

# The Relationship Between Prevalence of Asthma and Environmental Factors in Rural Households

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## Summary

A cross sectional study was conducted among 1007 children aged 1-12 years, from a padi farming area. The percentage of male children was 51.4%. The prevalence of at least one of the chronic respiratory symptoms was 12.81%, and the prevalence of chronic cough, chronic sputum, wheezing, and bronchial asthma as diagnosed by doctors were 9.33%, 3.87%, 5.36% and 3.38% respectively. The overall prevalence of bronchial asthma was 6.26%. The prevalence of asthma was highest among children aged 11-12 years (8.9%) and higher among males (6.95%). No significant relationship was found between the prevalence of either chronic respiratory disease symptoms or bronchial asthma, and selected environmental factors, namely exposure to cigarette smoke, use of mosquito coil and wood stove. However there was a significant relationship between prevalence of asthma in children and history of asthma among parents and grandparents.

*Key Words:* Children, Bronchial asthma, Rural area

## Introduction

Several studies have been done in Malaysia to determine the prevalence of asthma and the influence of environmental factors on its occurrence. A study on respiratory diseases conducted at several primary schools in Kuala Lumpur, the capital city of Malaysia, showed that the prevalence of asthma that were diagnosed by doctors was 8.7%. The prevalence of chronic cough with phlegm and wheezing were 8.2% and 8.0%, respectively. The prevalence of asthma or those with wheezing was 13.8%<sup>1</sup>. In these studies, the study populations were children because they are most easily affected by environmental factors<sup>2</sup>. However, there has been no study on the prevalence of asthma among rural Malaysian children. The objectives of this study were to determine the prevalence of asthma and chronic respiratory symptoms; to investigate the

associations between environmental factors, namely exposure to cigarette smoke, use of mosquito coil and use of wooden stove, and the prevalence of asthma and chronic respiratory symptoms; and to investigate the association between family history of asthma among parents, grandparents, and siblings, and the prevalence of asthma. Two villages in Tg. Karang, a rural area about 100 km from Kuala Lumpur, namely Kg. Sawah Sempadan (SS) and Kg Sri Tiram Jaya (STJ), were chosen. Tanjung Karang is a major padi-farming area in Selangor.

## Materials and Methods

A cross sectional study was conducted in both villages from January to June 1991. A total of 1007 Malay children, aged 1-12 years were selected through cluster sampling. In SS, houses are arranged in blocks in the

midst of the padi fields, while houses in STJ are located at the fringe of the padi fields.

A total of 366 heads of household were interviewed by pre-trained numerators, using a translated and modified standardized American Thoracic Society questionnaire<sup>3</sup>. Respondents were asked about the occurrence of chronic respiratory symptoms, namely chronic cough, chronic phlegm and wheezing, and asthma that was diagnosed by doctors.

The definition of the variables used in the study were, asthma is a case of asthma diagnosed by doctor or had history of wheezing or both. Chronic cough is a children with history of cough more than 3 days per week for 3 months per year; chronic sputum as history of cough more than 3 days per week for 3 months and wheezing as history of wheeze at any time.

The association between exposure to cigarette smoke, use of mosquito coil and wood stove, with prevalence of asthma and chronic respiratory symptoms among children were studied. Both descriptive and analytic statistical methods were used to test the association between exposure and outcome.

## Results

A sample of 366 heads of household were interviewed. The total number of children aged 1-12 years studied was 1007. Males comprised 51.4% of the 1007 children. A majority (46.5%) of them were in the 6-10-year age group.

### Prevalence of chronic respiratory symptoms

The prevalence of any one of the three chronic respiratory symptoms was 12.81%. The prevalence of chronic cough, chronic phlegm, wheezing and asthma that was diagnosed by doctor was 9.33%, 3.87%, 5.36% and 3.38%, respectively (Table I).

### Prevalence of Asthma

The prevalence of asthma (subject with wheezing or asthma diagnosed by doctor or both) was 6.26%. Twenty-five children had both history of wheezing and asthma diagnosed by doctor. However another 38 children had history of either wheezing or asthma

diagnosed by doctor. Out of the 63 asthmatic children, 36 were boys, with prevalence being 6.95% among boys and 5.52% among the girls (Table II). The highest prevalence of 8.9% was among children aged 11-12 years, and lowest 5.56% among those aged 6-10 years.

**Table I**  
Prevalence of chronic respiratory symptoms

| Symptoms                     | Frequency (N=1007) |       |
|------------------------------|--------------------|-------|
|                              | No.                | %     |
| Chronic respiratory symptoms | 129                | 12.81 |
| Chronic cough                | 94                 | 9.33  |
| Chronic phlegm               | 39                 | 3.87  |
| Wheezing                     | 54                 | 5.36  |
| Asthma diagnosed by doctors  | 34                 | 3.38  |

**Table II**  
Prevalence of asthma by sex and age

| Asthma cases  | Frequency |      |
|---|-----------|------|
|   | No.       | %    |
| Total asthma cases<br>(diagnosed by doctors or<br>wheezing or both) | 63        | 6.26 |
| Cases by sex  |           |      |
| males (N=518)   | 36        | 6.95 |
| females (N=489)   | 27        | 5.52 |
| Cases by age  |           |      |
| 1-5 years old (N=393)   | 24        | 6.11 |
| 6-10 years old (N=468)  | 26        | 5.56 |
| 11-12 years old (N=146)   | 13        | 8.90 |

### Association between chronic respiratory symptoms and environmental factors

In this study, 658 of the children had a smoking parent, 897 of them were exposed to mosquito coils and 208 to wooden stoves.

Table III shows the prevalence of chronic respiratory symptoms and their association with selected

environmental factors. The prevalence among children whose parents smoked and those who used mosquito coils was the same at 13.2% whilst that among those who used wood stove was 9.6%. The chi-square tests performed indicate that there is no statistically significant relationship between prevalence of chronic respiratory symptoms and the environmental factors.

**Table III**  
**Prevalence of chronic respiratory symptoms and association with selected environmental factors**

| Environmental Factors   | Prevalence of Chronic Respiratory Symptoms No. (%) | P value |
|-------------------------|--|---------|
| 1. Smoking Parent       |  |         |
| Yes (N=658)             | 87(13.2)   | >0.05   |
| No (N=332)              | 40(12.0)   |         |
| Missing (N=17)          |  |         |
| 2. Use of mosquito coil |  |         |
| Yes (N=897)             | 118(13.2)  | >0.05   |
| No (N=82)               | 9(11.0)  |         |
| Missing (N=28)          |  |         |
| 3. Use of wood stove    |  |         |
| Yes (N=208)             | 20 (9.6)   | >0.05   |
| No (N=799)              | 107(13.4)  |         |

Missing = no response from sample

**Association between asthma and environmental factors**

Table IV shows the prevalence of asthma among the children, and its association with selected environmental factors, where 6.7% of the children with parents who smoked, 6.5% of their families who used mosquito coils and 4.3% of their families who used wood stove, had asthmatic children. However, there is no statistically significant relationship between prevalence of asthma and these environmental factors.

**Association between asthma and family history**

The prevalence of asthma and its association with family history is given in Table V, where 16.3% of

**Table IV**  
**Prevalence of asthma and association with selected environmental factors**

| Environmental Factors   | Prevalence of Asthma Among Children No. (%) | P value |
|-------------------------|---|---------|
| 1. Smoking parent       |   |         |
| Yes (N=658)             | 44 (6.7)                                    | >0.05   |
| No (N=332)              | 19 (5.7)                                    |         |
| Missing (N=17)          |   |         |
| 2. Use of mosquito coil |   |         |
| Yes (N=897)             | 58 (6.5)                                    | >0.05   |
| No (N=82)               | 5 (6.1)                                     |         |
| Missing (N=28)          |   |         |
| 3. Use of wood stove    |   |         |
| Yes (N=208)             | 9 (4.3)                                     | >0.05   |
| No (N=799)              | 54 (6.8)                                    |         |

Missing = no response from sample

**Table V**  
**Prevalence of asthma and association with family history of asthma**

| Family History            | Prevalence of Asthma Among Children No. (%) | P value |
|---------------------------|---|---------|
| 1. Asthmatic Parents      |   |         |
| Yes (N=116)               | 19(16.3)                                    | <0.05   |
| No (N=860)                | 43 (5.0)                                    |         |
| Missing (N=31)            | 1   |         |
| 2. Asthmatic Grandparents |   |         |
| Yes (N=280)               | 25 (8.9)                                    | <0.05   |
| No (N=694)                | 37 (5.3)                                    |         |
| Missing (N=33)            | 1   |         |
| 3. Asthmatic Siblings     |   |         |
| Yes (N=113)               | 8 (7.1)                                     | >0.05   |
| No (N=867)                | 55 (6.3)                                    |         |
| Missing (N=27)            | 0   |         |

Missing = no response from sample

asthmatic children had parents who had history of asthma, 8.9% of them had asthmatic grandparents, and 7.1% of them had asthmatic siblings. The Chi-square tests indicate that there is statistically significant association between prevalence of asthma among the children and a history of asthma in their parents and grandparents.

## Discussion

In view of comparing the result between the rural area and urban area, the definition for asthma, chronic respiratory symptoms and variables studied were similar to the study done by Azizi B.H.O.<sup>1</sup> except for the age of the sample. No attempt was made to study the effect of combined effects of environmental factors for the asthma.

Prevalence of chronic respiratory symptoms in children in rural households, as determined in this study, are lower than those reported for urban areas. The prevalence of chronic phlegm, wheezing and asthma that were diagnosed by doctors were 3.87%, 5.36% and 3.38%, respectively, which are lower than those reported in a study by Azizi B.H.O. in 1988 where the prevalence of the same symptoms were 8.2%, 8.0% and 8.7%, respectively. The prevalence of asthma among males (6.95%) was higher than among females (5.52%) and this finding is similar with the other study<sup>1</sup>.

Lower level of air pollution in the rural areas could explain the lower prevalence of chronic respiratory symptoms. Studies by Azizi B.H.O were done in Kuala Lumpur where air pollution and the population density is high. Kuala Lumpur has a static air circulation because it is situated in the Klang Valley and surrounded by mountain ranges. Besides, Kuala

Lumpur is a city with varied sources of air pollution such as emissions from industries, motor vehicles and construction sites.

Sources of air pollution in the study areas are few. These sources are activities such as the burning of padi straws and the use of pesticides, but the level of pollution is suspected to be much lower than that existing in an urban area like Kuala Lumpur. The population density in rural areas is much lower and the house structure provides good natural ventilation. This may explain why environmental factors like exposure to cigarette smoke, use of mosquito coil and wooden stove, do not influence the prevalence of chronic respiratory symptoms.

This study showed that for asthmatic children in the rural areas, the prevalence of asthma was not affected by environmental factors like exposure to cigarette smoke and the use of mosquito coils and wood stoves. This contrasted with the findings by a study conducted in Kuala Lumpur which revealed that passive smoking and the use of mosquito coil had an effect on the prevalence of asthma among children<sup>4</sup>.

A probable explanation for this is that every rural house has a verandah and large windows, with ventilation being much better than that of an urban dwelling. The greater distances between houses in the rural area also facilitates general ventilation in the house. Verandah is also the place where parents usually smoke. This well ventilated area will decrease children's exposure to tobacco smoke.

As expected, family history has an influence on the prevalence of asthma among children. This association was also shown in other studies<sup>5,6,7</sup>. However having an asthmatic sibling does not influence the prevalence of asthma.

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