

Translation of questions: the International Study of Asthma and Allergies in Childhood (ISAAC) experience

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SUMMARY

OBJECTIVE: To explore the consequences of translating the International Study of Asthma and Allergies in Childhood (ISAAC) English core questionnaires on asthma, rhinitis and eczema symptoms into other languages.

DESIGN: ISAAC Phase III developed 49 language translations for adolescents and 42 for children following standardised guidelines, which included back-translating the questionnaires into English to check their accuracy and meaning. Language deviations were categorised and analysed with regard to influences on the reported symptom prevalence.

RESULTS: Category 1 deviations for one or more questions were found in seven translations (14%) for adolescents and in three translations (7%) for children. Data for these questions were excluded from the worldwide

analyses. Category 2 deviations were identified in the publications, and Category 3 deviations were ignored.

CONCLUSIONS: Translations of questionnaires should follow a consistent protocol in global epidemiological research. Cultural norms need to be considered when evaluating back-translations into English, as disease labels are not available in every language, nor are they understood in the same way. Deviations from literal translations of English should be permitted if the intent of the original meaning is retained. A web-based tool of medical terminology would be useful for international research requiring the use of translations.

KEY WORDS: ISAAC; children; translation; epidemiology; asthma; rhinitis; eczema

ALTHOUGH QUESTIONNAIRE TOOLS are used widely in epidemiological research, little has been written about possible loss of validity during translation when used in comparative international studies. The process of questionnaire translation and back-translation is seldom, if at all, described. Here, we report the processes and consequences of translating questionnaires used in a major global epidemiological survey of allergic diseases.

The International Study of Asthma and Allergies in Childhood (ISAAC), the largest epidemiological study in children,¹ was designed in 1991 to describe the world-wide symptom prevalence of asthma, rhinitis and eczema in schoolchildren. Validated questions were used, where possible, and questionnaires were designed in English by the ISAAC Steering Committee members, representing 12 countries and 10 languages.²

ISAAC Phase III (2001–2005), a repeat of Phase I (1991–1996), was cross-sectional, school-based and

involved adolescents aged 13–14 years and children aged 6–7 years. Standardised core written questionnaires,² translated into local languages following detailed guidelines, were self-completed by adolescents and by parents of the children.^{3,4} A video questionnaire depicting symptoms of asthma, not dependent upon written languages, was developed for optional use for the adolescents.⁵

ISAAC Phase III involved 233 centres from 97 countries for adolescents and 144 centres from 61 countries for children. Comparability and replication of methodology are important aspects of repeated cross-sectional surveys,⁶ including question validity and the use of translations. Questionnaire translation and back-translation into English by an independent person was considered a key issue for data comparison. Translating an instrument into another language can be subject to cultural and linguistic variations and the most crucial step in the adoption of a well-developed instrument in another language.⁷ In ISAAC Phase III, questionnaire translations used in various cultural

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contexts allowed us to analyse possible consequences for data analysis and interpretation of outcomes.

METHOD

ISAAC translation process

Translated questionnaires were required to have the same structure and logic as the original. As it was important for the questions to be correctly understood by the participants, translations needed to apply the language used by the children and parents themselves, rather than the terminology of medical professionals. Previous experience from an ISAAC Phase I pilot study in Germany had shown that this could be a problem.⁴ Guidelines were written to ensure a consistent protocol,³ and are summarised in Table 1. It became apparent before starting Phase III that evaluation of the back-translations into English was an important quality control process, due to concerns about possible incorrect translations in Phase I.

Data centre processes

The Phase III Manual³ included language codes that collaborators precoded onto questionnaires to identify the languages used (e.g., 001 = Afrikaans, 002 = Albanian, etc.). Centres completed a Centre Report, which was submitted to the ISAAC International Data Centre (IIDC) at the time of data submission. The Centre Report asked detailed questions about aspects of the study methodology,³ including the translation process: whether the translator/s were familiar with asthma, rhinitis and eczema terminology; the consultation process with local communities; the process undertaken to develop translations and back-translations; and if the translations were pilot tested.

Table 1 Guidelines for the translation of the ISAAC English language questionnaire

- 1 The English language questionnaire should be translated by people who are bilingual and familiar with the area in which the questionnaire would be used
- 2 To find the most appropriate translation for difficult terms, investigators were encouraged to i) ask local doctors about local words to describe these terms; ii) ask children with these conditions and parents of children with these conditions how they would describe the conditions; iii) show the ISAAC video and ask children with asthma and parents of children with asthma how they would describe the breathing of the participants in the video; iv) submit a list of possible descriptors to children with asthma, rhinitis and eczema and parents of children with these conditions and ask them to indicate, e.g., using a rating system, which description(s) they favour
- 3 The most appropriate translation should be agreed upon among a group of national experts on the basis of 2 (i–iv). National questionnaires should allow for differences in the wording of questions according to the local use of language
- 4 The questionnaires should be translated back into English by an independent translator and modifications made if necessary
- 5 The questionnaires should be tested in populations that are representative of the study population. Modifications should be made if necessary

Steps 2 to 5 are repeated if required.

ISAAC = International Study of Asthma and Allergies in Childhood.

Ethics committee approval was a requirement for the ISAAC fieldwork, but was not necessary for this evaluation of the back-translations into English. The Centre Report documented the date ethics approval was obtained and the name of the ethics committee that approved the study.

Analysis of translations

At the beginning of Phase III, a sub-committee of the ISAAC Steering Committee reviewed the back-translations to observe how closely the original English version was followed (those not received were back-translated by a professional translation service following the same IIDC procedure). Identifying information about the centre and language was removed for anonymity to ensure impartial judgment. Deviations from the original English version were assessed in three categories: Category 1 for major deviations that were considered severe enough to change the meaning of the question; Category 2 for minor deviations where extra questions had been inserted or where there had been partial exclusion of data; and Category 3 for very minor deviations that did not alter the meaning of the question. Empirical definitions derived by the Translation Subcommittee of what constituted Category 1, 2 and 3 violations are elaborated in Table 2. The Translation Subcommittee, aware there

Table 2 Codes assigned to the questions from the back-translations into English

Code	Action taken
Category 1 Major deviations from the original English language question, severe enough to change the meaning of the question entirely or partly, with possible consequence on the outcome. For example: 'Have you ever had hayfever?' translated to 'Have you ever had a post nasal growth?' and 'Have you ever had eczema?' translated to 'Have you ever been sick with a skin condition called vitiligo?'	Exclude the data for the question from the analyses and publications and identify the centre's lack of alert in the publications with a footnote
Category 2 Minor deviations, such as the use of a dual language questionnaire; additional questions administered before or in between the core ISAAC questions; partial exclusion of data; questions not administered in the correct order; a different translation used in Phase I from that in Phase III	Include the question in the analyses and identify the centre in the first worldwide publications with a footnote to alert the reader to the fact that it was not known what effect these deviations could have on the outcome data
Category 3 Very minor deviations. For example: changes to the English language questionnaire which did not appear to change the meaning of the question; some terminology not exact but was correct for the culture; and errors found in the back-translation. For example: 'Have you ever had asthma?' translated to 'Have you ever had asthma or asthmatiform bronchitis?'	Include the question in the analyses without identification

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was not a translation in every language for some clinical descriptions and disease terminology, gave careful consideration to these questions to avoid unnecessary exclusion of questions. For example, in some languages 'wheeze' did not have an obvious synonym, while 'rhinitis', 'hayfever' and 'eczema' were identified as anglo-centric words that could be difficult to translate.

The Translation Subcommittee consulted with local investigators and National/Regional Coordinators regarding these deviations and made the following decisions. For Category 1 deviations, they decided to: 1) distinguish between the clearly wrong and the unsure deviations; 2) make a final list of the serious deviations; 3) request a second back-translation to confirm that the deviation was in fact true; and 4) consider excluding the data for the question from publications. For the Category 2 translations, as it was not possible to identify whether the analyses would be affected, the deviations were identified by the use of a footnote in the worldwide publications to alert the reader to the fact that minor adjustments had been made to the translation. For the Category 3, very minor deviations, these were considered too minor to have any effect and were subsequently ignored.

A sensitivity analysis was then undertaken to examine how the regional prevalence values changed when the mistranslated data were included.

RESULTS

Adolescent group

A total of 233 centres from 97 countries participated in the ISAAC Phase III study. The questionnaire was translated into 49 languages and used in 201 centres. One language only was used in 190 centres (94%), 10 (5%) centres used two languages, and one centre used three (0.4%) languages. Table 3 shows the languages and the number of centres that used each translation. Spanish (48 centres, 21%) was the language most commonly used. English was used exclusively in 32 centres (14%), and in another 15 centres as a proportion, with other languages making up the remainder (for example, one centre used English for 32% and Urdu [68%] for the rest). Other languages were Portuguese (25 centres, 11%), Arabic (16 centres, 7%), Italian (13 centres, 6%), French (11 centres, 5%), Chinese and Hindi (both 8 centres, 3%) and Marathi (7 centres, 3%). The other 41 languages made up the remainder. To accommodate local variations in dialect, some countries developed several questionnaires, notably in Spanish.

Of the 49 translations archived at the IIDC, 30 (61%) back-translations to English were received at the IIDC from Regional Coordinators. The remaining 19 translations were undertaken by the professional translation service (Figure 1).

Category 1 deviations

One centre was excluded entirely due to an inappropriate translation (and for other protocol deviations).

Table 3 Languages used in ISAAC Phase III for the 13–14 year age group; number of centres for each language shown in parentheses

Afrikaans (2)	Georgian (1)	Malay (3)	Spanish (48)
Albanian (1)	German (2)	Maltese (1)	Swedish (1)
Amharic (1)	Hindi (8)	Malayalam (1)	Tagalog (1)
Arabic (16)	Hungarian (3)	Marathi (7)	Tamil (2)
Basque (1)	Indonesian (3)	North Sotho (1)	Thai (6)
Bulgarian (1)	Italian (13)	Persian (4)	Tokelau (1)
Chinese (8)	Japanese (2)	Polish (2)	Tongan (1)
Croatian (1)	Kannada (1)	Portuguese (25)	Urdu (2)
Dutch (2)	Korean (2)	Romanian (1)	Uzbek (1)
English (47)	Kyrgyz (3)	Russian (7)	Vietnamese (1)
Estonian (1)	Latvian (1)	Samoan (1)	Xhosa (1)
Finnish (1)	Lithuanian (3)	Serbian (5)	
French (11)	Macedonian (1)	Sinhala (1)	

ISAAC = International Study of Asthma and Allergies in Childhood.

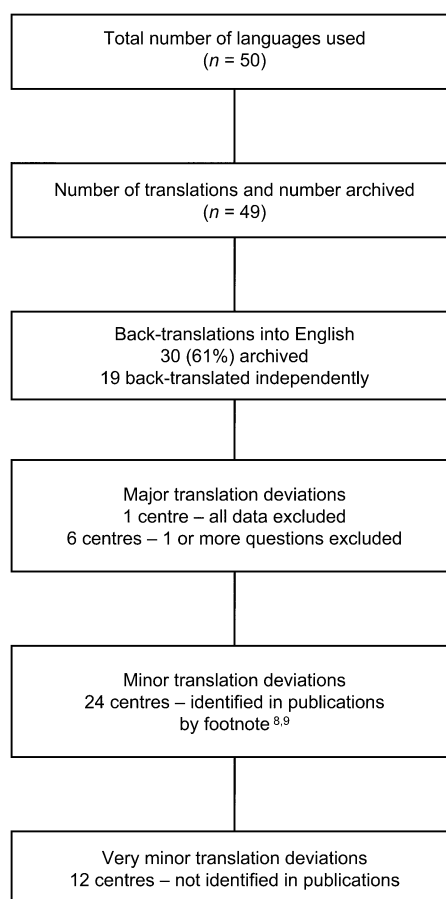


Figure 1 Flow chart depicting number of languages and deviations in the 13–14 year age group (adolescents).

In six centres, translation deviations were found that were considered severe enough to exclude the data for one or more questions from the data analyses. These centres were identified by a footnote in the ISAAC worldwide publications.^{8,9}

Category 2 deviations

Twenty-four centres had translation deviations in one or more questions that required a footnote in the

worldwide publications;^{8,9} one centre used a dual language questionnaire, 17 centres included their own questions within the core ISAAC questionnaire, and two centres had partial data excluded from the data analyses; one of these centres used 'hayfever ever' and then switched to 'rhinitis ever', resulting in the exclusion of 'rhinitis ever' from the analyses. The other centre had 'hayfever ever' excluded for one language (North Sotho) due to an inappropriate translation; however, the other languages used (English 30% and Afrikaans 10%) for this question were appropriate; three centres did not administer the questions in the correct order; and one centre used a different translation for Phase III from that of Phase I.⁸

Category 3 deviations

Category 3 deviations were found in 12 centres; however, these were considered minor enough not to affect the results and were not identified in the publications.

Children

A total of 144 centres (61 countries) participated in ISAAC Phase III. The questionnaire was translated into 42 languages and used in 131 centres. One language only was used in 120 centres (83%). Nine centres (6%) used two languages, one centre (0.7%) used three languages and one centre (0.7%) used four languages. Table 4 shows the languages and the number of centres that used each translation. Spanish (36 centres, 21%) was the language most commonly used, followed by English (26 centres, 20%), Portuguese (13 centres, 11%) and Italian (10 centres, 6%). The other 38 languages made up the remainder.

Of the 42 translations archived at the IIDC, 22 (52%) back-translations to English were received by the IIDC. The remaining 20 translations were undertaken by the professional translation service (Figure 2).

Category 1 deviations

One centre was excluded entirely due to an inappropriate translation (and due to other protocol deviations); two centres had translation deviations which were considered severe enough to exclude the data for one or more questions. These centres were identified in the worldwide publications by a footnote.^{8,9}

Category 2 deviations

Thirteen centres had translation deviations in one or more questions that required a footnote in the worldwide publications;^{8,9} one centre used a dual language questionnaire; eight centres included their own questions within the core ISAAC questionnaire; one centre had 'hayfever ever' excluded for one language (North Sotho) due to an inappropriate translation, however the other two languages used for this question (English 10% and Afrikaans 5%) were appropriate. Two centres did not administer the questions in the cor-

Table 4 Languages used in ISAAC Phase III for the 6–7 year age group; number of centres for each language shown in parentheses

Afrikaans (1)	Georgian (1)	Kyrgyz (2)	Serbian(4)
Albanian (1)	German (3)	Lithuanian (3)	Sinhala (1)
Arabic (7)	Greek (1)	Malay (4)	Spanish (36)
Basque (1)	Hebrew (1)	Maltese (1)	Swedish (1)
Bulgarian (1)	Hindi (5)	Malayalam (1)	Tamil (1)
Catalan (1)	Hungarian (2)	Marathi (7)	Thai (6)
Chinese (5)	Indonesian (1)	North Sotho (1)	Turkish (1)
Croatian (1)	Italian (10)	Persian (4)	Urdu (2)
Dutch (1)	Japanese (1)	Polish (2)	Uzbek(1)
English (26)	Kannada (1)	Portuguese (13)	Vietnamese (1)
Estonian (1)	Korean (2)	Russian (5)	

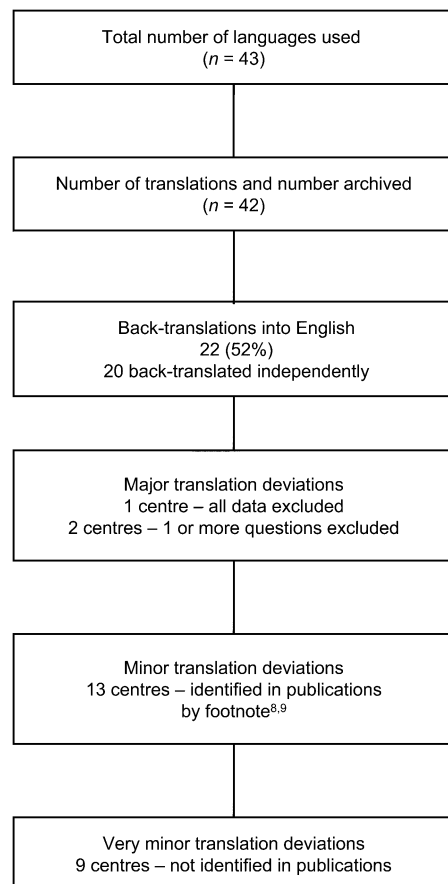


Figure 2 Flow chart depicting number of languages and deviations in the 6–7 year age group (children).

rect order and one centre used a different translation for Phase III to that of Phase I.⁸

Category 3 deviations

Category 3 deviations were found in nine centres; however, they were considered minor enough not to affect the results and were not identified in the publications.

Both age groups, sensitivity analysis

Inclusion of the mis-translated questions increased or reduced symptom prevalence values by 0.5% or more

in four variables for the adolescents and two for the children. For example, for Asia Pacific, 'eczema ever' increased by 1.4% for the adolescents and by 2.2% for the children (Appendix Tables 1 and 2).*

DISCUSSION

Main findings

Precision in translating questions from English to other languages was a challenging methodological issue, despite the availability of detailed guidelines to ensure consistent methodology. This was not anticipated when ISAAC was designed in 1990/1991, as few large studies using multiple translations had been undertaken and little had been written about the subject. Whilst the ISAAC Steering Committee acknowledged that some clinical terminology would be difficult to translate, such as asthma, rhinitis and eczema, we believed these words would be accurately explained in other languages by a local person familiar with the terminology and that local investigators or National/Regional Coordinators were the appropriate people to undertake the translation process rather than a centralised independent translating service. This was not always the case, however. The video questionnaire showing visual scenes of various asthma symptoms arose from the uncertainty of translating the written English language questionnaires into other languages. The ISAAC written questionnaires have a reasonable correlation with the video questionnaire,^{5,10} and others have undertaken their own validation of the ISAAC questionnaire.¹¹⁻²¹

Of interest was the sensitivity analysis, with the adolescent group showing more increases in prevalence values for the excluded questions than children. This may reflect the possibility that the parents of the children were able to understand the mistranslated questions more easily than the adolescents, and it would have been useful to address this issue more fully.

Consequences of translation errors

Although translation errors cannot be ignored, only a few were major, requiring data exclusion. These decisions were made after independent back-translation into English was undertaken to confirm that the question/s were in fact inaccurate and after discussion with the Principal Investigator or National/Regional Coordinators. The rigorous process undertaken to confirm that other deviations found were true translation deviations resulted in few footnotes. The rechecking, done by the independent translation service, and the ensuing dialogue with collaborators, seeking their local knowledge, resulted in the appropriate clarification and resolution of most of the issues.

Comparisons with other international studies

Similar approaches using standardised protocols for translations and back-translations into English were undertaken in two other large international cross-sectional multi-centre studies, the European Community Respiratory Health Survey (ECRHS)²² and the Multinational MONItoring of trends and determinants in CARDiovascular disease (MONICA).²³ These studies reported that they included quality assurance and studied internal validity; however, ISAAC has taken a more comprehensive and rigorous approach to the back-translation issue, as described in this paper, as well as making suggestions for a more robust approach to the process of translating the English language questionnaire into other languages. Other, smaller studies have also identified the importance of appropriate questionnaire translation^{7,24-28} to allow confidence in the accuracy of the data collected.

Some English words are difficult to translate

Some terminology was difficult to translate into other languages despite a detailed protocol. The English word 'wheeze' is an obvious example, as an exact synonym was lacking in most other languages. This problem was solved by suggesting various words and combinations of words to a panel of asthmatic children and their parents.⁴ The word 'hayfever' is not meaningful in countries with no distinct pollen seasons and, as succinctly put by one collaborator, is not related to either 'hay' or 'fever'. Likewise, 'itchy rash' and 'eczema' have their own interpretation problems in some languages.

Implications for future research

Translation processes are a vital component of methodology and should be validated internally and externally to guarantee confidence in the data. Ideally, translations and back-translations into English should be carefully compared by coordinating centres before studies commence. This allows comparisons to be made of languages used for difficult terminology and a new translation developed if required, thus avoiding later difficulties. A web-designed database of terminology would be useful when planning large-scale research projects. This could include technical terms such as those found in the ISAAC questionnaire, and include typical medical nouns such as 'asthma', 'hayfever' and 'eczema', along with definitions in English and their typical translation into other languages. Descriptive terms should be included, such as 'wheezing' and 'whistling' and other terms related to the three conditions used in the ISAAC study. A database such as this could be useful for other large international epidemiological studies and smaller studies where a translated questionnaire is used, as well as being a useful addition to the ISAAC tools currently available.[†]

* Available in the online version of this article at <http://www.ingentaconnect.com/content/iuatld/ijtd/2009/00000013/00000009/art00021>

[†] <http://isaac.auckland.ac.nz>

Despite our initial misgivings when beginning ISAAC Phase III, we found that repeated cross-sectional epidemiological multicentre studies throughout the world, such as ISAAC, are feasible and achievable, using multiple language translations by people with diverse cultural backgrounds. With careful documentation and communication, errors can be minimised to allow international comparisons of data to be undertaken. Allowances must be made for differences in terminology where cultural backgrounds are diverse and where cultures within countries are changing. These studies set the foundation to improve child and adolescent health outcomes worldwide.

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R É S U M É

OBJECTIF : Explorer les conséquences de la traduction en d'autres langues des questionnaires anglais de base de l'International Study of Asthma and Allergies in Childhood (ISAAC) au sujet de l'asthme, de la rhinite et des symptômes d'eczéma.

SCHEMA : Au cours de la Phase III de l'ISAAC, on a élaboré 49 traductions pour adolescents et 42 pour enfants en respectant les directives standardisées qui comportaient la rétro-traduction en anglais du questionnaire afin de contrôler sa précision et sa signification. Les déviations de langage ont été catégorisées et analysées en ce qui concerne leur influence sur la prévalence signalée des symptômes.

RÉSULTATS : On a observé des déviations de Catégorie 1 pour une ou plusieurs questions dans sept traductions (14%) pour les adolescents et dans trois traductions (7%) pour les enfants. On a exclu pour ces questions les

données des analyses au niveau mondial. Des déviations de Catégorie 2 ont été identifiées dans les publications et on a ignoré les déviations de Catégorie 3.

CONCLUSIONS : Dans les recherches épidémiologiques mondiales, les traductions de questionnaires doivent respecter un protocole cohérent. Il y a lieu de prendre en considération les normes culturelles lorsqu'on évalue les rétro-traductions vers l'anglais, car les dénominations des maladies ne sont pas disponibles dans toutes les langues ni comprises de la même manière. Des déviations provenant des traductions littérales à partir de l'anglais doivent être permises lorsque l'intention de la signification originale est maintenue. Un outil en ligne concernant la terminologie médicale pourrait être utile pour les recherches internationales nécessitant l'utilisation de traductions.

RESUMEN

OBJETIVO : Examinar las consecuencias de la traducción a otros idiomas de los cuestionarios básicos en inglés del Estudio Internacional de Asma y Alergias en la Niñez (ISAAC) sobre los síntomas de asma, rinitis y eczema.

MÉTODOS : En la Fase III del ISAAC se realizaron 49 traducciones de cuestionarios destinados a los adolescentes y 42 a los niños, siguiendo recomendaciones normalizadas que comprendían la retrotraducción de las preguntas al inglés, con el fin de verificar la exactitud y el sentido. Las desviaciones del idioma se clasificaron y analizaron en función de su influencia sobre la prevalencia comunicada de los síntomas.

RESULTADOS : Se observaron desviaciones de primera categoría en una o más preguntas de siete traducciones dirigidas a los adolescentes (14%) y en tres traducciones dirigidas a los niños (7%). Los datos sobre estas pre-

guntas se excluyeron del análisis mundial. Se detectaron desviaciones de segunda categoría en las publicaciones y no se tuvieron en cuenta las desviaciones de tercera categoría.

CONCLUSIÓN : En la investigación epidemiológica mundial, las traducciones de los cuestionarios deben seguir un protocolo homogéneo. Es preciso tener en cuenta las normas culturales cuando se evalúa la retrotraducción al inglés, pues no todas las enfermedades cuentan con términos equivalentes en cada idioma, ni se comprenden de la misma manera. Se deben permitir las desviaciones de la traducción literal del inglés, siempre y cuando se conserve la intención del significado original. Sería de gran utilidad contar con una herramienta de terminología médica en línea para toda investigación internacional en la cual se recurre a las traducciones.

APPENDIX TABLE 1

Effect of inclusion of mistranslated questions, ISAAC Phase Three, 13–14 year age group

	Asia-Pacific			Oceania			Indian Sub-continent		
	Without mistranslations %	With mistranslations %	Difference %	Without mistranslations %	With mistranslations %	Difference %	Without mistranslations %	With mistranslations %	Difference %
No interference with activities in last 12 months				13.0	12.8	-0.2			
A little interference with activities in last 12 months				20.8	20.0	-0.7			
Moderate interference with activities in last 12 months				3.6	4.2	0.5			
A lot of interference with activities in last 12 months				2.0	2.5	0.4			
Hayfever ever				24.4	21.8	-2.6	18.5	18.4	-0.1
Rash ever	8.6	9.0	0.4				7.3	7.4	0.1
Current rash	7.2	7.7	0.4						
Rash in flexures	6.2	6.4	0.3						
Rash cleared in last 12 months	5.8	6.1	0.3						
Sleep disturbance from rash never	12.3	12.2	-0.1						
Sleep disturbance from rash <1 night per week	2.7	2.7	0.0						
Sleep disturbance from rash >1 night per week	1.0	1.0	0.0						
Eczema ever	14.4	15.7	1.4						
Current eczema symptoms	5.3	5.6	0.3						

APPENDIX TABLE 2

Effect of inclusion of mistranslated questions, ISAAC Phase Three, 6–7 year age group

	Asia-Pacific			Indian Sub-continent		
	Without mistranslations %	With mistranslations %	Difference %	Without mistranslations %	With mistranslations %	Difference %
Hayfever ever				9.0	9.1	0.1
Rash ever	13.4	13.8	0.4	5.5	5.4	-0.1
Current rash	12.8	13.2	0.4			
Rash in flexures	11.7	12.0	0.3			
Rash at <2 years	5.0	5.3	0.3			
Rash at 2–4 years	4.9	5.0	0.1			
Rash at over 4 years	6.6	6.5	-0.1			
Rash cleared in last 12 months	11.1	11.3	0.1			
Sleep disturbance from rash never	25.7	25.2	-0.5			
Sleep disturbance from rash <1 night per week	4.8	4.8	0.0			
Sleep disturbance from rash >1 night per week	1.7	1.7	0.0			
Eczema ever	17.8	20.0	2.2			
Current eczema symptoms	10.1	10.4	0.3			