

Validation of the Malaysian Versions of Parents and Children Health Survey for Asthma by Using Rasch-Model

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ABSTRACT

Context: In recent years, health-related quality of life (HRQOL) has become an important outcome measure in epidemiologic studies and clinical trials. For patients with asthma there are many instruments but most of them have been developed in English. With the increase in research project, researchers working in other languages have two options; either to develop a new measure or to translate an already developed measure. Children Health Survey for Asthma is developed by American Academy of Paediatrics which has two versions one for the parents (CHSA) and the other for the child (CHSA-C). However, there is no Malay version of the CHSA or the CHSA-C.

Aim: The aim of this study was to translate and determine the validity and reliability of the Malaysian versions of Parent and Children Health Survey for Asthma.

Materials and Methods: Questionnaires were translated to Bahasa Malayu using previously established guidelines, data from 180 respondents (asthmatic children and their parent) were analysed using Rasch-Model; as, it is an approach that

has been increasingly used in health field and also it explores the performance of each item rather than total set score.

Results: The internal consistency was high for the parent questionnaire (CHSA) (reliability score for persons = 0.88 and for items was 0.97), and good for child questionnaire (CHSA-C) (reliability score for persons = 0.83 and for items was 0.94). Also, this study shows that all items measure for both questionnaires (CHSA and CHSA-C) are fitted to Rasch-Model.

Conclusion: This study produced questionnaires that are conceptually equivalent to the original, easy to understand for the children and their parents, and good in terms of internal consistency. Because of the questionnaire has two versions one for the child and the other for the parents, they could be used in clinical practice to measure the effect of asthma on the child and their families. This current research had translated two instruments to other language (Bahasa Malayu) and evaluated their reliability and validity hence will help researchers from the same country to use these translated instruments in their studies.

Keywords: CHSA, CHSA-C, Rasch analysis, Reliability, Validity

INTRODUCTION

The increased prevalence of chronic diseases such as asthma has contributed to increasing interest in patients' views about health quality of life outcomes. Asthma is one significant health problem that results in high morbidity and mortality. In general, there are about 300 million persons affected by asthma around the world [1]. Particularly, childhood asthma is a serious health problem that results in impairment of physical and social life of the affected children and their immediate families [2,3]. Therefore, accurate measurements are necessary for clinical decisions and medical interventions. There are many instruments targeted the child themselves or the caregivers. But there are few instruments targeted both of them. One of these instruments is Children Health Survey for Asthma that developed by American Academy of Paediatrics which has two versions one for the parents (CHSA) and the other for the child (CHSA-C) [4,5]. A study was conducted in the United States which used both versions of Children's Health Survey for Asthma (CHSA), the CHSA that completed by parents and the child-completed CHSA-C, the researchers found there was a difference between a child's and a parent's report especially during emotional distress [6]. However, this type of study which includes both children's and caregivers' point of view about the effect of asthma on the child life has not yet been conducted in Malaysia. Also; there is no Malay version of the CHSA or the CHSA-C. Since Most of HRQL measures have been developed in English. With the increase in research project, researchers working in other languages have two options; either to develop a new measure or to adapt an existing measure [7]. However, translation to a new language should be done with care and the psychometric properties of a translated instrument should

be examined in the new culture. To reach to the equivalence between the original source and target versions of the questionnaire, The items should not only translate well to the targeted language, but should also be suitable for cross-culture adaptation to maintain the content validity of the instrument at a conceptual level across different cultures [8]. So, the aim of this pilot study is to measure the validity and reliability of translated versions of CHSA and CHSA-C in Malay by using modern psychometric perspectives Rasch-Model.

MATERIALS AND METHODS

1. Participants and setting

After getting ethical permission from UiTM Research Ethics Committee (UiTM Selayang and Sungai Buloh Hospital) as well as from the National Institute of Health (NIH) and Ministry of Health Malaysia (MOH), a study was conducted at MOH and UiTM paediatric and respiratory specialist clinics in Selayang and Sungai Buloh hospitals. An estimated asthmatic paediatric population of 335, with a 5% margin of error, a 90% confidence level with a 50% response distribution, the required sample size of respective respondents was 150, calculated by using Raosoft® software [9]. A target sample size of 100 paediatric patients and their parents is estimated to give a good precision for reliability and validity study [10]. However, an increased sample size is suggested to overcome erroneous results and to increase the reliability of the conclusion [11]. Therefore, the study recruited 180 pairs of asthmatic children and their parents. The age of the children was from 7 to 16-year-old who has been diagnosed with asthma. Only participants who were able to understand the Malay Language were included.

2. English Version of Parent Questionnaire (CHSA)

The CHSA is a valid and reliable instrument to assess the impact of asthma and treatment on the lives of children and their families. It is a self-report measure completed by parents of children with chronic asthma between the age of 5 and 16 years old. The CHSA can be used alone or as a companion to the child-completed CHSA-C. It has 48 core scale items computed in five domains including physical health for child (15 items), activity for child (5 items) and for family (6 items), and emotional health for child (5 items) and for family (17 items). Additional items cover health care utilization, asthma triggers, and family demographics [12].

3. English Version of Child Questionnaire (CHSA-C)

CHSA-C is a self-completed instrument for children with asthma (children aged 7 to 16-year-old) and is interviewer-administered appropriate for children less than 10-year-old. The CHSA-C can be used alone or as a companion to the parent-completed CHSA. It is an asthma-specific instrument that has 25 items computed in three domains including child physical health (7 items), child activities (6 items), and child emotional health (12 items). Additional items cover health care utilization, asthma triggers, and child demographics [5].

4. Translation procedures of questionnaires

After obtaining permission from the American Academy of Pediatrics and authors of both versions of the CHSA, both versions were translated into BahasaMelayu according to the international guidelines [13] as explained below.

Forward translation: The original questionnaire was translated from English to BahasaMelayu by two independent local professional bilingual persons; one of them has a medical and clinical background and the other with linguistics background (professional translator). After that both translated versions were reviewed by the local project manager of translation committee and agreed on a single reconciled version (reconciliation). The aim of this step is to produce a conceptually equivalent translated version with the original one and the language used should be simple and easy to understand (face validity). Since the questionnaires are disease-specific, the review of these intermediary versions was conducted by a paediatrician (respirologist).

Backward translation: In this step, the reconciled translated questionnaire was back-translated from BahasaMelayu to English language by other local independent professional translators totally blind to the original version. The objective of this step being to check that the translated version reflects the same item content as the original without any misunderstandings, miss-translation or inaccuracies to reduce any cultural and social bias. This step provided the content validity from the judgmental committee and the experts.

Harmonization: Before pretesting the translated questionnaire, translation committee that reviewed those forward and backward translations checked and modified format, modified or rejected inappropriate items/words for final consensus. In this harmonization stage, any content value variances among the translations in this targeted language were identified and resolved for uniformity of translations. The local project manager of translation committee together with another independent respirologist (since instrument is a disease-specific) reviewed and approved the second harmonized translation for cognitive debriefing interviews.

Testing for translated questionnaire: The translated questionnaires were distributed to respondents who were not a part of the targeted sample of this study. Each subject completed the questionnaire and interviewed about the meaning of each item, instruction and response choice, and asked if there were any difficulties in understanding those cognitive debriefing interviews. The questionnaires were adapted according to Malaysian culture especially in the demographic part such as ethnic groups, seasons in the years, education system,

and health insurance system. Because the researcher faced some patients' confusion about some items, it was decided that several actions would be taken, including a meeting between researchers, translation committee, and a consultation with an expert translator. These actions helped to solve those obstacles and selected the most suitable expressions for the confusing items.

5. Analysis procedure

Descriptive statistics were used to describe demographic data for asthmatic children and their parents and disease characteristics of the patients. Percentages and frequencies were used for the categorical variables, while means and standard deviations were calculated for the continuous variables. The validity and reliability were defined as follows: "Validity is the ability of the scale to measure what it is supposed to measure"; "Reliability is the degree of the consistency and stability of a measure" [14]. The instruments were determined in their face or content validity by asking the subjects themselves if they understood and accepted the questionnaires and also by sending the translated questionnaires to two experts. Their comments were used to improve the items in the translated questionnaires. The results showed that two items in parent version from 48 items were modified to be suitable for respondents' understanding. The researchers have used Bond & Steps software® based on Rasch-Model analysis to measure validity and reliability for person and item for the Malaysian versions of CHSA and CHSA-C. The person reliability means that if this sample of persons were to be given another set of items measuring the same construct. Item reliability means that if these same items were to be given to another sample of comparable ability will measure the same variables. Items should fit model's expectation; Point Mean Correlation between 0.4 and 0.8, Mean Square (MNSQ) between 0.5 and 1.5, and Z-Standard (ZStd) within -2 and +2.

6. Rasch-Model overview

Firstly, in order to develop or translate an instrument it is critical to measure the specific psychometric requirements. There are two groups of psychometric requirement: one associated with Classical Test Theory (CTT), and the other with Modern Test Theory (MTT) or Item Response Theory (IRT). This study used IRT approach, in particular Rasch analysis because it has been increasingly used in health field and explores the performance of each item rather than total set score as in CTT [15,16]. The Rasch model has been described in earlier studies [17]. Rasch measurement analysis provides result which uses log odd unit or log it scale and it is considered better and more accurate for analysing ordinal raw data. Rasch model can be applied wherever data are obtained even by Likert scale [18]. Rasch Measurement Model is expressed as;

$$(1/S^2 (1-R))$$

S – Observed Standard Deviation

R – Reliability

The pattern of an outfit is considered by Linacre & Wright as below:

PtMea Corr. x; where x is found within 0.4 and 0.8; ($0.4 < x < 0.8$), in the Outfit column; the Mean Square (MNSQ) y; where y value falls between 0.5 and 1.5; ($0.5 < y < 1.5$), in the Outfit column; The Z-Standard (ZStd) z; z is within -2 and +2; ($-2 < z < +2$) [19].

RESULTS

1. Sample characteristics

A total of 180 pairs of asthmatic children and their parents completed the questionnaires. As shown in [Table/Fig-1,2] child ranged in age from 7 to 15-year-old with mean= 9.9-year-old, and the majority in race were Malay by 87.2% and 6.1% were Indian, 52.2% of the children have been hospitalized for asthma, and only 7.8% of the children stopped breathing or was intubated because of asthma.

Children		n (%)
Gender	Male	105 (58.4)
	Female	75 (41.6)
Age (yr) Mean (±SD)	9.9 (2.2) Min: 7; Max: 15	
Ethnicity	Malay	157 (87.2)
	Indian	11 (6.1)
	Chinese	7 (3.9)
	Other	5(2.8)
Child stopped breathing or was intubated because of asthma		14 (7.8)
Child ever used steroids 4 times in a 6-month period		21 (11.7)
Child ever been hospitalized for asthma		94 (52.2)
Child ever been taken to emergency room due to asthma		123 (68)

[Table/Fig-1]: Sample demographic features of Asthmatic children(n=180)

Parents		n (%)
Gender	Male	73 (40.6)
	Female	107 (59.4)
Age (years old) Mean (±SD)	39 (5.1)Min: 28 ; Max : 53	
Education	Primary school	1 (0.6)
	Secondary school SRP/PMR	10 (5.6)
	Secondary school SPM	37 (20.5)
	Technical/vocational school	21 (11.7)
	University diploma	59 (32.8)
	Bachelor (degree)	22 (12.2)
	Master	7 (3.8)
	PhD	1(0.6)
Monthly household income (Malaysian Ringgit)	Missing	22 (12.2)
	Less than 1500	14 (7.8)
	1501-3000	72 (40)
	3001-5000	60 (33.3)
	More than 5000	27 (15)
	Missing	7 (3.9)

[Table/Fig-2]: Sample demographic features of parents (n=180)

7.8% reporting an annual household income less than 1500 RM, 32.8% of the parents were have university diploma, and 59.4% of the caregivers were mothers of the children.

2. Person and item reliability

Rasch analysis software; Bond & Fox Steps was used to analyse the data, which is an original customized version of Winsteps® intended for use with the book 'Applying the Rasch Model' [20]. The results of this study showed the reliability and validity test for the translated questionnaires (CHSA & CHSA-C).

[Table/Fig-3] shows the detailed result of reliability score of person and item for Child questionnaire (CHSA-C) that has 25 items, which was equivalent with 4425 data sets, obtained in this test for CHSA-C. Both tests supported that the reliability of the instrument was good, reliable and suitable (0.83 and 0.94) for research purposes.

[Table/Fig-4] shows the detailed result of reliability score of person and item for parent questionnaire (CHSA) that has 48 items, which was equivalent with 8512 data sets, obtained in this pilot test for CHSA. As can be seen in [Table/Fig-4] the reliability for person and item were very good (0.88 and 0.97, respectively).

3. Validity for the translated questionnaires (CHSA and CHSA-C)

For item factor analysis, according to Rasch measurement model, mean square value (MNSQ) for a valid item should be between 0.5

SUMMARY OF 180 MEASURED Persons								
	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	102.8	25.0	1.27	.26	1.07	.0	.99	-.1
S.D.	13.3	.0	.76	.08	.53	1.6	.51	1.5
MAX	122.0	25.0	3.08	3(3.13%)	2.82	4.1	2.95	4.4
MIN.	58.0	25.0	-.64	.19	.23	-4.6	.26	-4.4
REAL RMSE .31 ADJ.SD .69 SEPARATION 2.23 Person RELIABILITY .83 MODEL RMSE .27 ADJ.SD .70 SEPARATION 2.57 Person RELIABILITY .87 S.E. OF Person MEAN = .06								

SUMMARY OF 25 MEASURED Items								
	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	732.1	177.0	.00	.09	1.04	.3	1.00	.0
S.D.	48.4	.0	.40	.01	.16	1.3	.14	1.0
MAX	801.0	177.0	.73	.11	1.44	3.1	1.25	2.1
MIN.	635.0	177.0	-.64	.08	.82	-1.7	.78	-1.4
REAL RMSE .10 ADJ.SD .39 SEPARATION 3.94 Item RELIABILITY .94 MODEL RMSE .09 ADJ.SD .39 SEPARATION 4.14 Item RELIABILITY .94 S.E. OF Item MEAN = .08								
4425 DATA POINTS. APPROXIMATE LOG-LIKELIHOOD CHI-SQUARE: 9185.79								

[Table/Fig-3]: Person and Item Reliability for CHSA-C

SUMMARY OF 180 MEASURED Persons								
	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	200.5	47.8	1.45	.21	1.05	.0	1.05	-.1
S.D.	23.0	1.2	.87	.18	.44	1.9	.72	1.9
MAX	240.0	48.0	6.02	1.83	2.99	5.0	7.13	8.9
MIN.	118.0	40.0	-.47	.14	.33	-4.8	.37	-4.7
REAL RMSE .30 ADJ.SD .82 SEPARATION 2.75 Person RELIABILITY .88 MODEL RMSE .28 ADJ.SD .82 SEPARATION 2.91 Person RELIABILITY .89 S.E. OF Person MEAN = .06								
SUMMARY OF 48 MEASURED Items								
	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	742.0	177.3	.00	.10	1.02	.1	1.04	.3
S.D.	71.3	1.5	.58	.02	.17	1.5	.20	1.4
MAX	848.0	178.0	1.41	.15	1.42	3.8	1.51	3.2
MIN.	523.0	174.0	-1.16	.07	.70	-3.1	.68	-2.6
REAL RMSE .10 ADJ.SD .57 SEPARATION 5.55 Item RELIABILITY .97 MODEL RMSE .10 ADJ.SD .57 SEPARATION 5.80 Item RELIABILITY .97 S.E. OF Item MEAN = .08								
8512 DATA POINTS. APPROXIMATE LOG-LIKELIHOOD CHI-SQUARE: 17301.49								

[Table/Fig-4]: Person and Item Reliability for CHSA

and 2.0, Z-standard (ZSTD) value should be between -2 to 2, and correlation score should be between 0.4 and 0.85. Typically, two statistics were used for MNSQ and ZSTD: infit (weighted) and outfit (unweighted) statistics.

[Table/Fig-5] shows item measure for CHSA-C. All items were fitted and correlated to the model. [Table/Fig-6] shows item measure for CHSA. All items were fitted and correlated. However, items (5, 13, 19, 20, 22, 38, 43, and 48) were little to outside of ideal correlation. Also, items (27, 29, 30, 31, 32, 33, 34, 35, and 36) were low correlation but still correlated and considered valid.

This study shows that all items measure for both questionnaires (CHSA and CHSA-C) were fitted to Rasch-Model. In other word, analysis of the mean-square fit statistics indicated that the estimated measures are valid and this provides empirical evidence that the items measure the construct interest. On the other hand, some participants were not fitted to the measure; and thus they were deleted and the software was rerun again.

ITEM	EXACT OBS%	MATCH EXP%	PTMEA CORR	INFIT		OUTFIT	
				MNSQ	ZSTD	MNSQ	ZSTD
Q-01	53.1	49.6	0.51	0.83	-1.5	0.83	-1.2
Q-02	52.0	49.9	0.51	0.88	-1.0	0.85	-1.1
Q-03	43.5	42.4	0.51	0.89	-1.1	0.94	-0.5
Q-04	39.0	37.9	0.47	0.88	-1.2	1.00	0.0
Q-05	40.1	40.8	0.44	1.11	1.1	1.20	1.7
Q-06	41.2	42.5	0.47	0.92	-0.7	1.03	0.3
Q-07	42.9	43.1	0.45	1.05	0.5	1.22	1.7
Q-08	57.1	54.9	0.53	1.10	0.8	0.93	-0.4
Q-09	54.2	47.3	0.55	1.04	0.4	1.06	0.5
Q-10	54.8	53.7	0.53	1.16	1.3	0.87	-0.8
Q-11	48.6	42.9	0.50	1.08	0.8	1.14	1.2
Q-12	46.3	48.6	0.54	1.12	1.1	0.97	-0.1
Q-13	58.8	56.1	0.50	1.39	2.8	1.17	1.0
Q-14	57.6	48.5	0.57	1.00	0.0	0.87	-0.9
Q-15	64.4	61.8	0.47	1.18	1.3	1.02	0.2
Q-16	65.5	58.4	0.48	1.13	1.0	1.02	0.2
Q-17	53.7	55.0	0.40	1.44	3.1	1.25	1.5
Q-18	61.6	59.3	0.48	0.85	-1.1	0.78	-1.4
Q-19	52.5	47.0	0.55	0.82	-1.7	0.84	-1.2
Q-20	61.6	52.7	0.54	0.93	-0.5	0.84	-1.0
Q-21	63.8	56.2	0.48	1.07	0.6	0.92	-0.4
Q-22	44.6	42.5	0.47	1.10	1.0	1.09	0.8
Q-23	35.6	39.1	0.48	1.23	2.1	1.24	2.1
Q-24	41.2	40.8	0.58	0.95	-0.5	0.92	-0.7
Q-25	42.4	40.8	0.57	0.94	-0.6	0.92	-0.7

[Table/Fig-5]: Item Measure for CHSA-C

ITEM	EXACT OBS%	MATCH EXP%	PTMEA CORR	INFIT		OUTFIT	
				MNSQ	ZSTD	MNSQ	ZSTD
Q-01	55.6	44.6	0.51	0.94	-0.4	0.84	-1.2
Q-02	55.6	46.6	0.51	0.90	-0.8	0.81	-1.4
Q-03	45.5	39.2	0.50	0.87	-1.2	0.87	-1.1
Q-04	38.8	36.7	0.43	0.85	-1.6	1.04	0.4
Q-05	29.8	36.7	0.38	1.04	0.5	1.38	3.2
Q-06	38.2	37.7	0.48	0.86	-1.5	0.96	-0.3
Q-07	44.4	39.2	0.50	0.85	-1.5	0.94	-0.4
Q-08	47.1	44.4	0.46	0.82	-1.6	0.90	-0.7
Q-09	52.9	50.4	0.44	0.90	-0.8	0.88	-0.7
Q-10	54.6	53.4	0.43	0.93	-0.5	0.89	-0.6
Q-11	52.9	50.4	0.47	0.84	-1.3	0.80	-1.4
Q-12	40.8	41.5	0.43	1.11	1.0	1.08	0.6
Q-13	46.6	39.6	0.57	0.70	-3.1	0.70	-2.6
Q-14	42.0	44.4	0.49	1.03	0.3	0.96	-0.2
Q-15	45.4	45.3	0.48	0.91	-0.8	0.88	-0.8
Q-16	47.2	47.3	0.43	0.93	-0.5	1.14	1.0
Q-17	51.1	46.9	0.50	0.80	-1.8	0.81	-1.3
Q-18	48.3	44.6	0.48	0.77	-2.1	0.81	-1.4
Q-19	53.9	47.3	0.52	0.81	-1.6	0.73	-2.0
Q-20	56.7	46.9	0.54	0.77	-2.1	0.68	-2.4
Q-21	55.1	53.5	0.44	1.16	1.2	1.27	1.6
Q-22	48.3	46.6	0.39	1.20	1.6	1.36	2.3
Q-23	36.0	39.2	0.45	1.22	2.0	1.19	1.6
Q-24	50.6	46.9	0.47	0.91	-0.7	0.93	-0.4
Q-25	66.9	63.7	0.40	1.36	2.2	1.09	0.5
Q-26	59.0	53.7	0.42	0.97	-0.2	0.97	-0.2

Q-27	55.1	56.4	0.37	1.05	0.4	1.08	0.5
Q-28	39.9	44.6	0.40	1.15	1.3	1.09	0.7
Q-29	69.7	69.2	0.30	1.10	0.6	1.25	1.2
Q-30	78.7	77.3	0.30	1.08	0.5	1.25	1.1
Q-31	81.5	79.1	0.26	1.36	1.7	1.51	1.9
Q-32	73.6	75.1	0.37	0.86	-0.8	0.86	-0.6
Q-33	77.0	77.3	0.24	1.26	1.4	1.31	1.3
Q-34	74.2	73.5	0.33	0.93	-0.3	1.25	1.2
Q-35	79.8	77.3	0.31	1.03	0.2	1.28	1.2
Q-36	71.9	71.9	0.31	0.99	0.0	1.03	0.2
Q-37	44.9	43.5	0.45	1.18	1.5	1.07	0.5
Q-38	37.1	37.1	0.39	1.42	3.8	1.40	3.2
Q-39	50.6	47.3	0.40	1.10	0.8	1.06	0.4
Q-40	45.5	40.8	0.48	0.93	-0.6	0.91	-0.7
Q-41	42.1	39.9	0.42	1.05	0.5	1.03	0.3
Q-42	55.6	50.7	0.40	1.00	0.0	1.02	0.2
Q-43	25.3	35.2	0.44	1.36	3.4	1.35	3.2
Q-44	33.7	36.7	0.46	1.09	1.0	1.05	0.5
Q-45	37.6	36.7	0.45	1.20	2.0	1.17	1.6
Q-46	43.8	37.7	0.42	1.14	1.4	1.09	0.8
Q-47	48.9	42.4	0.42	0.94	-0.5	0.93	-0.5
Q-48	27.0	35.2	0.49	1.29	2.9	1.25	2.4

[Table/Fig-6]: Item Measure for CHSA

DISCUSSION

The purpose of this study was to assess the psychometric properties of the Malaysian versions for CHSA and CHSA-C for asthmatic children and their parents. This study produced questionnaires that are conceptually equivalent to the original, easy to understand for the children and their parents, and good in terms of internal consistency. Because of the questionnaire has two versions one for the child and the other for the parents, they could be used in clinical practice to measure the effect of asthma on the child and their families. The original questionnaires were developed in English [4,5]. The translation procedure that we used is the standard one to be sure that the translated version is culturally adapted to populations with different culture and language to those for which the questionnaires were originally developed [13]. The original versions of CHSA and CHSA-C are already established in the literature as valid and reliable tools from a traditional psychometric perspective while this study used modern psychometric perspectives to assess the reliability and validity for the translated versions. However, previous studies approved those CHSA questionnaires performed well-psychometric tests including internal consistency, short-term test-retest and validity [4,5]. In this study Rasch- Model shows that the items and person reliability is good and reliable for research purposes. According to the results of item measure, all items of the domains in both questionnaires were found to represent a homogenous construct and it has been already confirmed by Rasch-Model as well and fitted the model. The findings of this study suggest that the Malaysian versions of the CHSA and CHSA-C had high internal consistency, with a Cronbach α of 0.97 and 0.94 respectively, which is higher than the minimum recommended value (0.70) [21]. The internal consistency scores obtained for CHSA and CHSA-C shows that the items measured HRQOL consistently with small random error. On the other hand, the validity is good for the item measured. In the present study modern method had been used to make definitive conclusions about the psychometric properties of the Malaysian versions of CHSA and CHSA-C. In addition, classical method has a limitation that it is unable to estimate item difficulty and person ability characteristics separately. Another limitation of Classical Test Theory is that it yields only a single reliability estimate and corresponding standard error of measurement, but

the precision of measurement varies by ability level [22]. A study conducted by Amin et al., used a Rasch analysis of the PedsQL 4.0 Generic Core Scales (parent report) to determine how the total scale score behaves from an item-level perspective [15]. The PedsQL is already established in the literature as a valid and reliable tool from a traditional psychometric perspective and it is the most widely used generic HRQOL tool in pediatric oncology [23,24]. However, a modern psychometric approach uncovered a number of limitations in terms of disordered thresholds, local dependency, and targeting issues. In order of that, future studies are needed to measure the validity and reliability by using modern methods such as Rasch-Model for HRQOL instruments that are already established by classical method by Rasch-Model. Rasch model is a mathematical model used to determine the relation of the difficulty of an item (or in CHSA the level of asthma severity implied by the item) to the ability of a person (or in our instruments their level of asthma severity). Actually, it provides two parameter estimates: person position and item difficulty [25]. Rasch introduced the analysis system with ratio-based values, rather than average score of number values. This study uses Rasch measurement model because of many reasons, as follows: it produces linear measures, overcomes missing data, gives estimates of precision, has devices for detecting misfit and the parameters of the object being measured and of the measurement instrument must be separable [26]. Also, this approach can be used to determine validity of rating scales that assess constructs that are difficult to measure, such as health-related quality of life (HRQOL). Rasch measurement provides evidence to support the inclusion or exclusion of items, improving our knowledge and understanding of the concepts that comprise HRQOL [15].

CONCLUSION

Conclusion can be made based upon the findings of the present study. The results showed that person and item reliability values for both translated questionnaires were very good. Also, both translated questionnaires were valid by fitted all the items to Rasch-Model. This present study supported that the Malaysian versions of CHSA are acceptably reliable for research purpose from a modern psychometric perspective. The use of the translated questionnaires as tools for self-report of quality of life in individuals with asthma and their family were recommended in clinical setting.

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