

# Prevalence of asthma-like symptoms by ISAAC video questionnaire in Mozambican schoolchildren

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**ABSTRACT:** *Prevalence of asthma-like symptoms by ISAAC video questionnaire in Mozambican schoolchildren. S. Mavale-Manuel, O. Joaquim, E. Nunes, A. Pedro, S. Bandeira, E. Eduardo, C. Macome, L. Almeida, A. Cossa, J. Malichocho, L. Maciel, E. Constance, S. Marques, A. Tembe, J. de Blic, I. Annesi-Maesano.*

**Background.** The International Study of Asthma and Allergies in Childhood (ISAAC) video questionnaire was developed to overcome the language and cultural differences in the assessment of asthma-like symptoms.

**Methods.** 27 schools were included in the Maputo Asthma and Allergies in childhood Study (MAPAAS) using ISAAC methods, and a video questionnaire (VQ) was administered to 1614 adolescents 13-14 years old of 20 schools located in urban, suburban and semi-rural areas of Maputo (Mozambique). Simultaneously, they also replied to the ISAAC written questionnaire (WQ).

**Results.** According to the video questionnaire, the prevalence of current asthma was 11.9% (compared with

13.3% using the written questionnaire). Wheezing after exercise in the last year was reported by about 21%. Females reported more frequent wheezing after exercise than males ( $p < .001$ ). The prevalence of nocturnal cough in the last year was 24.7%, and was more frequent in the suburban area ( $p < .001$ ). "Severe attacks of asthma" was reported by 11.9% of the individuals. Teenagers instructed in the suburban schools reported more severe asthma-like symptoms than others ( $p < .05$ ). There was a poor correlation between the WQ and the AVQ3.0 (kappa coefficients varied from 0.09 to 0.24). The lowest agreement was observed for the question regarding severe attacks of asthma. Agreement was better in terms of specificity than in terms of sensitivity.

**Conclusions.** In spite of the poor agreement between the written and the video questionnaires, the prevalence of asthma symptoms estimated using the video questionnaire confirms that asthma is an important public health problem in Maputo.

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**Keywords:** Allergy, asthma, children, ISAAC, mozambique, video questionnaires.

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## Introduction

Recent studies have reported a high prevalence of asthma symptoms in the world, particularly among children [1]. Asthma prevalence is variable among the countries and it is suggested that the variation may be due to differences in the diagnostic criteria and study methods used. In epidemiological studies, asthma has commonly been defined in the following ways:

- 1) the self-reporting of asthma (with or without the physician's confirmation) or asthma-like symptoms (wheeze, whistling, nocturnal cough and exercise induced dyspnoea) [2]; and
- 2) the existence of bronchial hyperresponsiveness as assessed by a challenge to special stimuli (histamine, methacholine, cold air, exercise...).

Indeed, there are potential problems associated both with asthma-like symptoms arising from sub-

jective symptoms recognition and recall and with the under diagnosis of asthma depending either on the health care system or on age, sex and smoking habits of the individuals. Furthermore, the affordability of clinical tests like bronchial challenges depends on the health systems or on resources. The International Study of Asthma and Allergies in Childhood (ISAAC) was intended to provide an accurate assessment of asthma prevalence in children from differing language and cultures [4]. The ISAAC protocol for measuring asthma prevalence and severity in 13-14 years old schoolchildren comprises a self-completed written questionnaire (WQ) based on self-reported asthma-like symptoms and a video questionnaire. In the ISAAC phase I, English speaking countries have reported a higher prevalence of asthma symptoms [5], which was attributed also to a better understanding of the word "wheezing" in English speaking individuals, as wheezing does not exist in all languages. The use of video constitutes an attempt to overcome the translation problems associated with the written questionnaire as population with different cultural and language background may vary widely in the interpretation of the same questions [6]. Furthermore, it was suggested that each country needs to check the validity of both types of questionnaire provided by ISAAC with its own local data [7]. The aim of this study was to evaluate the concordance between the written and video questionnaire in Mozambican school children.

## Methods

### STUDY POPULATION

In the frame of the Maputo Asthma and Allergies in childhood Study (MAPAAS), 21 primary schools and 6 secondary schools were randomly selected from a total of 126 schools registered in Maputo by stratifying for geographic (urban, suburban and semi-rural) location and inhabitant's density so that to be representative of the distribution of the population of children and adolescents in Maputo. Regarding this stratification, 10 were in the urban area, 12 in the suburban area and 5 in the semi-rural area. All schools but one were public. We selected children by their actual age, regardless of the grade within the school by selecting several grades. The inclusion of the right class of age was made by visiting each classroom in each school and requesting those who attained 13 years of age and at most 14 years 11 months to stand up. Those remaining seated were requested to vacate the class. The others were enrolled in this survey. Teenagers were invited to complete a written questionnaire and in a sub-sample to reply to a video questionnaire.

### QUESTIONNAIRES

#### *Written questionnaire*

The ISAAC written questionnaires (WQ) was presented to students in the Portuguese version.

The WQ includes questions on wheezing and cough symptoms, previous diagnostics of asthma,

and questions on rhinitis and eczema. The written questionnaire on asthma comprises 5 questions that correspond to the 5 sequences depicted in the video questionnaire. The questions on asthma-like symptoms are:

- 1) Have you had wheezing or whistling in the chest in the last 12 months?
- 2) In the last 12 months, you chest sounded wheezy during or after exercise?
- 3) In the last 12 months, how often, on average has your sleep been disturbed due to wheezing? (Never woken with wheezing/ less than one night per week / one or more nights per week).
- 4) In the last 12 months, have you had a dry cough at night, apart from a cold or chest infection?
- 5) In the last 12 months, has wheezing ever been severe enough to limit you speech to only one or two words at time between breaths?

#### *Video questionnaire*

The International Version of the ISAAC video questionnaire (AVQ 3.0) was used. The international version was developed to make the exercise sequence more universally applicable, by showing running rather than indoor aerobic exercise, and also to provide ethnic diversity amongst the subjects in the video. The video contains five short sequences of asthma symptoms and signs. The first sequence shows a young person seated with clearly audible wheezing, but without breathlessness and no evidence of airway obstruction. Four further sequences shown in the video are:

- 1) exercise-induced wheezing;
- 2) walking at night with wheezing;
- 3) nocturnal coughing; and
- 4) a final sequence showing a severe attack of asthma.

Each sequence is followed by three questions asking the respondent if their breathing has ever been like the person's in the video, if "yes" in the last 12 months?" and if "yes" again in the last month?". The field researcher read the questions, and teenagers were asked to mark down whether they themselves had experienced such symptoms using a one-page printed answers sheet. The video questionnaire took about 7 minutes to be administered, and the term "asthma" was not mentioned during this time.

### STUDY DESIGN

After completing the written questionnaire, the children themselves were shown the video and answered questions at the time. In accordance with the ISAAC methodology, after the completion of the WQ, this was collected by members of the staff and, when the logistic conditions allowed it, adolescents were invited to answer the AVQ3.0.

### STATISTICAL ANALYSIS

The Kappa index [8] was used to find the degree of agreement between the ISAAC AVQ3.0 and WQ on asthma symptoms in the last 12 months. Simultaneously the agreement was com-

puted as the ratio of the number of concordant responses to the total of the population. The data was entered using Microsoft Office Access 2000 and analyzed with STATA Intercooled version 8.2 (StataCorp 4905 Lakeway Drive College Station, Texas 77845 USA).

**ETHICAL CONSIDERATIONS**

Permission to conduct the study was obtained from the Bio-ethics committee in Mozambique, the Department of Schools Education, school Principals, the parents of the children and all participants gave a verbal consent to participate.

**Results**

**Socio-demographic characteristics**

**SCHOOLS**

27 schools participated in ISAAC WQ and 20 schools in both WQ and AVQ 3.0 (77.7%). Con-

trarily as expected, urban schools had fair participation in video questionnaire (75%). The highest school participation rate in AVQ3.0 was observed in the suburban area (90%). Semi-rural areas present the lowest participation in AVQ3.0 (table 1).

**ADOLESCENTS**

2630 children completed the WQ. The video and written questionnaire was administrated to 1614 children (61%). Of a total of 1614 adolescents, 743 (46%) were male and 871 (54%) female.

**Prevalence of asthma-like symptoms**

The global prevalence of current asthma according to AVQ3.0 was 11.9% compared to 13.3% in the case of current wheeze (wheezing in the last 12 months) according to WQ. In the schools of urban, suburban and semi rural area, the prevalence of video current wheeze is similar (table 2). Students of suburban area reported more frequently

Table 1. - Distribution and location of schools

Location of schools	Written questionnaire (number of schools)	Video questionnaire (number of schools)	Rate of video participation (%)
Urban	12	9	75
Suburban	10	9	90
Semi-rural	5	2	40
Total	27	20	74

Table 2. - Prevalence of video questionnaire asthma-like symptoms by location of schools

	Urban		Suburban		Rural		Total		P
	Freq	%	Freq	%	Freq	%	Freq	%	
<b>Population</b>	419	25.9	1046	64.8	149	9.2	1614	100	
<b>Asthma-life symptoms</b>									
<b>Wheezing (while at rest)</b>									
Ever	85	20.3	234	22.4	29	19.5	348	21.6	NS
In last year	47	11.2	129	12.3	17	11.4	193	11.9	NS
One or more per month	35	8.4	133	12.7	9	6.0	177	10.9	<.05
<b>Wheezing after exercise</b>									
Ever	162	38.7	365	34.9	46	30.9	573	35.5	NS
In last year	103	24.6	207	19.8	27	18.1	337	20.9	NS
One or more per month	86	20.5	243	23.2	25	16.8	354	21.9	NS
<b>Waking with wheeze</b>									
Ever	80	19.1	172	16.4	25	16.8	277	17.1	NS
In last year	40	9.6	102	9.8	18	12.1	160	9.9	NS
One or more per month	36	8.6	97	9.3	8	5.4	141	8.7	<.001
<b>Waking with cough</b>									
Ever	170	40.6	492	47.0	43	28.9	705	43.7	<.001
In last year	95	22.7	283	27.1	21	14.1	399	24.7	<.01
One or more per month	74	17.7	274	26.2	17	11.4	365	22.6	<.001
<b>Severe attack of asthma</b>									
Ever	74	17.7	239	22.9	30	20.1	343	21.3	NS
In last year	38	9.1	133	12.3	22	14.8	193	11.9	NS
One or more per month	25	5.6	140	13.4	18	12.1	183	11.3	<.001

waking with cough ever and in the last year (table 2). The prevalence of wheezing after exercise in the last year was about 21%, and there was no location difference (table 2). The prevalence of nocturnal cough in the last year was 24.7%. The prevalence of current waking with wheeze was 9.9%, without any significant location difference (table 2).

Female schoolchildren reported significantly more frequent wheezing after exercise ( $p < .001$ ) (table 3). No other differences were observed among sexes.

### Severity of asthma

Severe attacks of asthma were reported by 11.9% of the individuals (table 2). Teenagers instructed in the suburban schools reported severe

asthma-like symptoms significantly more severe regardless wheezing while at rest, waking with wheeze, waking with cough and clearly severe attack of asthma one or more time per month (table 2). Female adolescents reported significantly more severe attacks of asthma than male (table 3).

### Agreement between WQ and AVQ3.0

Agreement between responses to the 5 corresponding questions "wheezing at rest, nocturnal wheezing, exercise wheezing, night cough and severe wheezing" in the AVQ3.0 and WQ respectively were moderate and weak, although statistically significant at the level of 0.05, with Kappa indices varying from 0.09 to 0.24. Severe wheezing yielded the weakest correlation (table 4).

Table 3. - Prevalence of asthma-like symptoms by gender

	Male		Female		p	All	
	Freq	%	Freq	%		Freq	%
<b>Population</b>	743	46	871	54		1614	100
<b>Asthma symptoms</b>							
Wheezing (while at rest)							
Ever	154	20.7	194	22.3	NS	348	21.6
In last year	81	10.9	112	12.9	NS	193	11.9
One or more per month	71	9.6	106	12.2	NS	177	11.0
Wheezing after exercise							
Ever	236	31.8	337	38.7	<.05	573	35.5
In last year	131	17.6	206	23.7	<.05	337	20.9
One or more per month	147	19.8	207	23.8	.05	354	21.9
Waking with wheeze							
Ever	140	18.8	137	15.7	NS	277	17.2
In last year	81	10.9	79	9.1	NS	160	9.9
One or more per month	66	8.9	77	8.8	NS	143	8.9
Waking with cough							
Ever	317	42.7	388	44.6	NS	705	43.7
In last year	173	23.3	226	26.0	NS	399	24.7
One or more per month	160	21.5	205	23.6	NS	365	22.6
Severe attack of asthma							
Ever	141	19.0	202	23.2	<.05	343	21.3
In last year	77	10.3	116	13.3	.0680	193	12.0
One or more per month	71	9.6	112	12.9	<.05	183	11.3

Table 4. - Agreement between written and video questionnaires

written Questionnaire	Yes		No		Agreement (%)		Kappa	P-value			
	Yes	No	Yes	No	Agreement (%)						
						n			%	n	%
1. Wheeze at rest	65	(4)	134	(8.3)	128	(7.9)	1287	(79.7)	83.7	0.24	<.001
2. Exercise wheeze	75	(4.6)	73	(4.5)	262	(16.2)	1204	(74.6)	79.4	0.21	<.0001
3. Night wheeze	50	(3.1)	106	(6.5)	110	(6.8)	1348	(83.5)	86.6	0.24	<.001
4. Night cough	108	(6.7)	145	(8.9)	291	(18)	1070	(66.2)	72.9	0.17	<.0001
5. Severe wheeze	19	(1.1)	50	(3.1)	174	(10.7)	1371	(84.9)	86.0	0.09	<.0001

P < 0.005 indicating significant agreement.

Agreement was better in terms of specificity than in terms of sensitivity. The lowest Kappa values were found in the rural zone (table 5).

**Discussion**

The prevalence of current asthma is 13.3% using ISAAC written and 11.9% using ISAAC video questionnaire. To our knowledge, this is the first study which compares these two types of questionnaires in African Portuguese speaking countries.

Although Portuguese is the official language in Mozambique, there are several traditional languages. Maputo, the capital, is an urbanised town and there are miscellaneous of cultures, the predominant traditional language is Ronga and Xangana. For this survey, we used the Portuguese translation of ISAAC written questionnaire and the

international version of video questionnaire AVQ3.0. We did not include tests for bronchial hyper-responsiveness due to their high costs.

Only 61% of eligible adolescents have answered the video questionnaire. One of the causes is due to limitation of material supply (television and video). Sometimes AVQ3.0 was administrated one or two days after WQ and in this case we lost some children. Conversely, video questionnaires were not easily administered in all schools due to local logistical conditions such as absence of electricity. During the WQ, we observed that the majority of children did not understand well the translated terms of wheezing in Portuguese “*Pieira, as-sobios no peito ou chios*”. Thai’s study shows that most asthmatic children as well as controls used terms to describe wheeze different from the ones chosen by medical personnel [9]. In addition, some studies suggest that to arrive at the correct preva-

Table 5. - Agreement between written and video questionnaires by zones

	WQ/AVQ								% Agreement	TOTAL	Kappa	p
	yes/yes		yes/no		no/yes		no/no					
	N	%	N	%	N	%	N	%				
<b>1. Wheezing while at rest</b>												
Urban	21	5.0	40	9.5	26	6.2	332	79.2	84.2	419	0.30	< 0.0001
SemiUrban	42	4.0	79	7.6	87	8.3	838	80.1	84.1	1046	0.25	< 0.0001
Rural	2	1.3	15	10.1	15	10.1	117	78.5	79.9	149	0.30	0.48
Total	65	4.0	134	8.3	128	7.9	1287	79.7	83.8	1614	0.24	< 0.001
<b>2. Wheezing after exercise</b>												
Urban	23	5.5	25	6.0	80	19.1	291	69.5	74.9	419	0.18	< 0.0001
SemiUrban	47	4.5	40	3.8	160	15.3	799	76.4	80.9	1046	0.23	< 0.0001
Rural	5	3.4	8	5.4	22	14.8	114	76.5	79.9	149	0.18	0.02
Total	75	4.6	73	4.5	262	16.2	1204	74.6	79.2	1614	0.14	< 0.001
<b>3. Nocturnal Wheeze</b>												
Urban	12	2.9	30	7.2	28	6.7	349	83.3	86.2	419	0.22	< 0.0001
SemiUrban	37	3.5	63	6.0	65	6.2	881	84.2	87.8	1046	0.30	< 0.0001
Rural	1	0.7	13	8.7	17	11.4	118	79.2	79.9	149	0.22	0.72
Total	50	3.1	106	6.6	110	6.8	1348	83.5	86.6	1614	0.20	< 0.001
<b>4. Nocturnal cough</b>												
Urban	24	5.7	40	9.5	71	16.9	284	67.8	73.5	419	0.15	< 0.001
SemiUrban	81	7.7	81	7.7	202	19.3	682	65.2	72.9	1046	0.21	0.03
Rural	3	2.0	24	16.1	18	12.1	104	69.8	71.8	149	0.15	0.69
Total	108	6.7	145	9.0	291	18.0	1070	66.3	73.0	1614	0.12	< 0.001
<b>5. Severe wheeze</b>												
Urban	6	1.4	15	3.6	32	7.6	366	87.4	88.8	419	0.15	< 0.001
SemiUrban	12	1.1	28	2.7	121	11.6	885	84.6	85.8	1046	0.08	< 0.001
Rural	1	0.7	7	4.7	21	14.1	120	80.5	81.2	149	0.15	0.57
Total	19	1.2	50	3.1	174	10.8	1371	84.9	86.1	1614	0.08	< 0.001

Table. 6. - The ISAAC written questions on asthma and their corresponding 5 sequences in the video questionnaire

Written questionnaire	Video questionnaire
1. Have you had wheezing or whistling in the chest in the last 12 months?	Moderate wheezing at rest
2. In the last 12 months, you chest sounded wheezy during or after exercise?	Wheezing after exercise
3. In the last 12 months, how often, on average has your sleep been disturbed due to wheezing? (Never woken with wheezing/ less than one night per week / one or more nights per week);	Waking at night with wheezing
4. In the last 12 months, have you had a dry cough at night, apart from a cold or chest infection?	Waking at night with cough
5. In the last 12 months, has wheezing ever been severe enough to limit you speech to only one or two words at time between breaths?	Severe attack of asthma with wheezing and breathlessness at rest



lence of wheeze within each ethnic group, one would need to determine the actual word the patients use to denote "wheeze" in their local language [9]. We have previously demonstrated that knowledge concerning asthma and asthma-like symptoms is weak in Mozambique [10]. Indeed we had to mimic the sound of wheezing to reduce some language bias associated to written questionnaire. In theory, the video questionnaire has been designed to circumvent the problem. However, video questionnaire has often failed in its aim [11].

Our data suggests poor correlation between the two questionnaires on all questions, overall in the case of the question regarding severe wheeze. The validity of ISAAC questionnaire is likely to vary across cultures and languages. Moreover, the number of positive responses to the video was generally lower than for the similar questions with the written questionnaire. In the rural areas where children have clearly more socio-economic background (poverty, lower school performances), there was consistently disagreement between the two types of questionnaires. Like us, others studies had report lower prevalence in video than in the written questionnaire [12, 13]. One of the possible reasons is that signs that are obvious enough to be visible or audible on a video are likely to represent more severe symptoms than the full spectrum from mild to severe asthma covered by the written questionnaire [13], and secondly may be due to problem to understanding the term [12].

The international version of AVQ3.0 has been validated in adolescents school children against methacholine airway hyperresponsiveness to hypertonic saline, and reported good agreement between written and video ISAAC questionnaires, and the AVQ3.0 was equivalent to the ISAAC WQ in its ability to predict airway hyperresponsiveness to hypertonic saline [6, 14].

The video question may have been interpreted as illustrating more severe wheezing than that experienced by individuals. We observed that some children were "assustados" surprised when some video sequences were presented. This is supported by the higher prevalence of wheezing from written question compared to the video in 90 of the 99 centres [11]. In the Ivory Coast the prevalence of asthma decreased to 3.34% when the video questionnaire was used [15]. In France, the degree of concordance between written and video questions measured by the kappa coefficient was low. One possible explanation is the fact that written and video questions do not represent exactly the same situation. Even if some studies have shown, with the measurement of bronchial hyperreactivity, that the video questionnaire is at least as effective as the written questionnaire to identify asthma symptoms, there is need for more adjusted between the two [16].

In the present study, the prevalence of asthma symptoms obtained using the video questionnaire decreased a little, however, confirms that asthma is a public health problem in Mozambique. The prevalence of exercise wheezing and night cough in the last year had decreased by about 20% using

the video questionnaire. The prevalence of current asthma (wheezing in the last 12 months) is relatively lower in the video questionnaire and not significantly different between the 3 areas of Maputo. Conversely asthma severity (speech disturbance and severe attack of asthma) was more frequently reported by video questionnaire than written questionnaire especially in the rural areas. It is reported that children who responded negatively to the written questionnaire but positively to the video, presumably these children were uncertain about the meaning of the written term but recognised the symptom when it was shown to them audiovisually [11]. Regarding the sex, the results are comparable with that of the written questionnaire. Girls had significantly more exercise wheeze and asthma appears be more severe ( $p=0.05$ ). The questionnaires show good negative agreement because children answered negatively to written questions they tended to answer negatively when they saw the video. One of the drawbacks of the video questionnaire is that it requires a classroom setting for its administration and electricity. In some African schools it was very complicated to complete.

In conclusion, in Maputo the prevalence of current asthma is comparable using written and video questionnaire (13.3 and 11.9% respectively). Agreement between the WQ and AVQ3.0 is weak and kappa varied from 0.09 to 0.24. A valid method for detecting asthma in epidemiological studies in situation in which there are language difficulties is still required.

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