Community Medicine Group Project

Correlation Between Air Pollution Level And Symptoms Of Allergic Rhinitis -

A Study On Secondary School Students Of Two Different Districts In Hong Kong

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I) *Introduction*

The reason why we chose this topic is because Rhinitis, either Allergic or non-allergic type is an common disease in the population. A study done by the Hong Kong University revealed that up to 14.7% of primary school children population suffered from allergic rhinitis. Also, air pollution has been a major environmental problem in Hong Kong. There are some postulations that air pollution increase the incidence of rhinitis and worsen the symptoms. But some previous studies in other countries failed to identify a correlation between air pollution level and the number of people suffering from symptoms of allergic rhinitis. A similar study done by the Hong Kong University had identified that there is correlation between level of air polllution and incidence of allergic rhinitis and other symptoms of upper respiratory tract disease. So studies are needed to clarify the situation.

By definition, symptoms of allergic/ non allergic rhinitis include running nose, consecutive sneezing, nasal blockade, itchy nose, itchy eyes, injected conjunctiva and excessive lacrimation. Typically the diease occurs in the adolescent and young adult with no preference in sex, ethnic group and social economic background.

About air pollution, the Environment Protection Department of the Hong Kong Government (EPD) has been monitoring the amount of air pollutant in various destricts in Hong since early '80's. Since then, a total of 11 stations have been established and 3 more are under planning. Currently EPD monitors the level of 7 pollutants including sulphur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead , total suspended particulates and respirable suspended partculates. As Hong Kong is very backward in introducting legislation measure in controlling air pollution (e.g U S A has introduced unleaded petrol back in the early 70's but Hong Kong only introducted it in 1990.) The present available control measures and legislation are inadequate when compared to other developed countries.

II) *Objectives of the Study*

Our objectives is to investigate that whether there is any correlation between air pollution level and incidence of symptoms of allergic rhinitis. We will tried to determine the difference in incidence of reported symptoms of allergic rhinitis in secondary school students in 2 district of different pollution level. Our Null Hypothesis is 'There is no correlation between the prevalence of secondary school students with symptoms of allergic rhinitis and the level of air pollution. In a different phase ' There is no difference between the number of students sufferung from symptoms of rhinitis in destricts of different levels of pollution.' At the same time , we will also tried to find out any associated factors of allergic rhinitis. We hope that our result can show the detrimental effect of air pollution on health, so we may push the government to put air pollution problem in higher priority for consideration. Also ,hopefully our result can influence the public to alter personal behaviours which are very important in the management of allergic/non- allergic rhinitis.

III) *Literature review*

Allergic rhinitis is a common problem worldwide. Prevalence of the disease in western world is estimated to be 20-25% [10,15], while some up to 44.1% has been reported [1]. In a previous study on primary school students in Hong Kong, 14% was self-reported as suffering allergic rhinitis [7]. Because of its high prevalence, and the possible physical and psychosocial effects, the problem should not be overlooked [15,16]

Diagnosis of allergic rhinitis is mainly based on history and examination [16]. Majority of the epidemiological studies of the topic are based on self-reporting questionnaires, and 95% agreement in diagnosing allergic rhinitis has been achieved between questionnaire and interview [10]. Longitudinal study showed a reducing severity of symptoms with age [15].

The disease is affected by a lot of factors [9]. Most commonly encountered allergens in western world are pollens, fungal spores, house dust mites etc.[3,4,5,11]. In studying the relationship between the disease and air pollution, these factors should be well controlled. Humidity and temperature also affect the nasal symptoms [5,8,9], while smoking, however, correlates poorly with allergic rhinitis in many studies [2,5,12,13].

The severity of air pollution is reflected by the pollutant level monitoring in most countries including Hong Kong . The Environmental Protection Department (EPD) is measuring the level of NO_2, SO_2, O_3 and TSP (total suspended particles) through its network of fixed monitoring stations scattered around Hong Kong. Although these pollutants are thought to be the prominent ones that are detrimental to respiratory health, their contribution to respiratory symptoms is not readily shown up in epidemiological studies carried out by different people in different countries. Braun-Fahrlander et al. were able to demonstrate a positive relationship between respiratory symptoms and the NO_2 and TSP level [2]. Similar conclusions had been derived from Robertson's study and the local study on asthmatic hospitalization and particulate air pollution by Dr Tseng [9,19]. However, another study by Dr Koo on NO_2 and respiratory illness only found the association among adults while the same relationship was failed to be picked up among children. The effect of SO_2 on respiratory health is not well defined. Dr Tseng et al found an inverse relationship between SO_2 level and quarterly asthmatic hospitalization, and their result was agreed by a previous study carried out in New Zealand [18]. They postulated a "lag-response hypothesis" stating that the high asthmatic hospitalization during the low SO_2 season could be resulted from the exposure to SO_2 in the previous season which increased the bronchial hypersensitivity to other triggering factors in the next season. The Germany study on prevalence of asthma and allergic disorders among children in two cities with very different air quality particularly on SO_2 level fail to illustrate any difference in the two populations [21]. The importance of O_3 had been confirmed by an experiment on human subjects, however the relative contribution in daily live is not well defined [6]. Viegi and his colleagues found a higher prevalence of rhinitis and wheeze in a more polluted urban area compared to rural area in Italy [21].

A similar study on respiratory health and air quality carried out by Dr Ong and his colleagues in 1989 has not yet finished [7]. They chose 2 districts with different air pollution level and distributed questionnaires to primary 3 and 4 kids asking them the presence of a long list of respiratory symptoms and diseases and the other confounders they were going to control. The same questionnaires were also answered by their parents separately to test the validity of the reporting. Since they attempted to interview and examine every subject who reported respiratory symptoms, their final report had not been published yet. In their preliminary analysis which included only the self- reporting questionnaires, their is significant difference between the two districts in terms of respiratory symptoms in general. However, there are certain points we would like to mention in interpretating the results. Since it is a retrospective study, subjects are required to recall the symptoms and disease they have been experienced, but from the report it seems that the period of time during which any symptoms should be reported is not defined, they only defined the presence of a symptom

to be interested as more than 3 times per week, we are wondering whether there is misinterpretation in answering the questions. Another alarming result is that the questionnaire is also asking for diseased being diagnosed in the past. For primary school children it might not be appropriate, and also for the adults in Hong Kong because the medical knowledge in the public is regretfully poor, and the doctors here are quite reluctant in telling the correct diagnosis and discuss thoroughly with the patients, partly because they are too busy, and partly because they did not want to increase the unnecessary anxiety of the family members especially the parents who are worrying about their kids so much that any minor problem may terrify them. From the published result, we do see that some diseases are misinterpretated , the most striking one is measles which was reported to be 30% in both districts--obviously over-reported. In the questionnaire, opinions about the air pollution in the district were asked. This could contribute to reporting bias especially we know that in Kwai Tsing, one of the districts being studied, there has been many discussions on the air quality and it was the Kwai Tsing District Board that requested the HKU to carry out this study. In the report, they did not account for the effect of smoking and other confounders in presenting the results. Although in discussion they stated that even if they are included the difference still existed, how large and how significant it is is a mystery. Therefore, the result of the preliminary analysis is not very sound, and we are waiting for the final report which might solve many questions being raised.

The conflicting results among studies simply illustrate the fact that respiratory symptoms, including symptoms of rhinitis, are affected by too many confounding factors making the researchers very difficult to control. Different methods of sampling, pollutant measurement, information collection, control of factors etc. contribute to the problem in comparing various study results.

our result may influence the public to alter personal behaviours (e.g. avoid active or passive smoking) which are very important in the management of allergic/non-allergic rhinitis.

IV) *Methodology*

• Type of Epidemiological Study

Case control study. Secondary school students were chosen and compared with the symptoms of rhinitis and where they lived, where the air pollution level were significantly different.

• Sampling

1.Sampling Frame

Two districts were chosen for comparison according to air pollutants levels reported in the Environment Hong Kong 1992, published by the Environmental Protection Department (EPD).

Amount of Air Pollutants In the 2 Districts

Pollutants	Kwun Tong	Shatin
SO_2	20	10
NO_2	60	0
O_3	0	0
TSP*	90	60
RSP**	75	40

All units in ugm^{-3}.
* TSP - total suspended particle
** RSP - respirable suspended particle

Secondary school which were within 5 kilometres from the EPD monitoring stations were noted. In Kwun Tong, there were 33 schools with 26400 students whereas in Shatin, there were 34 schools with 27200 students.

2.Type of Sampling

Convenience clustered sampling.

5 co-educational secondary schools which met the above criteria were chosen from each district, covering letters were sent to ask for consent to participate. The first school which agreed to participate in the study were chosen and then all Form 1 to Form 5 students were given a questionnaire to fill in in the class and were collected on the same day.(21-12-92)

3. Sampling size

It was a one tail test, from the power table,310 subjects from each district were required to reject the null. there were altogether 970 subjects in each school and by our inclusion criteria, 544 subjects in each district were subsequently included in our analysis.

4 .Inclusion criteria for subjects

Those who lived and studied in the some district for the past one year were included in the analysis. (Q3- Q6)

- Confounders Measured and Utilized as Covariants

The following confounders were taken as covariants and measured (Q16-Q24). They were taken into account in the analysis by the method of discriminant analysis.

- smoking habit of the subject
- smoking habit in the family
- burning incense in home
- burning mosquito coils in home
- hairy dolls or toys on bed
- having common cold
- history of allergy
- average living area for each person in home
- number of people living together

- Confounders Controlled by Elimination

Pollens were neglected as a covariant in the analysis because it was a low pollen period for the past 3 months

Weather were relatively the same in the two districts because Hone Kong is a very small place and there is not much difference in the microclimate in the two districts.

Socio-economic status (SES) were assumed to be similar since the two schools were in close proximity to the public estates so as to ensure homogeneity in SES ; by this, indoor dust due to carpets, curtains and bed linens were neglected.

- Questionnaire

It was a single sheet with 2 printed pages divided into 3 parts in a closed format. The first part asked for personal particulars, mainly used to exclude those who did not fulfil our inclusion criteria out of our analysis.

The second part asked for the presence of rhinitis symptoms & whether they needed treatment and accompanied by symptoms of common cold. Other allergic histories were asked in this part.

The third part consisted questions which measured the confounders.

- Pilot Survey

A pilot survey was conducted to explore flaws, make corrections and determine the time needed to complete the questionnaire. The questionnaire was tried on a total number of 30 students in Shatin.

- Evaluation of Questionnaire

The response rate of the questionnaire was 100%. Among these, 2% of respondents did not fill in the back page; 5.7% did not have symptoms of rhinitis neglected both Q15 and Q16 instead of just Q15. 15.6% did not answer Q18.

In the pilot survey, most of the students were in higher Form, they had a better understanding and read the questionnaire more carefully so it give the impression that the questionnaire was satisfactory. However, in the actual survey, the students ranged from Form 1 to Form 5, younger students might read the questionnaire less carefully and thus misunderstood and omitted some of the statements in the questionnaire

V) *Data Analysis*

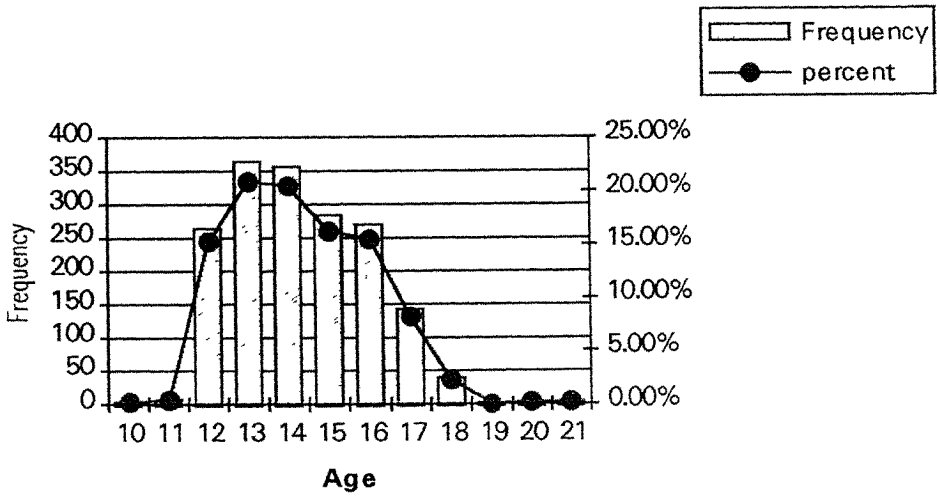
A total of 1943 questionnaires were collected and after careful selection, a total of 1743 subjects were used in the analysis. The others were discarded because they are either unfinished or with unacceptable data.

The following are the summary of the subjects used in the analysis

Sex	Frequency	Percent
Male	619	46.3%
Female	716	53.5%

Region	Frequency	Percent
Kwun Tong	656	37.9%
Shatin	808	46.7%
Others	268	15.5%

The following is a plot of the age of the subjects :-

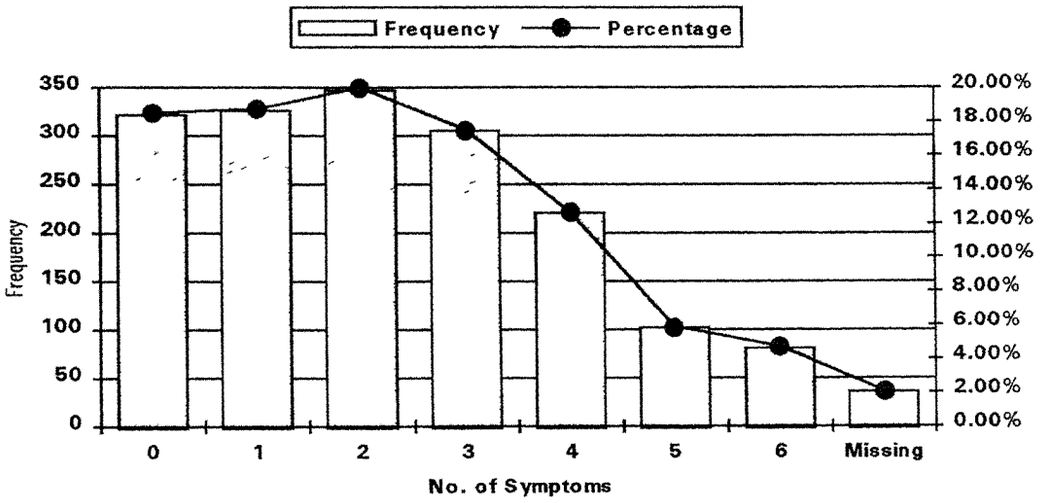


We can see that the subjects are mostly adolescence with the peak age of 13. There is no statistical difference in the distribution of sex and age between the 2 schools. Therefore we consider the 2 schools to be demographically equal.

The following are the raw data of the report of symptoms (with reference to the definition above in the questionnaire design)

Complaint	Yes	No
Consecutive sneezing	825 (48 5%)	875 (51.5%)
Runny nose	614 (36 1%)	1086 (63 9%)
Blocked nose	663 (39 0%)	1037 (61 0%)
Itchy nose	546 (32.1%)	1154 (67 9%)
Runny eyes	662 (38.9%)	1038 (61 1%)
Itchy eyes	497 (29 2%)	1023 (70 8%)

Below is a plot of the frequency by the number of patients with symptoms -



The above graph showed a particular distribution of the frequency of subjects with multiple symptoms. The above data include those suffering from upper respiratory tract infection. Originally we thought that the largest group should be the group with no symptoms but it turned out to be a flat top from 0 to 4 symptoms. This kind of response made us difficult in defining a cut off point of allergic rhinitis and casted doubts on the validity of reporting of the subjects.

The actual analysis utilized those patients that have been living in the district and studying in the district for more than 12 months. Those subject with URTI are also included partly because the high prevalence of URTI in the sample There are altogether 715 subjects claimed to be suffering from URTI when they have the symptoms and exclusion of them would make the sample size too small to be accurate Although the high number of subjects suffering from URTI were suspicious we had no way in cross checking its validity

After exclusion, a total of 1348 subjects were used for analysis. The method we used was the DISCRIMINATE ANALYSIS and the statistics package was the SPSS package by SPSS Inc The method basically uses all the confounding variable to predict an outcome, in our case, allergic rhinitis All the confounding variable were

used in the analysis. The significance of each variable in contributing to the prediction of the variable was also calculated. In this case, the statistical significance of the location would be calculated. In addition, the correlation coefficient of each variable would be calculated. We have chosen this method because we consider the symptoms of allergic rhinitis are due to multiple factors and simple cross tabulation is inadequte in analysing the data.

The subject is defined to be suffering RHINITIS if he/she is suffering 2 or more nasal symptoms or suffering 1 nasal and 1 eye symptom. In the following analysis, the RHINITIS would be used according to the above definition.

A simple cross tabulation of rhinitis with location failed to reveal any statistical difference in distribution in the 2 location. The follow is the result of the first run of the discriminant analysis with all the confounding variable.

897 (unweighted) cases will be used in the analysis.

Number of Cases by Group :-

	Number of Cases	
Rhinitis	Unweighted	Weighted
Yes	421	421.0
No	476	476.0
Total	897	897.0

This is the correlation coefficients of all the confounding variable in relation to each other.

Pooled Within-Groups Correlation Matrix

	Sex	**Age**	**Flu**	**Drug Allergy**	**Food Allergy**	**Skin Allergy**	**Asthma**
Sex	1.0000						
Age	.01782	1.0000					
Flu	-.07806	-.02990	1.0000				
Drug Allergy	.00389	-.05633	.01793	1.0000			
Food Allergy	.03447	-.06777	.06051	***.20378***	1.0000		
Skin Allergy	-.05910	-.01540	.08788	***.19012***	***.25557***	1.0000	
Asthma	-.00065	-.01216	.04147	***.21225***	***.14184***	***.16205***	1.0000
Area	-.04465	.05591	.04993	-.05276	-.02675	.02888	-.09608
People	.11962	.03883	-.03704	-.00833	-.00549	.00126	-.00077
Smoke	.11248	-.02301	.00551	.10987	.14053	.04241	.08985

	Sex	Age	Flu	Drug allergy	Food Allergy	Skin Allergy	Asthma
Passive Smoking	- 04723	.02147	.01517	-.02935	00422	-.04170	.01953
Incense	.03164	.02169	.01493	-.04565	.03164	-.03193	-.02686
M. Coil	-.03551	.03751	.06244	.07807	.11048	.07376	.09625
Pets	.00524	-.00587	.01482	-.00135	.03010	.02456	.02513
Dolls	*-.47471*	.07668	.01079	.00029	02430	.05688	.02787
Location	.02269	.10240	.03026	.00704	-.04548	-.02675	-.04991

	Area	People	Smoke	Passive Smoke	Incense	M. Coil	Pets
Area	1.00000						
People	*.17534*	1.00000					
Smoke	-.06851	.03534	1.00000				
Passive Smoke	-.01865	-.08095	.10049	1.00000			
Incense	.04243	-.16246	-.04538	.09826	1.00000		
M. Coil	.03706	-.01492	.08380	.04151	.07163	1.00000	
Pets	-.06252	-.03819	.08723	.06026	.02495	.09994	1.00000
Dolls	-.00755	-.01467	.01499	.03350	-.00834	.07280	.00237
Location	.10648	-.06710	-.09687	.04777	.05661	.03129	.02379

	Dolls	Location
Dolls	1.00000	
Location	-.15374	1.00000

* Yes = 1, No = 2 .
* Male = 1, female = 2
* Kwun tong = 1, Shatin = 2

The following are the statistical significance of each of the variable :-

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 895 degrees of freedom

Variable	Wilks' Lambda	F	Significance
Sex	.99332	6.109	***.0143***
Age	.99927	.6523	.4195
Influenza	.97217	25.62	***.0000***
Food Allergy	.99841	1.429	***.2322***
Drug Allergy	.99117	7.974	***.0049***
Skin Allergy	.99327	6.064	***.0140***
Asthma	.99997	.02888	.8651
Area*	.99999	.01007	.9201
People*	.99630	3.325	***.0686***
Smoking	.99936	.5703	.4503
Passive Smoking	.99750	2.243	***.1345***
Incense	.99057	8.521	***.0036***
Mosquito Coil	.99998	.01613	.8990
Pets	.99795	1.838	.1755
Dolls	.98623	12.50	***.0004***
Location	.99821	1.607	***.2053***

* Area : area of the house.
* People : no. of people living under the same roof.

The overall significance of the above discriminant analysis are :-

Wilk's Lambda	Chi-square	Deg of Freedom	Significance
.9374	57.362	15	***.0000***

Using all the variables and predict the status of rhinitis, the accuracy is :-

Actual Group	No. of Cases	Predicted Group Membership	
Rhinitis	511	298 58.3%	213 41.7%
No Rhinitis	577	577 41.8%	336 58.2%

Percent of "grouped" cases correctly classified: **58.27%.**

From the above result we could see that the confounding factor were quite independent of each other (correlation coefficient < 0.1) Exceptions were the allergies and asthma which were some what correlated, as expected. Sex was also moderately correlated with the possession of dolls. These correlation's partly proved the validity of the data. Using the above variables to

predict the status of rhinitis, there would be a 8.27% excess of correct prediction that pure guessing (50% correct). Overall this discriminant analysis was statistically significant with a p value < .0001.

The variables with statistical significance or in the margin were selected out to run another discriminant analysis. The result were as follow :-

943 (unweighted) cases will be used in the analysis.

	Number of Cases	
Rhinitis	Unweighted	Weighted
Yes	443	443.0
No	500	500.0
Total	943	943.0

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 941 degrees of freedom

Variable	Wilks' Lambda	F	Significance
Sex	.99659	3.216	.0733
Influenza	.97165	27.45	***.0000***
Drug Allergy	.99207	7.523	***.0062***
Skin allergy	.99446	5.239	***.0223***
No. of People	.99856	1.358	.2442
Passive smoke	.99864	1.279	.2585
Incense	.99152	8.049	***.0046***
Dolls	.98858	10.87	***.0010***
Location	.99782	2.054	.1522

Wilk's Lambda	Chi-square	DF	Significance
.9471	50.884	8	.0000

The second run showed that after elimination of the statistically insignificant factors, the F value of the above factors increased. But regrettably, location was still not a significant factor. The second run was overall statistically significant.

A third and final run with the selected statistically significant variable was done and the results were as follow :-

992 (unweighted) cases will be used in the analysis.

Number of Cases by Group

RHINITIS	Unweighted	Weighted Label
Yes	466	466.0
No	526	526.0
Total	992	992.0

Pooled Within-Groups Correlation Matrix

	Sex	**Flu**	**Drug allergy**	**Skin Allergy**	**Incense**	**Dolls**
Sex	1.00000					
Flu	-.08107	1.00000				
Drug Allergy	.03337	.06828	1.00000			
Skin Allergy	-.06148	.09518	***.29303***	1.0000		
Incense	.04856	.03227	.03629	-.02015	1.0000	
Dolls	*-.47232*	.03768	.02754	.06282	-.01205	1.0000

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 990 degrees of freedom

Variable	Wilks' Lambda	F	Significance
Sex	.99633	3.648	.0564
Flu	.97515	25.23	***.0000***
Drug Allergy	.99216	7.827	***.0052***
Skin Allergy	.99367	6.305	***.0122***
Incense	.99478	5.192	***.0229***
Dolls	.98946	10.54	***.0012***

Canonical Discriminant Functions

Wilks' Lambda	Chi-square	Degree of Freedom	Significance
0.9553	45.158	6	***0.0000***

Classification Results -

Rhinitis		No. of Predicted Group Membership	
Actual Group	Cases	Yes	No
Yes	511	308 60.3%	203 39.7%
No	577	268 46.4%	309 53.6%

Percent of "grouped" cases correctly classified: **56.71%**

The final run of the discriminant analysis confirmed that influenza, drug allergy, food allergy and dolls are significant factors contributing to the status of rhinitis. Sex was still not significant ($p>0.05$). The reason for sex having such a p value might be due to its association with the possession of dolls, which was a significant factor.

The final run of the discriminate analysis was statistically significant ($p<0.0000$) but the overall predictive value decreased to 56.71% as compared to the initial run (including all variables) of 58.27%. This indicates that although the other factors themselves were not statistically significant, their contribution could not be ignored.

The low predictive value of the tests (max. 58.27% , 8.27% better than pure guessing) means that environmental factors alone could not predict much of any allergic or atopic responses as the body's internal factors also played an significant role.

Distribution of influenza are cross-tabulated with location as shown below :-

FLU By LOCATION

Count Row% Column%	Kwun Tong	Shatin	Row Total
Yes	**261** 43.5% 58.4%	**339** 56.5% 54.6%	**600** 56.2%
No	**186** 39.7% 41.6%	**282** 60.3% 45/4%	**468** 43.8%
Column Total	**447** 41.9%	**621** 58.1%	**1069** 100%

chi-square	D.F.	Significance	Min. E.F.	Cells with E.F.< 5
1.37401	1	**.2411**	195.876	None
1.52446	1	**.2169**	(Before Yates Correction)	

Number of Missing Observations = 270

As shown, there is also no difference in the distribution of influenza cases in the 2 districts.

Of all the 1743 subjects 216 consulted the doctor in the last month. Below is a descriptive statistics of the treatment they received :-

Treatment	Frequency	Percent
No Treatment	27	13.1
Avoid Allergens	19	9.2
Drug Treatment	112	54.4
Both	20	9.7
Missing	28	13.6

Here we find that 12.3% of the sample visited a doctor last month for some upper respiratory tract symptoms. This high rate explains the fact that the private and government general clinic are always busy. The main stay of treatment is still drug treatment with only less than 20 % of the patients were given advice on avoidance allergen.

Below is a table showing the treatment received from doctor of those whom suffer from upper respiratory symptoms but was diagnosed not suffering from an infection :-

Treatment	Frequency	Percent
No Treatment	8	13.3
Avoid Allergens	8	13.3
Drug Treatment	25	41.7
Both	10	16.7
Missing	9	15.0

Once again, drug treatment is the mainstay, but around 30% were given advice on life style changes.

Conclusion and Discussion

In conclusion, from the data we collected we could prove that symptoms of allergic rhinitis are **positively associated** with environmental factors including **incense burning** and **possession of dolls** and intrinsic factors like **influenza, drug and skin allergy**. Location , thus air pollution level does not have an significant association, and we **cannot reject the null hypothesis.** The above factors are all well known factors and we have not found any new factors in our study.

Several reasons might help to explain the fact that we could not reject the null. First there are very serious over reporting in the symptoms. Only 18% of the total sample are symptom free for the last month, which is very low. Moreover, about 16% of the total have 3 symptoms, many of our group member doubt the validity of the reporting. With this kind of over-reporting, we found difficulty in classifying whether a subject is or is not suffering from rhinitis. We run the discriminant analysis with different definition of rhinitis but none of the runs showed any result that is grossly different from the one we displayed above.

Secondly, the rate of influenza reported is also very high, over 50%. Originally we expect around 10% of the sample would be suffering from an upper respiratory tract infection, we would then discard these subject from our analysis. The unexpected high rate make us unable to discard these cases otherwise our sample size would be very small. Thus we have included influenza as a variable in our analysis. Here we suspect that there is also serious over-reporting in the rate of upper respiratory tract infection.

Thirdly, a a lot of the questionnaires are only partially filled or not properly filled. Some of the subject have completely misunderstood some questions. The validity of the data from those partially filled questionnaire is questionable.

Originally we have decided to doing some sampling cross check with the selected subject to determine the rate of over-reporting or under-reporting, but the headmasters of the schools denied our visit because we would hinder their school activity. Moreover, we sent the questionnaire on the 21st December, when both school were having Christmas party. The student might be in a holiday mood and did not fill in the questionnaire in a proper manner. It was found that in the younger subjects, there was a higher rate of invalid data. The questions might be too difficult fro the younger subjects to understand, so they might just pick random answers in those questions that they did not understand.

Although by random selection we selected these two schools, but unfortuantly, the schools are of Band 3 and Band 5. This means that the students are mainly of lower academic results and there are more under achievers. The students of lower band schools are known to have more behavioural problems and more rebellious (partly as a fact that there are more under achievers). Whether this would be a reason for the severe over reporting, we don't know.

In conclusion, we failed to obtain enough valid data for the study. It is not suitable to draw any hard conclusion from the above data and we would like to redo the data collection in 2 other schools

VI)*Acknowledgements*

We would like to thank the department of Community and Family Medicine of the Chinese University of Hong Kong in supporting our study. We would like to thank all the staff that have critizied our methods and given us ideas. We would like to thank Professor Lyold in helping us contacting the schools and the staff of the general office in helping us to prepare the questionnaire. Last but not the least, we would like to thank Professor Hazlett who has been with us in the whole project, guiding us from the very beginning. He has given us numerous inspirations and ideas and also has been with us in the painstaking days of analysis the data. Without his help, we could not possibly produce any results.

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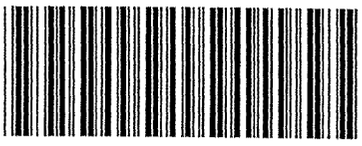

中學生鼻敏感症狀調查

香港中文大學醫學院社區及家庭醫學系

我們現正進行一項中學生鼻敏感症狀調查，此調查之結果有助將來醫療服務之制定。懇請　台端如實作答，一切資料將保密。　多謝合作。

A.　個人資料

1. 年齡 ____

2. 性別　　男 ☐　女 ☐

3. 住址　　官塘 ☐　沙田 ☐　其他 ☐

4. 學校地區　　官塘 ☐　沙田 ☐　其他 ☐

5. 在過去一年內你都在本區居住　　是 ☐　否 ☐

6. 在過去一年內你都在本區就讀　　是 ☐　否 ☐

B.　鼻敏感的症狀

(第7至12題) 最近一個月內，你是否曾經有以下情況：

7. 平均一個星期內，有三次或以上連續打噴嚏的情況　是 ☐　否 ☐

8. 平均一個星期內，有三日或以上流鼻水　是 ☐　否 ☐

9. 平均一個星期內，有三次或以上鼻塞　是 ☐　否 ☐

10. 平均一個星期內，有三次或以上鼻痕　是 ☐　否 ☐

11. 平均一個星期內，有三次或以上眼睛痕癢　是 ☐　否 ☐

12. 平均一個星期內，有三次或以上流眼水　是 ☐　否 ☐

13. 上述第7至12題之情況有沒有向醫生求診　有 ☐　沒有 ☐

如果沒有向醫生求診，無需回答第14題

14. 如果是，所採用的治療方法是 (請在適當項目✓)

i. 無 ____

ii. 避免接觸刺激性之物品(如煙塵、毛公仔、花粉) ____

iii. 藥物治療 (滴鼻或口服) ____

----- 請轉背頁 -----

如果没有第7至12題之情況，無需回答第15題

15. 具備上述第7至12題之情況的同時，你有没有傷風感冒的症狀，例如： 發燒、頭痛、痰多、咳嗽、喉嚨痛　有 ☐　没有 ☐

16. 你是否有以下情況？

i. 藥物敏感　是 ☐　否 ☐

ii. 食物敏感　是 ☐　否 ☐

iii. 皮膚敏感　是 ☐　否 ☐

iv. 哮喘　是 ☐　否 ☐

C. 居住環境

17. 居住面積
(請在適當項目 ✓)

100 平方呎以下 ____
100 - 300 平方呎 ____
301 - 500 平方呎 ____
501 - 700 平方呎 ____
701 - 900 平方呎 ____
900 平方呎以上 ____

18. 同住人數(包括你本人) ____

19. 你有没有吸煙的習慣？　有 ☐　没有 ☐

20. 與你同住的人士有没有在家中吸煙的習慣？　有 ☐　没有 ☐

21. 家中有没有燃點香火(不包括電香)？　有 ☐　没有 ☐

22. 家中有没有燃點蚊香(不包括電蚊香)？　有 ☐　没有 ☐

23. 家中有没有飼養多毛之寵物(例如：貓、狗、兔仔、鳥類)？　有 ☐　没有 ☐

24. 你的床上有没有擺設毛公仔？　有 ☐　没有 ☐