Prevalence of Asthma Among Filipino Adults Based on the National Nutrition and Health Survey (NNHeS)

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Abstract

Background: Prevalence surveys are important to aid in assessing the current burden of diseases, which will impact on the public health agenda as well as preventive interventions and health policies. Three previous local surveys on asthma prevalence of Filipino adults have been carried out. This is the fourth local survey and is also a part of the second NNHeS study, which is carried out every five years. The purpose of the survey is to determine the trend in asthma prevalence and to aid in formulating and evaluating local initiatives.

Objective: To determine the prevalence of asthma among Filipino adults

Methodology: Using a multi-staged cluster sampling methodology, this study evaluated 7,202 adults at least 20 years old, from 3,744 households, 79 provinces and 17 regions. A pre-validated written questionnaire for wheezing among children based on the International Study of Asthma and Allergies of Childhood (ISAAC) was used as the survey instrument. This instrument was adopted since it has been widely used as a case definition for asthma, which allows for comparison of prevalence outcomes across time and population.

Results: The overall prevalence of asthma based on wheezing for the past 12 months was 8.7% (SE 0.4%). Males had a higher prevalence of wheezing for the past 12 months at 9.4% (SE 0.5%) compared to females at 8.2% (SE 0.5%). The overall prevalence of asthma based on wheezing at any time was 14.3% (SE 0.5%). Males had a higher prevalence of wheezing at any time of 14.8% (SE 0.7%) compared to females at 13.8% (SE 0.6%). The prevalence of adult asthma in the rural area was slightly higher than in the urban area (15.3% vs. 13.3%), but the difference was not statistically significant.

Conclusion: The overall prevalence of adult asthma in the Philippines based on the second NNHeS is 8.7%. This figure is lower than previous reported local prevalence data. The prevalence of adult asthma in the rural and urban setting is almost similar.

Keywords: asthma, wheezing, survey, prevalence, Philippine asthma prevalence, NNHeS

Introduction

The prevalence of allergic diseases, particularly the respiratory allergies have risen dramatically over the last few decades, both in developed and developing countries. According to World Health Organization (WHO) statistics, it is estimated that 300 million suffer from asthma. Since the prevalence of allergic diseases has increased to such an extent, allergy must therefore be regarded as a major healthcare problem.1

Asthma is characterized as airway hyper responsiveness and airflow obstruction at the bronchial level. It is often reversible, either spontaneously or with treatment. Asthma is considered a life-long chronic airway inflammation, associated with variable structural changes, that affects both children and adults of all ages. When poorly controlled, or uncontrolled, asthma can greatly interfere with normal activities, or even cause untimely death. Thus, it does not only have a major impact on the individual’s quality of life, but the family’s as well. On the public health view, uncontrolled asthma poses as a major economic burden.

In children, the most extensive multicenter study was the International Study of Asthma and Allergies in Childhood (ISAAC). In 1998 the ISAC Steering Committee reported findings of 463,801 children aged 13 to 14 years (155 centers in 56 countries) and of 257,800 children aged six to seven years (91 centers in 38 countries).2

In the Philippines, the prevalence of asthma among Filipino children has been more studied than in adults, and
has been reported in at least four previous surveys with prevalence rates ranging from 9.2% – 27.4%.

Asthma in adults may persist from childhood or have its onset in adult life. The primary variable for persistence and severity of asthma identified in longitudinal studies is the severity in childhood. Bronchial asthma in the adult Filipino population has been less well studied. At the present, there are only three previously reported, local prevalence surveys of asthma in the adult Filipino population (unpublished). These three studies were conducted from 1991 to 2003 with prevalence rates ranging from 9.0% to 22.4%. So far, most of these available local data were collected in the urban areas or a single specific region; hence a nationwide prevalence of asthma in adults has yet to be determined.

Currently, there are three large international studies that could provide data on the status of asthma in adults wherein we can also compare this local prevalence report. Namely, the European Community Respiratory Health Survey (ECHRS), the World Health Survey (WHS) and the Global Allergy and Asthma Network of Excellence (GA2LEN). The prevalence of asthma in different countries varies widely, but because of economic and social “globalization,” many developing countries are now adopting the Western-type lifestyle, which have narrowed the difference in prevalence rates between low to middle income countries and the western countries. The National Nutrition and Health Survey (NNHeS) is a nationwide health survey, and is a collaborative effort among 14 medical specialty associations, the Food and Nutrition Research Institute of the Department of Science and Technology (FNRI-DOST), and the Department of Health. The first survey was conducted in 2003, and the second survey was done in 2008, of which this report is a part. The associations included the Philippine Lipid Society, Philippine Society of Hypertension, Philippine Heart Association, Philippine Diabetes Association, Philippine Pediatric Society, Philippine Society of Nephrology, Philippine Society of Endocrinology and Metabolism, Osteoporosis Society of the Philippines, Philippine Association for the Study of Obesity and Overweight, Philippine Neurological Association, Philippine Rheumatology Association, Philippine College of Physicians, Philippine Society of Gastroenterology and the Philippine Society of Allergy, Asthma and Immunology.

The objective of the survey was to determine the national prevalence of 20 nutrition-related diseases and 14 risk factors. This second NNHeS study, reports the nationwide prevalence of asthma in the adult Filipino population. This will aid in assessing the current burden of asthma in the Philippines, which will impact on the public health agenda as well as preventive interventions and health policies of concerned agencies.

Materials and Methods

Sampling Design of NNS

The 7th National Nutrition Survey (NNS) utilized the National Statistics Office (NSO) 2008 Labor Force Survey (LFS) master sample employing a stratified multi-stage sampling design in order to represent each of the 17 regions in the country. The first stage of the sampling was the selection of the Primary Sampling Units (PSUs) with probability proportional to the estimated number of households. PSUs consisted of a barangay or contiguous barangays with at least 500 households. The second stage was the selection of Enumeration Areas (EAs) within sampled PSUs with the probability proportional to size. EAs consisted of contiguous area in a barangay or a barangay with 150-200 households and served as the Secondary Sampling Unit (SSU). The last stage was the selection of housing units within the sampled EAs and served as the Ultimate Sampling Unit (USU). As such, the household was considered as a cluster in which all the units within a cluster were part of the survey.

The clinical and health component in particular covered only one of the four replicates of the master sample and 25 percent of sample households were considered as sub-sample. Sub-sampling of households for clinical and health component was resorted due to budgetary constraints. A replicate is defined as a sub-sample that possesses the properties of the full master sample such that each replicate is able to generate national level estimates of adequate precision.

Response Rates

In the 7th NNS Clinical and Health Component, a total of 3,744 eligible households were covered from 79 provinces and 3,377 EAs. The response rate obtained from interview of adults using various questionnaires was 94.1%.

Data Collection

The survey used six questionnaires for the data collection of clinical and health component. These questionnaires were standardized and validated by the corresponding medical specialty associations. The NNHeS survey instrument used for the diagnosis of asthma was a standardized questionnaire that was validated locally. (Tee M. Validation of the NNHeS questionnaire, unpublished.) This instrument was adopted since it has been widely used as a case definition for asthma, which allows for comparison of prevalence outcomes across time and population.

This questionnaire contained items from a pre-validated ISAAC screening instrument for wheezing among children. Based on the questionnaire, a study participant was diagnosed to have asthma if there was a previous history of wheezing in the past 12 months or at any time in the past. The questionnaire had a sensitivity
of 93.2% and a specificity of 31.6% for wheezing in the past 12 months, and a sensitivity of 87.6% and a specificity of 42.0% for wheezing at any time in the past, when compared to an expert panel diagnosis. In this survey, as in the ISAAC steering committee report, the 12-month prevalence was used as the surrogate measure of asthma prevalence. Twelve-month prevalence was calculated by dividing the number of positive responses to the question “Have you ever had wheezing or whistling in the chest in the last 12 months?” by the number of completed questionnaires.

This questionnaire was used to determine the prevalence of allergy among Filipino adults 20 years and over and validated by the Philippine Society of Allergy, Asthma and Immunology (PSAAI).

Data Editing, Encoding and Analysis

All team leaders conducted field data editing based on the Manual of Instructions (MOI) to ensure correctness, completeness and validity of collected data. Team coordinators, on the other hand, performed spot-checking of accomplished forms as part of field editing process in order to reduce errors in data entry. Simultaneously with data collection, data encoding was done by hired encoders at FNRI-DOST.

Data encoding used the MySQL database. To ensure correctness and validity of data, hired validators did a two-round proofreading of the databases. The first-round involved manual validation and the second was done through machine validation. When the data were cleaned, several data files were merged to create a master dataset followed by another checking and validation of the dataset to eliminate errors and inconsistencies. Weights were assigned and attached to the master dataset by a statistician in order that the distributions of the sample correspond more closely to their actual distributions in the whole population.

Stata software (StataCorp., USA) was used to process and analyze the clinical and health data to come up with the prevalence of this disease and risk factors according to age.

Results

In the 7th NNS Clinical and Health Component, a total of 3,744 eligible households were covered from 79 provinces and 3,377 EAs. The response rate obtained from interview of adults using the questionnaires was 93.7%. The survey covered all respondents of the randomly selected households consisting of 7202 participants.

Table I summarizes the demographic profile of the participants according to age, sex and type of residence. There was almost equal distribution of female and male participants, 3,885 (54.6%) and 3,317 (45.4%) respectively as well as type of urban and rural residences, 3,418 (52.5%) and 3,784 (47.5%) respectively. Almost 84% of the respondents were less than 60 years old.

Table II summarizes the estimated prevalence rates of asthma based on wheezing in the past 12 months according to different age groups and sex. The overall prevalence of asthma was 8.7% (SE 0.4%) based on wheezing in the past 12 months. Males had a higher prevalence of asthma at 9.4% (SE 0.5%) compared to 8.2% (SE 0.5%) among females.

Table III summarizes the estimated prevalence rates of asthma based on wheezing at any time according to different age groups and sex. Based on wheezing at
any time, the overall prevalence of asthma was 14.3% (SE 0.5%). Males had a higher prevalence at 14.8% (SE 0.7%) compared to 13.8% (SE 0.6%) among females.

Table III: Age-specific prevalence of wheezing at any time (N = 7202)

<table>
<thead>
<tr>
<th>Age (%)</th>
<th>With wheezing</th>
<th>Without wheezing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Years)</td>
<td>% (SE)</td>
<td>% (SE)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>11.2 (1.2)</td>
<td>87.3 (1.2)</td>
</tr>
<tr>
<td>30-39</td>
<td>13.9 (1.4)</td>
<td>86.1 (1.4)</td>
</tr>
<tr>
<td>50-59</td>
<td>16.2 (1.8)</td>
<td>83.8 (1.8)</td>
</tr>
<tr>
<td>70 &amp; over</td>
<td>19.2 (3.1)</td>
<td>80.8 (3.1)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
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<tr>
<td>20-29</td>
<td>12.7 (1.2)</td>
<td>87.3 (1.2)</td>
</tr>
<tr>
<td>30-39</td>
<td>13.4 (1.2)</td>
<td>86.6 (1.2)</td>
</tr>
<tr>
<td>40-49</td>
<td>12.6 (1.1)</td>
<td>87.4 (1.1)</td>
</tr>
<tr>
<td>50-59</td>
<td>14.7 (1.5)</td>
<td>85.3 (1.5)</td>
</tr>
<tr>
<td>60-69</td>
<td>16.1 (2.0)</td>
<td>83.9 (2.0)</td>
</tr>
<tr>
<td>70 &amp; over</td>
<td>17.5 (2.3)</td>
<td>82.5 (2.3)</td>
</tr>
<tr>
<td>Overall</td>
<td>14.3 (0.5)</td>
<td>85.7 (0.5)</td>
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</tbody>
</table>

Table IV: Prevalence of wheezing at any time in the past, by area of residence, age and sex

<table>
<thead>
<tr>
<th>Residence</th>
<th>Both sexes</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n % (SE)</td>
<td>n % (SE)</td>
<td>n % (SE)</td>
</tr>
<tr>
<td>Urban</td>
<td>458 13.3 (0.6)</td>
<td>199 13.6 (0.9)</td>
<td>259 13.1 (0.8)</td>
</tr>
<tr>
<td>Rural</td>
<td>587 15.3 (0.7)</td>
<td>293 16.0 (0.9)</td>
<td>294 14.6 (0.9)</td>
</tr>
<tr>
<td>p-value</td>
<td>0.3612</td>
<td>0.4647</td>
<td>0.6109</td>
</tr>
</tbody>
</table>

Discussion

To accurately assess the burden of asthma in our country and worldwide, it is necessary to first determine prevalence, then to relate prevalence and severity to the indicators of morbidity, and eventually to make international comparisons. Unfortunately, large gaps remain in knowledge about the true prevalence of asthma both locally and internationally, which makes it very difficult to assess the burden of this disease. Asthma prevalence studies may vary because of many sources of inaccuracy, and this is widely acknowledged. First of all, there is a lack of agreed definition of asthma. Asthma prevalence can be measured in terms of self-reported wheeze, doctor-diagnosed asthma, or a combination of symptoms and lung function abnormality. Secondly, there are limitations to the use of questionnaires in the measurement of asthma. These arise because of differences among doctors, parents and patients in the use of the label “asthma” and, to a lesser extent, “wheeze”. Furthermore, problems with recall bias may influence the findings. Thirdly, reported asthma symptoms in the older patients are difficult to differentiate from chronic obstructive pulmonary disease (COPD) symptoms. In evaluating questionnaire-based reports of the prevalence of asthma, it is important to be aware of the questions used to define asthma in the particular study. Ideally, researchers should decide and agree on useful definitions of asthma so that prevalence outcomes can be compared across time and across populations. Most of the reported asthma prevalence data from other countries have adapted the ISAAC protocol and use “wheezing in the past 12 months” as the case definition of asthma, to be able to compare asthma prevalence across countries. In this survey, the “wheezing in the past 12 months” was also used as the case definition for asthma, based on the ISAAC protocol.

There is a possibility that this definition may have under- or over-estimated the true prevalence of asthma in this survey. As an example, cases of cough-variant asthma may not have been picked up since these patients usually present with cough without wheezing. On the other hand, there is also a possibility of having falsely labeled as asthma those patients who wheezed from other causes. These possible false positive and false negative results may be corrected from this instrument by using the Marchevsky formula. However, we could not apply this formula because the crude prevalence from our survey was low (8.7 %), and the specificity of our survey instrument (“wheezing in the past 12 months”) when validated locally was only 31.6% as reported in the 2003 NAES Report by Tuazon et al. (Plenary session proceedings, 13th Annual Convention,
Table VI: Comparison of Philippine NNHeS 2008 prevalence of adult asthma with previous local studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Survey Instrument</th>
<th>Case Definition of Asthma</th>
<th>Prevalence of Asthma % (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NNHeS data 2008, Varona, et al.*</td>
<td>N=7202 adults &gt;20 y/o Urban and rural areas, nationwide</td>
<td>ISAAC** Questionnaire</td>
<td>Wheezing in the past 12 months</td>
<td>8.7 (0.4)</td>
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<tr>
<td>NAES data 2003 Roa, Wang et al§</td>
<td>N=1964 adults Three major urban centers in Luzon, Visayas, Mindanao</td>
<td>ECHRS*** Questionnaire</td>
<td>Definite asthma</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Cua-Lim, Roa, Pagcatipunan 1998§</td>
<td>N=1005 adults Malolos, Bulacan 18-44 y/o</td>
<td>ECHRS Questionnaire</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Roa, Salonga, et al. 1991¹</td>
<td>1 rural (Banca-Banca) &amp; 1 urban (Victoria, Laguna) community</td>
<td>ECRHS questionnaire</td>
<td></td>
<td>9.0</td>
</tr>
</tbody>
</table>

*Present study  
**ISAAC - International Study of Asthma and Allergies in Childhood  
***ECHRS – European Community Respiratory Health Survey  
§Unpublished Data

Philippine Academy of Pediatric Pulmonologists, 2005)  
Based on the said formula, our current NNHeS data would have yielded a negative prevalence. Therefore only the crude analysis can be reported in this survey.  

Table VI shows a comparison of previous local prevalence surveys of asthma in the adult population. The earliest survey was done by Roa, et al. in 1991 (unpublished) in an urban and rural community in Laguna involving adult subjects with a reported prevalence of 9.0%. The next survey was conducted by Cua-Lim et al. in 1998 (Poster Presentation, 3rd Asian Pacific Congress of Allergology and Clinical Immunology, 1998), involving a population of 1005 respondents in Malolos, Bulacan, with a reported prevalence of 17.2%, wherein they utilized the ECHRS questionnaires as instrument of survey. The third reported local prevalence study on bronchial asthma in adults (18-44 y/o) was by Roa et al., conducted as part of the 2003 NAES Report, done in three major urban cities, namely, Manila, Cebu, and Davao, with study population of 1,964 and a prevalence rate of 22.4% (Definite-4.3%, Probable-18.1%) utilizing the ECHRS questionnaire. (Executive Summary, National Asthma Epidemiology Study, Department of Health, 2003).

This current NNHeS report is a nationwide survey showing an overall asthma prevalence among adults based on wheezing in the past 12 months rate of 8.7% and an overall prevalence of 14.3% for wheezing at any time in the past. This is the first local nationwide survey with both rural and urban populations represented. This survey showed that although the prevalence of asthma was slightly higher in the rural than the urban areas, the difference was not statistically significant. Different environmental factors such as increased pollution rate, infection rate, diet, allergen exposure or yet unrecognized risk factors in urban versus rural areas may play a role in the development of asthma, but these were not identified in this survey. However, the practice of burning garbage and leaves in the backyard of people in the rural area may also contribute to the slightly higher prevalence in rural areas.

It is not possible to make a comparison or set a trend based on these four local studies because of several variables. The major differences, which may be the cause of the discrepancies, are the case definition of asthma, in sampling methodology, study population, and the setting where studies were conducted.

There is also a paucity of data on adult asthma from the neighbor countries. A cross-sectional postal survey on 4,455 young adults (ages 20 to 44) in Melbourne, Australia in 1998, showed 20% (ever diagnosed) and 18% physician diagnosed prevalence rate of asthma. In Thailand, there were two major reported surveys in adults. The first study surveyed Bangkok University students in 1998 finding the prevalence of diagnosed asthma and wheeze in 12 months at 8.8% and 10.1%. The second study on 2,633 university students, which utilized the ISAAC protocol, showed that the prevalence of wheeze within the past 12 months and of diagnosed asthma were 12.1% and 9.8% respectively.

When comparing this worldwide asthma prevalence to the NNHeS survey, our results fall within the wide range of prevalence rates as reported by other countries. However, the heterogeneity of asthma among different subgroups within and across countries argues strongly for environmental influences on allergic sensitization and development of asthma. Genetic factors are important,
but they cannot explain the changes in prevalence or the worldwide variation observed. Again, there must be some environmental, socio demographic and still unidentified risk factors producing these changes and discrepancies in asthma prevalence observed across countries. Increasing pollution, decreasing infection or changes in diet have all been suggested. These should all be considered in developing effective public health prevention and intervention strategies.

Epigenetic changes may offer another reason for the discrepancies in asthma prevalence. The development of allergic diseases including allergic asthma is an interplay of the genetic makeup of the individual and the influence of environmental exposure. This complex interaction results in shifting patterns of disease expression. Epigenetic studies have clearly shown that environmental exposure can influence or modify expression patterns, which vary from one individual to another and maybe passed on to several generations.\(^7\)\(^,\)^\(^17\)\(^,\)^\(^18\)

**Conclusion**

In summary, the prevalence of wheezing in the past 12 months among Filipino adults at least 20 years old is 8.7% (SE 0.4%). The prevalence of wheezing at any time among Filipino adults at least 20 years old is 14.3% (SE 0.5%). There is a greater prevalence of asthma symptoms among males. The three other Philippine surveys revealed a prevalence rate range from 9.0-22.4%, but still falling within the range of other Asian surveys. The prevalence of adult asthma in the rural area was slightly higher than in the urban area, but the difference was not statistically significant.

This data from the NNHeS demonstrates the magnitude of the burden of illness from adult asthma in the Philippines and highlights the varying prevalence of adult asthma in Asia. This should help in assessing the likely economic burden for the future.

*Overall NNHeS 2008Group*

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Immunology, Philippine College of Physicians, Philippine Society of Vascular Medicine, Philippine Rheumatology Association, Philippine Society of Nephrology, Philippine Society on Gastroenterology. Substantial contributions came from the following pharmaceutical companies: Astra, Boehringer, Bayer, and Qualigen.

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