

# An Evaluation of Asthma Morbidity in Singaporean Schoolchildren - A Teachers' Survey

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Asthma is a common childhood illness affecting up to 20% of Singaporean children.<sup>1</sup> It exerts a substantial burden on the patient, the family as well as the healthcare services.<sup>2-3</sup> As children spend a substantial amount of time in schools, it is important to understand the burden of childhood asthma on schools as well as the morbidity with regards to school attendance and participation in physical education. This information can help with the assessment of the indirect costs of asthma in Singapore as well as the need to implement asthma management training programs for our teachers.

In view of the high prevalence of asthma in our community, this study aimed to evaluate the morbidity of this disorder in our schoolchildren as indicated by the frequency of asthma-related school absenteeism and the lack of participation in physical exercise classes.

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**SUMMARY** Asthma is the most common chronic illness in childhood. This study evaluated the asthma morbidity among Singaporean schoolchildren. The survey involved 1,744 schoolteachers using a structured written questionnaire. 73.4% of class teachers reported at least 1 asthmatic student in their class. 37.1% of teachers had students absent from school for up to 3 days per month and 5.1% missed school for 4 to 14 days in a month. 87.4% of the physical education (PE) teachers reported at least 1 asthmatic student in their class. 65.2% reported an average of 1-3 students sitting out at each PE lesson and 15.1% reported students who were exempted from PE for more than 3 months in a year due to asthma. The morbidity of asthma in Singaporean schoolchildren in terms of school absenteeism and exemption from PE classes is substantial. The data supports a need to improve asthma control amongst our schoolchildren.

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School absenteeism and reduction in the ability to participate in physical activities are two well-known surrogates of asthma morbidity in schoolchildren.<sup>4</sup>

## MATERIALS AND METHODS

A structured questionnaire was developed to ascertain the burden of asthma in schools and asthma morbidity in terms of absenteeism from school and physical exercise (PE) lesson. A random selection of Primary and Secondary schools

was made from the Directory of Schools and Educational Institutes 1999, produced by the Ministry of Education, Singapore. In all, 20 primary and 13 secondary schools participated in this survey. These schools assisted in the distribution and collection of the self-administered questionnaires from their teachers. This study was conducted from

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March to November 2002. Data analysis was performed using the SAS statistical software.

## RESULTS

The response rate from full time teachers was 67.4% (1,744/2,589). Of these 1,744 respondents, 51.1% (n = 892) were class (overall in charge of a class) teachers, 2.9% (n = 51) were PE teachers and 14.5% (n = 253) were both class and PE teachers; the remaining 31.4% (n = 548) were subject teachers. Sixty-one percent (61%) of these teachers had more than 5 years of teaching experience (Table 1).

A high proportion of class teachers (73.4%) and physical education teachers (84.7%) were aware of the students who had asthma in their classes. The proportion was significantly ( $p < 0.0001$ ) higher in primary (6 to 12 year olds) (87.4%) than in secondary (13 to 16 year olds) (50.9%) class teachers. However, the reverse was observed for physical education where more secondary level PE teachers (86.8%) were informed of the students with asthma than their primary level counterparts (66.4%) ( $p < 0.005$ ).

The 1,145 class teachers, in-

cluding those who teach physical education, were then asked to estimate the number of asthmatic students they had (Table 2). Most reported having one to three asthmatics in their class (50.2%) (an average class has 40 students), and a sizeable 36.3% encountered four or more asthmatics in their class. Generally, class teachers in primary schools were more likely to encounter multiple (four or more) asthmatic students (41.7%) in their class than those in secondary schools (22.9%) ( $p < 0.0001$ ).

The class teachers were also asked to estimate the maximum length of asthma-related medical leave taken in a month by any of their students. Of the 1,100 respondents, 37.1% reported students who had missed school between 1 to 3 days in a month and 5.1% had students were absent between 4 to 14 days in a month; while 37.4% reported that none of their-students took asthma-related medical leave and 20.4% were unsure. The overall absenteeism rate was higher in primary school children (50.9%) than in secondary school students (40.7%) ( $p < 0.001$ ).

Amongst the PE teachers, 29.1% did not have students who

were excused from PE due to asthma-related reasons. However, two-thirds (65.2%) reported between 1 to 3 students per class who were excused and a handful (2.7%) reported 4-6 such students per class while 3% were not sure. The indicator for chronicity and significant morbidity (i.e. being excused from PE for more than 3 months in a year due to asthma) was more often reported by PE teachers in secondary (20.8%) than in primary (9.4%) schools ( $p < 0.02$ ).

Despite the tremendous burden of asthma on Singaporean schools, only 8.0% (140/1744) of all teachers surveyed received any form of training in the management of acute asthma. The proportion of PE teachers (16.2%) who received training was however higher when compared to non-PE teachers (3.4%) ( $p < 0.001$ ).

## DISCUSSION

Asthma is a major health problem in Singapore. It accounts for the second highest number of hospital discharges in children less than 14 years old.<sup>2</sup> Among children below 15 years of age, asthma ranked as the second leading condition seen by primary health care practi-

**Table 1** Distribution of teachers by years in teaching

	Years of teaching experience (%)			
	< 2 years	2-5 years	6-10 years	> 10 years
Primary (n=994)	22.1	20.4	15.4	42.0
Secondary (n=705)	12.5	20.3	16.5	50.8
Total (n=1,699) (excluding 45 teachers who gave null answers)	18.1	20.4	15.8	45.7

**Table 2** Distribution of the number of asthmatics known to class teachers who are aware of asthmatics in their class

No. of asthmatics encountered in class	% of teachers (n=1,145)
1-3	50.2
>3	36.3
None	3.7
Not sure	7.3
Null response	2.5

tioners.<sup>2</sup> The economic burden of asthma in Singapore is estimated to be around US\$33.93 million per annum.<sup>3</sup>

Singaporean children spend the major part of the day in school. It is reported that an average Singaporean student spends up to 6 hours a day a school.<sup>5</sup> More than seventy percent (73.4%) of all surveyed schoolteachers encountered asthmatic children in school. In PE classes, 84.7% of teachers reported at least 1 asthmatic child in each class. These figures support the notion that the burden of asthma in Singaporean schoolchildren is indeed substantial.

Asthma is thought to be the single most prevalent cause of childhood disability in the developed world.<sup>4</sup> School attendance has been routinely used to measure the health status of children with chronic disease.<sup>6-7</sup> It also measures the effectiveness of asthma management and is important for the calculation of indirect costs of asthma care in a country. High absenteeism rates are detrimental to the education of the child and his full participation in school activities. The repercussions of this observation also extend further-school absenteeism may also lead to poor academic success<sup>8</sup> and

parent work absenteeism, as there is the need to care for these children who are at home (absent from school).<sup>9</sup> Work absenteeism results in loss of productivity and contributes significantly to the indirect costs of asthma.

This study shows that in Singapore, school absenteeism due to asthma is a significant problem. Over fifty percent of class teachers (50.3%) had students missing at least one day of school every month. This translates to at least 10 days per school year. This data is comparable to that of other developed countries like the United States<sup>10-11</sup> and Europe<sup>12</sup>. In the United States, studies reported 7.6-10 days of school missed per year due to asthma-related reasons.<sup>4,13</sup> A large study in the US in 1998 recorded that children with asthma had an additional 10.1 million days missed from school per year as compared to their normal contemporaries.<sup>13</sup>

Physical exercise is important for all asthmatic children and they should be encouraged to participate fully in all physical activities. It has also been shown that physical training in an asthmatic improves overall cardio-respiratory fitness.<sup>17-19</sup> improves lung function<sup>20-21</sup> and reduces the incidence

and severity of exercise induced bronchospasm.<sup>22-23</sup> One study also showed that school absenteeism and hospitalization dropped markedly after a physical exercise program.<sup>24</sup> Participation in the physical exercise program can also improve coping behavior with asthma.<sup>20,25</sup> Keeping asthmatic children active is an important goal to ensure their healthy physical and social development.

In this study, the number of asthmatic students missing their routine physical exercise sessions in school was found to be considerable, with 65.2% of PE teachers reporting an average of 1-3 students sitting out at each PE lesson due to asthma-related reasons and 15.1% of teachers reporting that they had students who were exempt from PE for more than 3 months a year due to asthma. These findings are consistent with other studies that have also shown that asthma contributes significantly to childhood disability. Taylor *et al.*<sup>14</sup> reported that up to 30% of asthmatic children describe some activity limitation and Newacheck *et al.*<sup>4</sup> found that asthmatic children had an annual average of 20 restricted activity days a year.

As asthma poses such a big problem in Singaporean schools, the teachers can play an important role in the management of these children's chronic illness. There is a general belief that optimal management of asthma in schools may help reduce absenteeism and improve participation in all activities.<sup>26</sup> This could involve educational seminars for the teachers<sup>27</sup> with emphasis on the recognition and management of asthmatic exacerbations, the construction of

written guidelines for the management of asthmatic attacks<sup>28</sup> and equipping the school's first aid kits with inhalers and spacer devices. Toelle et al described an improvement in FEV<sub>1</sub>, asthma symptoms, as well as doctor visits after the implementation of a community-based management program.<sup>29</sup> However, there are still no good studies on whether these interventions can improve asthma morbidity in schools.

In conclusion, our data strongly suggests that the burden of asthma in Singapore schools is substantial both in terms of prevalence and morbidity – a high proportion of our teachers come into contact with asthmatic children daily. However, it was disconcerting to note that amongst these teachers, there was a gross lack of asthma management training. The morbidity with regards to school absenteeism and participation in physical exercises is also significant. These findings call for implementation of comprehensive asthma training programs for our teachers. There is also a need to improve the overall management of our asthmatic schoolchildren with the aim to reduce absenteeism as well as improving participation in all school activities.

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