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# International Study of Asthma and Allergy in Childhood Phase III (ISAAC III): The Role of Non-Response in Valencia

María Morales-Suarez-Varela<sup>1,2,3</sup>, Agustín Llopis-González<sup>1,2</sup>, Natalia Gimeno-Clemente<sup>1,2</sup>, Mª Cristina Jiménez-López<sup>1</sup>, and Luís García-Marcos Álvarez<sup>4,5</sup>

 <sup>1</sup> Unit of Public Health, Hygiene, and Environmental Care, Department of Preventive Medicine, University of Valencia. Valencia, Spain
 <sup>2</sup> Research group CIBER CB06/02/0045, CIBER actions - Epidemiology and Public Health, Valencia, Spain
 <sup>3</sup> Research Foundatio, Hospital Universitario "Dr. Peset", Valencia, Spain
 <sup>4</sup> Unit of Clinical Research, Cartagena, Spain
 <sup>5</sup> Department of Paediatrics, University of Murcia, Murcia, Spain

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## ABSTRACT

A study was done about non-participation during Phase III of the International Study of Asthma and Allergy in Childhood (ISAAC III) in Valencia to determine whether the non-response rate significantly affected the results obtained in Valencia. Of the schools selected to participate in ISAAC III, 13.3% denied not to, the main reason being they were already participated in a similar study. The ISAAC III questionnaire was handed out to participating schools for the parents of 6,358 schoolchildren aged 6-7 years. Of these, 53.4% responded correctly.

The remaining 46.6% were given a non-response questionnaire (NRQ), of which 4.1% completed the questionnaire correctly. The main reason why parents who received the NRQ did not participate in ISAAC III was that their children had neither asthma nor other atopic disease, so interest was null. No significant statistical differences were observed between the prevalence of asthma in the schoolchildren who participated in ISAAC III and in the non-participants who answered the NRQ. These results suggest that the ISAAC III results relating to asthma are not biased by non-response.

Key words: Asthma; Bias (Epidemiology); Child; Cross-sectional studies; Questionnaires

## INTRODUCTION

Asthma is still the most common cause of chronic disease among schoolchildren and is also one of the

**Corresponding Author:** María Morales-Suarez-Varela, PhD; Unit of Public Health and Environmental Care, Department of Preventive Medicine, University of Valencia, Avda. Vicente Andrés Estellés s/n, 46100 Burjasot, Valencia Spain. E-mail: maria.m.morales@uv.es main reasons for absenteeism.<sup>1</sup> In general, it is described as a growing problem, although the asthma prevalence figures in children obtained from the various studies done differ considerably. Indeed, the participation rate in all these studies may play an important role.<sup>2-4</sup>

Parents' participation in the activities that their children's schools organise is generally low. Some

reasons could be due to cultural and social differences, or to poor communication between parents and teachers or from teachers to parents. Moreover, this situation could be favoured, for example, by organisational stress which these activities cause teachers.<sup>5-7</sup> It is essential to make parents aware of not only the important role that they play at their children's school in school health programmes, but also the need for them to collaborate in such activities.

Although many suggestions to account for the differences found in the participation rates of epidemiology studies have been put forward,<sup>8-9</sup> very few data have been published specifically in studies on respiratory diseases.<sup>4,10-11</sup>

The results of the International Study of Asthma and Allergy in Childhood Phase III (ISAAC III) show differences in participation rates in several countries.<sup>2-3</sup> However, no specific data are available about the reasons for non-responses and, therefore, about the reliability of the data obtained.

The objective of this instrumental study is to determine whether the non-response rate has a significant confounding effect on the results obtained in the ISAAC III study conducted in Valencia by evaluating the psychometric properties (internal consistency, factorial structure and clinical significance).

## MATERIALS AND METHODS

#### **Study Design and Population**

During 2002-2003 we conducted a cross-sectional study in a schoolchildren population in Valencia (East Spain) aged 6-7 years. It was a part of ISAAC III study.

In the study area (Valencia), there are 286 schools for schoolchildren aged 6-7 years. Of the 286 schools, 98 were selected by random sampling (57.3% of the total), and were invited to participate in the ISAAC III study.

The ISAAC III questionnaire was sent to the participating schools to be forwarded to the parents (mother and/or father) of the 6-7-year-old schoolchildren in order to determine the prevalence of asthma among the schoolchildren. Those parents who refused to participate were handed a non-response questionnaire (NRQ) with similar protocols to those previously handed out in the ISAAC III questionnaire: the teachers were asked to hand out the NRQ to parents which came with a letter explaining the importance of

their cooperation. Those parents who completed the NRQ returned it to the teachers who sent it back to us.

#### **Measurement Instrument**

The NRQ is a structured self-report questionnaire which includes scaled open questions related to the reason for refusing to participate in the ISAAC III study. Questions correlated internally, which enabled answers to be validated.

The first question was: "Is your child asthmatic and has been previously diagnosed as such by a specialist?" Quality distinction is made by the criterion of the specialist who diagnosed the child, which allows a distinction to be made between a healthy and affected child. This question is vital given its high sensitivity and specificity for all the studies to validate questionnaires on respiratory epidemiology.<sup>12</sup>

The second question was: "Does your child have any other atopic disease and has been previously diagnosed as such by a specialist?"

Question three was: "Is your child asthmatic and have any other atopic disease, and has been previously diagnosed as such by a specialist?", this being the sum of questions one and two.

Question four was: "Is you child not asthmatic, has no any other atopic disease, and you do not wish to participate in this study?" Questions three and four allow us to evaluate the agreement and coherence among the questions.

Finally, a fifth open question was included for parents to provide other possible reasons for nonresponse which were not related to their children's atopy.

All questions included in the NRQ were formulated in a language that parents would find easy to understand. The possible answers were simple and open to favour the quality of the information obtained.

#### Ethics

This study received approval from the Hospital de Asturias' Ethics Committee.

#### **Statistical Analysis**

Firstly, the non-participation rate of the schools invited to participate in ISAAC III was determined by separating public schools and private schools.

Secondly, the non-response rate in the ISAAC III questionnaire of the parents of the schoolchildren who went to the participating schools was determined.

Thirdly, the degree of internal consistency of the NRQ was determined by applying the Kappa Coefficient.

Fourthly, absolute and relative frequencies were determined of the reasons for non-response indicated in the NRQ, which were also stratified by the type of school (public or private). These frequencies were compared between both school types by the Chi-square test with Yate's correction ( $p \le 0.05$ ).

Finally, the asthma prevalence rates were determined among those participating in ISAAC III and among non-participants (and responders of the NRQ). These prevalences were compared by the chi-square test ( $p \le 0.05$ ).

Confidence Intervals of 95% were applied (95% CI) in all cases.

Data analysis was performed using the SPSS statistical software, version 17.0.1 for Windows (SPSS Inc.).

## RESULTS

Figure 1 shows how ISAAC III develops, the participation rates of schools (public and private), and parents' response rates.

Out of the 98 schools selected to participate in the ISAAC III study, 13 refused to do so (13.3%). The main reason not to participate was that they were already participating in a similar study and they did not have enough time. Another reason was that parents could not understand the questionnaire.

It has to be pointed out that the schools indicated that most were immigrants or had a low level of education. The remaining 85 schools accepted participation (86.7%), and were included in the ISAAC III study. Of these, 57 were public schools (67.1%) and 28 were private schools (32.9%).

The ISAAC III questionnaire was also sent to the 85 participating schools to the parents of 6,358 schoolchildren aged 6-7 years. Of these, 3,395 answered the questionnaire correctly (53.4%). The remaining 2,963 parents refused to participate (46.6%). These parents were given the NRQ, of which 121 (4.1%) completed it correctly and gave their reasons; the children of 73 went to public schools (60.3%) and those of 48 went to a private school (39.7%).



Figure 1. Development of ISAAC III and participation of schools and parents

The analysis of internal consistency, or agreement, of the NRQ questions presented a 90% linear relationship between questions one and two, a 95% linear relationship between questions one and three, and one of 95% between questions two and three.

Table 1 shows the reasons for non-response to the ISAAC III questionnaire in relation to the presence or absence of atopy among children according to parents in the NRQ for all the schools and according to the type of school. The main reason for non-responses was that children were neither asthmatic nor they suffered from any other atopic disease for both private and public schools alike. No statistically significant differences were noted in terms of the reasons provided by parents regarding their children's atopy in both public and private schools.

	Public schools (n= 57)			Private schools (n=38)			- D - J	Total (n=95)		
Topics	n	%	(95% CI)	n	%	(95% CI)	P-value	n	%	(95% CI)
Asthma	2	3.5	(0.6, 11.1)	2	5.3	(0.9, 16.3)	0.917	4	4.2	(1.3, 9.8)
Other atopic disease	14	24.6	(14.7, 36.9)	9	23.7	(12.2, 39.0)	0.922	23	24.2	(16.4, 33.6)
Neither asthma nor other atopic disease	41	71.9	(59.3, 82.4)	27	71.0	(55.3, 83.7)	0.926	68	71.6	(61.9, 80.0)

Table 1. The reasons for non-response to the ISAAC III questionnaire provided by parents in relation to the presence or absence of atopy in their children. A comparison between public and private schools.

Table 2 shows parents' reasons for non-response to the ISAAC III questionnaire, which are not related to their children's atopy, where the main reason is lack of information about the study.

Table 3 shows the asthma prevalence rates of those who answered the ISAAC III questionnaire and who were non-responders and answered the NRQ. No statistically significant differences were observed between the asthma prevalences of both groups.

#### DISCUSSION

The non-response bias may affect the results of epidemiological studies by leading to uncertainty and confusion. The non-response rate is the best indicator of the level of confidence of the results; a high rate may prove very negative in terms of the accuracy of the study.<sup>13-17</sup> However, the influence of a non-response bias in respiratory epidemiology has been analysed in a few recent works.<sup>4,18-20</sup> Most of these works used postal

questionnaires,<sup>4,20</sup> but in none of studies schoolchildren in which the parents of schoolchildren answer. Some low non-participation and non-response rates, as well as the use of the same questionnaire in the same season of the year and with similar elements per age, together with an extensive analysis of non-responses, all contribute to the validation of the results of all epidemiological studies.

To estimate the possible effect of the non-response bias in the original study, we assumed that the information contained in the non-response questionnaires could be extrapolated to the whole group of non-responders.<sup>20</sup> With this basis, we determined the main reasons why schools did not participate in the ISAAC III study, and why the parents of schoolchildren did not respond to the questionnaire in order to subsequently evaluate the possible influences or biases in the results obtained in the original study.

Thereiter	Total (n=121)			
Topics	n	%	(95% CI)	
Parents lack information	8	6.6	(3.1, 12.2)	
Parents are immigrants	6	5.0	(2.0, 10.0)	
Parents are doctors	3	2.5	(0.6, 6.6)	
Child $\geq$ 7 years of age	6	5.0	(2.0, 10.0)	
Child diagnosed with cystic fibrosis	3	2.5	(0.6, 6.6)	

 Table 2. The reasons for non-response to the ISAAC III questionnaire

 provided by parents which are not related to atopy

Table 3. Comparison of the prevalences of asthma among children of parents who participated in ISAAC III and children of non-responding parents (responders of the NRQ).

Торіс	Pa	Participants in ISAAC (n=3395)			Non-participants in ISAAC III and respondents of NRO (n=95)			
	n	%	(95% CI)	n	%	95% CI		
Asthma	286	8.5	(7.6, 9.5)	4	4.2	(1.3, 9.8)	0.136	

The non-participation rate of the invited schools was 13.3%. In Valencia, programmes are constantly being organised to improve general health aspects in infants.<sup>21</sup> Schools are generally willing to collaborate in this type of studies, although at times they give priority to complete their syllabus. There are some teachers who are of the opinion that most parents take their children to a medical centre should they present health problems and that participation at if in this kind of programmes is not particularly important.

The non-participation rate of public schools was lower than that of private schools. However, having obtained the school's acceptance to participate, we noted that our visits to private schools were better organised; teachers at private schools collaborated more actively. This aspect was reflected in the response rates of parents whose children went to private schools, which was slightly higher. We may assume, therefore, that less difficulties are encountered for collaboration between parents and teachers in private schools.

Regarding the reasons for the non-responses to the ISAAC III questionnaire provided by parents in the NRQ (in relation to their children's atopy), the main reason given was: "my child is neither asthmatic nor has any other atopic disease" (71.6%).

To calculate the prevalences of asthma, only those NRQ in which the reason provided actually related to the presence of atopy in schoolchildren were taken into account because any other reason (e.g., not understanding the questionnaire) does not necessarily mean that the child does not present asthma. The prevalence rate of asthma diagnosed by a doctor calculated in this manner was higher among the participants in the ISAAC III study in Valencia (8.5%) than among non-responders (responders of the NRQ) (4.2%), although no statistically significant differences were noted. For this reason, we consider that the prevalence of asthma has been correctly estimated by the ISAAC III study and there was no non-response bias. We consider that the participation rate (53.4%)obtained with the original ISAAC III study questionnaire was high enough to provide reliable and valid asthma prevalence rates in schoolchildren aged 6-7 years. This lowers the probability of random errors and increases the accuracy of the results, which other studies also found.20

References to cystic fibrosis in the NRQ represented 2.5%. Non-significant differences were found with the chi-square test when comparing relative

frequency with cystic fibrosis incidence in western Europe.<sup>22</sup>

Among the reasons provided by parents which was not related to children presenting atopy was, lack of information about the study predominates, which is a point that must be taken into account for similar studies conducted in the future.

While the effects of non-participation and paying little attention are hard to determine in each particular case, the best way to handle the problem is to understand why parents do not reply, and to introduce improvements into the recruitment strategies which should stress the personal benefits of participation.<sup>23</sup> These results enable us to devise methodological strategies with a view to increasing the accuracy of studies done in the future.

In conclusion, this study provides evidence that the prevalence of asthma in schoolchildren aged 6-7 years has been correctly estimated by the ISAAC III study. The ISAAC III results relating to asthma are not biased by non-response.

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