: a study protocol. *BMC Public Health*. 2006; **6:** 218.

9 Ahmadi J, Khalili H, Jooybar R, Namazi N, Mohammadagaei P. Prevalence of cigarette smoking in Iran. *Psychol Rep*. 2001; **89:** 339 – 341.

10 Survey on Health and Disease in Iran. Tehran: National Research Center of Medical Sciences; 2001.

11 Monteil M, Joseph G, Chang- Kit C, Wheeler G, Antoine R. Smoking at home is strongly associated with symptoms of asthma and rhinitis in children of primary school age in Trinidad and Tobago. *Rev Panam Salud Publica*. 2004; **16:** 193 – 198.

12 Wong C, Hu Z, Lam T, Hedley A, Peters J. Effects of ambient air pollution and environmental tobacco smoke on respiratory health of non-smoking women in Hong Kong. *Int J Epidemiol*. 1999; **28:** 859 – 864.

13 Robbins A, Abbey D, Lebowitz M. Passive smoking and chronic respiratory disease symptoms in non-smoking adults. *Int J Epidemiol*. 1993; **22:** 809 – 817.

14 Segala C, Poizeau D, Neukirch F, Aubier M, Samson J, Gehanno P. Air pollution, passive smoking, and respiratory symptoms in adults. *Arch Environ Health*. 2004; **59:** 669 – 676.