

exposure during the first year of life,¹⁴ yet they have little influence on school-aged children.¹⁹ Adolescents being the study participants in this cross-sectional study, therefore, may not be the most ideal and sensitive population in which to examine these effects.

Air pollution condition is another significant factor causing allergic rhinitis as shown by previous studies,^{13,16,21} yet it was not demonstrated in this investigation. The most likely reason is that the question was used requires a subjective judgment about outdoor air pollution in this self-reported questionnaire survey. However, the evidence that air pollution has a significant effect on causing allergic rhinitis is not yet totally convincing. Studies have also shown that air pollution is not a risk factor for allergic rhinitis.^{14,15,22} Future research is needed to better characterize the exact association before a final conclusion.

Smoking is the major source of indoor air pollution, and studies have found passive smoking to be a risk factor for developing obstructive respiratory disease and allergic sensitization.^{15,19,23} Our study, using a stepwise-reduced model, shows statistical significance for such an effect of reporting allergic rhinitis when there is more than 1 person smoking in the family. However, no statistical significance was found with "the total number of cigarettes consumed" or with "if the participant smokes" by the same approach. Meanwhile, the number of family members smoking increased while the amount of cigarettes consumed decreased. We postulate that a decrease in cigarette consumption may be due to the presence of children with allergic rhinitis in the family. A previous study with a similar finding adopted a similar interpretation,¹³ reflecting a natural limitation in causal inferences of cross-sectional studies.

For the interaction between inherent factors and environmental factors, we observed only that gender and number of persons smoking at home had an interaction. This indicates that "a family history of allergic rhinitis" is independent of reporting allergic rhinitis. However, boys exposed to environmental tobacco smoke have a higher risk than girls, suggesting that boys may be more sensitive to environmental pollut-

ants and have a resulting higher prevalence of allergic rhinitis.

Any 2 factors having a strong correlation are likely to cause bias to be nullified when estimating the risk ratio in a multiple logistic regression. We therefore tested each factor showing a *p* value greater than 0.05 with the stepwise effect test. We then eliminated one of the 2 strongly correlated factors to ensure that they would not induce a cross-effect in the evaluation. In this study, factors with higher correlations are the number of family members smoking at home and the total number of cigarettes consumed at home ($r = 0.77$). In addition, prior analyses showed that the number of active smokers at home is a more important risk factor than the number of cigarettes consumed. The less important factor, the number of cigarettes consumed, should therefore be eliminated from further discussion.

Demographic characteristics indicate that males have a higher risk of reporting allergic rhinitis, as also shown in other studies.^{13,15,24} In addition, the higher educational level a family has, the higher the proportion of children with allergic rhinitis. It is not yet clear whether the results reflect a reporting bias due to educational levels, allergens that different social classes are exposed to,¹⁵ or whether they are actually related to variations in intelligence.^{15,21,24}

While we cannot change children's inherent factors to decrease the prevalence of allergic rhinitis among school children, these findings suggest that improving environmental hygiene, such as by reducing passive smoke, could be an effective measure. Public policy may adopt this information as future themes for general education.

ACKNOWLEDGEMENTS

The authors would like to thank all students, parents, and school administrators for their participation and collaboration. Their kind support was most critical in completing data collection. We are also grateful to the many field technicians who endured that year of