Validation of the Filipino Catquest-9SF Questionnaire for Cataract Patients

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Disclosures: The authors report no conflict of interest. The authors declare that they share primary authorship of the study.

ABSTRACT

Objective: The objective of this study was to determine the validity and reliability of a Filipino translation of the Catquest 9-SF questionnaire for measuring the patient reported visual outcomes of Filipino cataract patients in a tertiary hospital.

Methods: The English version of the Catquest-9SF questionnaire was translated into Tagalog or Filipino, back translated into English and finally translated again into Filipino using the WHO forward backward-forward translation technique. The final Filipino version of the questionnaire was administered to 90 patients who were awaiting cataract surgery and fit the inclusion criteria. The response patterns as well as the overall construct of the Filipino questionnaire were evaluated using the Rasch model in terms of specific components for reliability and validity.

Results: The Filipino version of the Catquest-9SF showed high reliability for person and item components based on Person Separation Index (PSI). All questions showed good fit statistics based on Show Mean Square (MNSQ), as well as unidimensionality using Principal Component Analysis (PCA). Differential Item Functioning (DIF) was not seen across all age groups, while only one question showed DIF among different sex groups.

Conclusion: The results of the Rasch analysis show good overall functioning of the Filipino version of the Catquest-9SF. It is a valid and reliable tool that can be used to measure the visual disability outcomes of Filipino cataract patients

Keywords: Cataract, Catquest-9SF questionnaire, translated Filipino cataract questionnaire, patient reported outcome measure, quality of life

Philipp J Ophthalmol 2025;50:3-9

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Cataracts remain a major cause of blindness worldwide, with objective measures such as visual acuity and refraction serving as the primary outcomes for determining cataract morbidity. However, the patient's subjective assessment of day-to-day activities before and after surgery has also been recognized as a crucial indicator of surgical success. This is evidenced by the development over the years of various Patient Reported Outcome Measures (PROMs), which have been refined and validated using Rasch analysis. One such tool is the Catquest nine-item short-form (Catquest-9SF), which demonstrates strong psychometric properties and has been shown to be responsive to cataract surgery. The original Catquest questionnaire was in Swedish and contained 19 questions. However, a Rasch-scaled version, reduced to 9 questions, has proven to more effectively and reliably measure visual disability outcomes following cataract surgery[1]. The Catquest-9SF has been adopted by the International Consortium for Health Outcomes Measurement (ICHOM) to assess risk factors and outcomes related to cataracts, which remain the leading cause of blindness globally.[2]

To date, the Catquest-9SF has been translated and culturally adapted for use in several countries, including Australia, Germany, Austria, Italy, the Netherlands, China, and Malaysia.[3] While most PROM questionnaires like the Catquest have been developed in high-income countries, an English version of the Catquest-9SF is widely accessible. However, it may not be as effective in evaluating the quality of life and the visual impairment of Filipino patients compared to a culturally appropriate translation of the questionnaire.

A Tagalog (Filipino) translation of the Catquest-9SF would enable eye specialists in the Philippines to better assess quality outcomes for cataract surgery within the local context, ultimately improving treatment and standards of care for cataract patients nationwide. Additionally, it would serve as a valuable clinical tool for evaluating and monitoring the response of Filipino patients to cataract surgery, both in clinical practice and research settings. To provide an additional tool for assessing the quality of life of cataract patients, this study aimed to determine the validity and reliability of the Filipino translation of the Catquest-9SF questionnaire. The goal was to measure patient-reported visual outcomes among Filipino cataract patients in a private tertiary hospital in Metro Manila using the Filipino translation of the Catquest-9SF questionnaire.

METHODOLOGY

Population and Sample

The study employed a prospective translation and validation study design. This included standard translation, cultural adaptation, and reliability testing using statistical analysis. The study population comprised ninety (90) individuals diagnosed with cataract at the outpatient clinic of a private tertiary hospital in the Philippines. This sample size was based on similar studies which employed Rasch analysis wherein polytomies (items with more than one choice as an answer) need at least ten (10) observations per category. In this case, a sample size of 90 was needed, because the questionnaire had nine (9) questions with five (5) choices each.[4] Study subjects included adults 50 years old and above, who were able to read and speak in conversational Tagalog (Filipino), had a best-corrected visual acuity worse or equal to 20/50 on both eyes, and were assessed to have some degree of cataract by an ophthalmologist based on the Lens Opacification Classification System (LOCS).

Methods

Translation of Questionnaire

The translation of the Catquest-9SF was done using the World Health Organization-Quality of Life (WHO-QOL) forward-backward-forward translation method. For the forward translation, the original English version of the Catquest-9SF[5] was translated into Tagalog (Filipino) by a professor of Filipino in a tertiary Philippine university and two junior ophthalmologists proficient in both English and Filipino. A senior ophthalmologist who was also proficient in both English and Filipino then reconciled the three versions done to come up with the first draft of the Filipino Catquest-9SF questionnaire. For the backward translation, another independent translator, who was an English professor in the same university and was proficient in both the Filipino and English languages,

translated the first draft in Filipino back into English. The two English versions were compared to see any major discrepancies that needed to be addressed. Revisions were then reflected in the second draft of the Filipino translation and was finalized by the same senior ophthalmologist who came up with the first draft. The second draft Filipino translation was pre-tested among five other ophthalmologists and five cataract patients to ensure that the items on the questionnaire could be adequately understood. Minor revisions resulting from the pre-testing were discussed and applied by the primary investigator and the senior ophthalmologist to come up with the final version of the Filipino Catquest-9SF. The study, including the final protocol, informed consent, and patient information sheet, was approved by the Institutional Review Board. Further revisions prior to the commencement of the study were properly reported.

Data Collection

Convenience sampling was done, recruiting individual patients who, on a particular day, visited the outpatient clinic of the Eye and Vision Institute of The Medical City (a tertiary hospital in Pasig City in Metro Manila). The study procedures were explained to all eligible subjects and those who gave consent to participate in the study were given the final translated Filipino version of the Catquest-9SF questionnaire by the primary investigator. Each participant was given around ten (10) minutes to answer the questionnaire. The ophthalmology resident, medical intern, or patient's companion were allowed to read the questions loudly and subjects were also given extra time to answer all nine questions if deemed necessary due to poor visual acuity. Data gathered by the investigator were encoded in a computerized table formatted for Rasch analysis.

Analysis

The corresponding answers of each item in the Filipino version of the Catquest-9SF were recorded and tallied using an online spreadsheet while the age and sex of the participants were tallied in a separate sheet for further analysis. The data were analyzed using WINSTEPS (current version: 3.73 August 2022, Oregon, USA)[6] to determine the reliability and validity of the Filipino version of the questionnaire. The Rasch model is a psychometric method widely used in the development of a new questionnaire that converts ordinal rating scale observations to linear measures and links how patients respond to certain questions using various measurement models. The polytomous Andrich rating scale model was applied using the same software.

The Filipino version of the Catquest-9SF was assessed for response category ordering, item fit statistics, analysis of its components, item differential, and precision. Several components were used to assess the validity of the questionnaire. These included the Person Separation Index (PSI), Person-item Map (PiM), Infit and Outfit Show Mean Square (MNSQ), Principal Component Analysis (PCA), and Differential Item Functioning (DIF). PSI tests if the questionnaire was able to distinguish samples in different levels, while PiM represents how well the items targeted the abilities of the study participants. MNSQ for item and person parameters test the model fit, and PCA measures unidimensionality. Unidimensionality ensures that the translated Catquest-9SF measures only a single construct, which in this case was the visual disability outcome of the subjects being tested. Finally, DIF ascertains whether the items performed differently in various subgroups. The following are the acceptable values of the various components to ensure the reliability and validity of the questionnaire[7]:

Component	Purpose	Acceptable values / range of values
Person Separation Index (PSI)	*Determines precision of the questionnaire*	Person: separation >2.00, reliability >0.8 Item: separation >2.00, reliability >0.8
Person-item Map (PiM)	*Shows how well the items target the ability of the respondents*	<1.00 logits between person and item measure
Infit and Outfit Show Mean Square (MNSQ)	*Checks if there are items that are not a good fit compared to the rest (misfit)*	Infit: 0.50-1.50 Outfit: 0.50-1.50
Principal Component Analysis (PCA)	*Assesses whether only a single construct is being tested*	<2 eigenvalue units for all choice components
Differential Item Functioning (DIF)	*Evaluates performance of the tool in various subgroups*	≥ 0.64 logits

RESULTS

After employing the WHO-QOL forward-backward-forward method, the final version of the Tagalog (Filipino) Catquest-9SF was produced (Appendix 2). This was then administered to a total of ninety (90) participants who were all diagnosed with cataract on both eyes from the outpatient clinic of The Medical City Eye and Vision Institute, Pasig City, Metro Manila, Philippines

There were more patients aged 66 years old and above (53.3%), and there were slightly more females (64.4%) than males. Among right eyes and left eyes, 73.3% and 64.4%, respectively, had, visual acuity of 20/63 or better. LOCS score of >5 (after adding the values for nuclear, cortical, and posterior subcapsular cataract) was more common in this sample for both the right (66.7%) and left (60.0%) eyes, indicating significant morbidity for cataract (Table 1).

Table 1. Profile of Patients

CHARACTERISTICS	CATEGORIES	COUNT	PERCENTAGE
Age	50 to 65 years old	42	46.7
	66 years old and above	48	53.3
Sex	Male	32	35.6
	Female	58	64.4
Hypertension	Without	41	45.6
	With	49	54.4
Diabetes Mellitus	Without	70	77.8
	With	20	22.2
VA OD Binary	Below 20/63	24	26.7
	20/63 or better	66	73.3
VA OS Binary	Below 20/63	32	35.6
	20/63 or better	58	64.4
LOCS Score OD Binary	≤ 5	30	33.3
	> 5	60	66.7
LOCS Score OS Binary	≤ 5	36	40.0
	> 5	54	60.0

The Person Separation Index analysis revealed separation of 3.66 and reliability of 0.93 for person, and separation of 2.31 and reliability of 0.84 for item (Table 2). The high separation (>2) and reliability (>0.8) results for person indicated that the questionnaire was sensitive enough to distinguish between high and low performers, while the high results for item meant that the questionnaire was sensitive enough to distinguish degrees of difficulty among the items. Furthermore, the mean person measure was 1.25 logits (real SE = 0.84) while the mean item measure was 0.00 logits (real SE = 0.25). The difference between the two was 1.25, indicating significant mistargeting. This was also demonstrated in the Person-Item Map (Figure 1), where question 2 seemed to be slightly different from the rest of the questions.

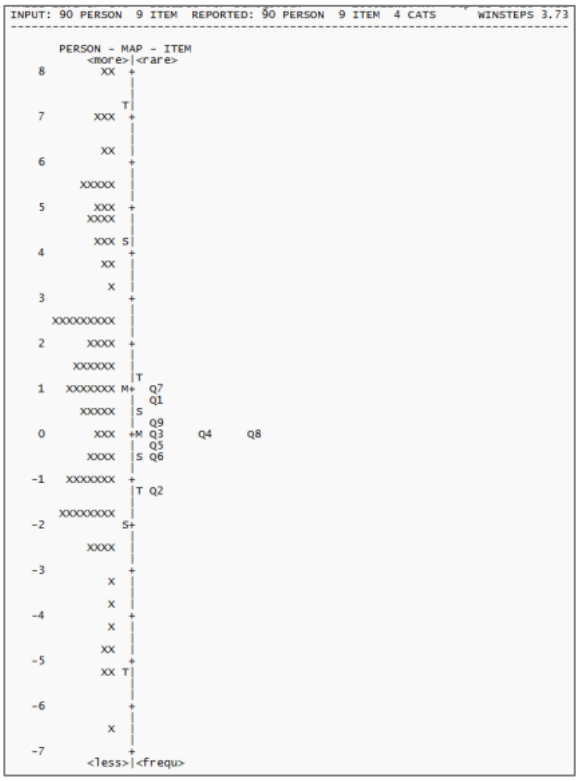

Figure 1. Person-Item Map (PiM)
*generated from WINSTEPS *(Current Version: 3.73 August 2022, Oregon, USA)*[4]

All nine questions showed good fit statistics (Infit and Outfit MNSQ) falling within the thresholds of 0.50 to 1.50 (Table 3). The Rasch dimension accounted for 68.2% of the raw variance in the data (Table 4), which was above the minimum acceptable value of 50%. The amount of unexplained variance was less than half of the explained variance (9.0 vs 19.3). Furthermore, Principal Components Analysis (PCA) testing revealed that the unexplained variance explained by the first, second, third, fourth, and fifth contrasts (e.g., the choices in the questionnaire from least to most desired) were 1.9, 1.5, 1.2, 1.1, and 0.9 eigenvalue units, respectively. All the contrasts had eigenvalues of less than 2, further indicating unidimensionality. In terms of Differential Item Functioning (DIF) (Table 5), a moderate to large differential function for sex (≥ 0.64 logits) was seen in Question No. 6 (difficulty walking on uneven surfaces), as it had DIF of 1.00 logit and p-value < 0.05.

Table 2. Reliability Parameters

PERSON	90	**INPUT**	90	**MEASURED**		**INFIT**		**OUTFIT**	
	TOTAL	***COUNT***		***MEASURE***	***REAL SE***	***MNSQ***	***ZSTD***	***MNSQ***	***ZSTD***
MEAN	24.6	9.0		1.25	0.84	0.97	0.0	0.96	–0.1
S.D.	6.0	0.0		3.28	0.21	0.57	1.2	0.61	1.2
REAL RMSE	0.86	**TRUE SD**	3.16	**SEPARATION** 3.66		**PERSON RELIABILITY** 0.93			
ITEM	9	**INPUT**	9	**MEASURED**		**INFIT**		**OUTFIT**	
	TOTAL	***COUNT***		***MEASURE***	***REAL SE***	***MNSQ***	***ZSTD***	***MNSQ***	***ZSTD***
MEAN	245.9	90.0		0.00	0.25	0.99	–0.1	0.96	–0.3
S.D.	11.0	0.0		0.62	0.01	0.20	1.4	0.20	1.2
REAL RMSE	0.25	**TRUE SD**	0.57	**SEPARATION** 2.31		**ITEM RELIABILITY** 0.84			

SE = standard error
MNSQ = mean square; ZSTD = standardized fit statistic
There is high reliability for person (sensitive enough to distinguish between high and low performers)
There is high reliability for item (sensitive enough to distinguish degree of difficulty of activities)

Table 3. Infit and Outfit Statistics (MNSQ)

ENTRY NO.	**TOTAL SCORE**	**TOTAL COUNT**	**MEASURE**	**MOD. S.E.**	**INFIT**		**OUTFIT**		**PT MEASURE**		**EXACT MATCH**		**ITEM**
					MNSQ	*ZSTD*	*MNSQ*	*ZSTD*	*CORR.*	*EXP*	*OBS %*	*EXP %*	
1	234	90	0.67	0.24	1.33	2.1	1.24	1.3	A 0.83	0.83	62.5	71.6	Q1
4	246	90	0.00	0.24	1.24	1.6	1.23	1.3	B 0.80	0.83	68.2	72.2	Q4
2	268	90	-1.26	0.24	1.11	0.7	1.06	0.4	C 0.76	0.82	70.5	74.1	Q2
6	254	90	-0.45	0.24	1.00	0.1	1.07	0.5	D 0.86	0.83	71.6	73.1	Q6
5	250	90	-0.23	0.24	1.00	0.1	0.94	-0.3	E 0.81	0.83	71.6	72.4	Q5
8	247	90	-0.06	0.24	0.97	-0.2	0.95	-0.3	d 0.81	0.83	78.4	72.2	Q8
7	227	90	1.06	0.24	0.79	-1.5	0.73	-1.7	c 0.88	0.83	77.3	72.7	Q7
3	244	90	0.11	0.24	0.78	-1.6	0.71	-1.8	b 0.89	0.83	72.7	72.0	Q3
9	243	90	0.16	0.24	0.73	-2.1	0.70	-1.9	a 0.85	0.83	78.4	71.8	Q9
MEAN	245.9	90.0	0.00	0.24	0.99	-0.1	0.96	-0.3			72.3	72.5	
S.D.	11.0	0.0	0.62	0.00	0.20	1.4	0.20	1.2			4.9	0.7	

SE = standard error; MNSQ = mean square; ZSTD = standardized fit statistic; EXP = expected; OBS = observed
All questions had good fit statistics falling within the threshold (0.50 - 1.50)

Table 4. Unidimensionality (PCA)

Table of Standardized Residual Variance (in eigenvalue units)				
	Empirical			**Modeled**
Total raw variance in observations	28.3	100%		100%
Raw variance explained by measures	19.3	68.2%		68.0%
Raw variance explained by persons	16.9	59.6%		59.5%
Raw variance explained by items	2.4	8.5%		8.5%
Raw unexplained variance (total)	9.0	31.8%	100%	32.0%
Unexplained variance in 1st contrast	1.9	6.6%	20.7%	
Unexplained variance in 2nd contrast	1.5	5.3%	16.7%	
Unexplained variance in 3rd contrast	1.2	4.3%	13.5%	
Unexplained variance in 4th contrast	1.1	3.9%	12.1%	
Unexplained variance in 5th contrast	0.9	3.1%	9.9%	

All contrasts have eigenvalues of less than 2, indicating unidimensionality
Rasch dimension explains 68.2% of variance in the data (above the minimum accepted threshold of 50%)

Table 5. Differential Item Functioning (DIF)

Difference in logits (DIF Contrast)				
Item	Age (≤65 vs >65)**	Sex (Male vs Female)	LOCS score OD (≤5 vs >5)**	LOCS score OS (≤5 vs ≥5)**
Q1	0.53	–0.73	0.22	–0.50
Q2	0.00	–0.20	–0.59	–1.07
Q3	–0.05	0.12	0.55	–0.06
Q4	–0.30	0.03	–0.02	0.84
Q5	–0.57	–0.58	0.06	0.98
Q6	0.53	1.00*	0.91	0.41
Q7	0.05	0.70	–0.36	0.28
Q8	–0.20	–0.11	–0.44	–0.71
Q9	0.07	–0.21	–0.29	–0.15
*Mantel Chi-Square p-value <0.05				
**Mantel Chi-Square *p*-values >0.05				

There is a moderate to large differential functioning for sex (males vs females) in question number 6 (walking on uneven surface)

DISCUSSION

Rasch analysis on the Tagalog (Filipino) translation of the Catquest 9-SF Questionnaire revealed that the said tool demonstrated good reliability, validity, and unidimensionality in terms of assessing the visual function and quality of life of Filipino patients with cataract. However, there were some thresholds in particular components in the Rasch analysis that were exceeded, indicating that the translated version can be improved further to make it more valid in assessing its target subjects.

The Tagalog translation of the Catquest 9-SF showed high reliability based on the Person Separation Index (PSI). The results of separation and reliability were in the acceptable range (separation >2, reliability >0.8) for both person and item, meaning the questionnaire was sensitive enough to distinguish between high and low performers for its target subjects. It was able to separate respondents generally into four distinct groups (person separation = 3.66), and the items had about two types of difficulty (item separation = 2.31), enabling it to assess different strata of patient abilities depending on their visual limitations.

The Person-item Map (PiM) showed a 1.5 difference between the mean person and mean item measures, which exceeded the acceptable range of <0.5. This could be explained by the fact that the subjects in the study were patients with cataract in both eyes, who may thus have worse visual potential, and therefore exhibit a big discrepancy in terms of the cohort's score in performing easier tasks. Moreover, it means that some of the activities mentioned in the different items might be easy enough for patients, whether their visual morbidity due to cataract is moderate or severe. This is one component of the questionnaire that can be improved in future validity and reliability studies of this version of the Catquest-9SF. The wording or syntax of specific activities can be modified, particularly in Questions 7 (activities using hands) and 9 (hobbies and interests). The Show Mean Square analysis for both infit and outfit categories yielded results within the range 0.5 to 1.5, indicating that the expected results from those who answered the Tagalog version of the questionnaire were neither too predictable (<0.5) nor too unpredictable (>1.5). This finding was further strengthened by the Principal Component Analysis (PCA) which revealed eigenvalue units of <2 across all contrasts, indicating that the Tagalog version of the Catquest-9SF showed unidimensionality and tested only a single construct

Differential Item Functioning (DIF) showed that most of the items performed similarly across different gender and age groups of patients, except for Question 6 (walking on uneven ground) which showed dissimilar behavior among males and females. This same result was also exhibited in a similar study on the revised Swedish translation of the questionnaire.[1]

In general, the Tagalog (Filipino) version of the Catquest 9-SF was able to separate persons by visual disability based on the level of difficulty in performing the specified activities. The results also showed that the questions were aligned with each other. The Tagalog version was at par in terms of reliability and validity in almost all aspects of the Rasch model, similar to results of other translations, like the Chinese version by Lin et al.[6] and the Malay version by Adnan et al.[9] Although specific components were not achieved by this current version, particularly in the tests for validity, similar results were seen in the development of translations of the Catquest-9SF in other languages, which have subsequently gone through further revisions to make them more appropriate in their respective settings.

As it is, this version of the Tagalog Catquest-9SF can be further tested by comparing the pre-operative scores with the post-operative scores of the patients after undergoing cataract surgery. Some

of the translation studies employed this methodology and improved their respective versions of the Catquest-9SF even more. Furthermore, this new version of the Catquest-9SF can be tested in subjects across the entire socio-economic spectrum by administering it to patients in private practices, public hospitals, and in the community ophthalmology setting. With further testing and validation, the questionnaire may become an objective metric in terms of assessing and improving health outcomes for cataract patients.

The translated Tagalog version of the Catquest-9SF showed good psychometric characteristics, making it an acceptable tool which can be used to assess the patient reported outcomes of Filipino cataract patients.

The translation of the Catquest-9SF from English to Tagalog can be further improved by employing professional bilingual English-Tagalog translators, following the methodology of Adnan et al.[9] The improved version can be tested on a larger population, and on a wider spectrum of cataract patients from different socio-economic groups. The questionnaire can be administered to cataract patients before and after surgery, and pre- and post-operative scores can be compared. The translated questionnaire can also be administered to patients from various geographical regions to further test its reliability and validity, as well as to assess the need for further translation into other Philippine languages.

REFERENCES

1. Lundström M, Pesudovs K. Catquest-9SF patient outcomes questionnaire: nine-item short-form Rasch-scaled revision of the Catquest questionnaire. *J Cataract Refract Surg*. 2009 Mar; 35(3): 504-513.
2. Xu Z, Wu S, Li W, *et al*. The Chinese Catquest-9SF: validation and application in community screenings. *BMC Ophthalmol*. 2018 Mar 20; 18(1): 77. doi: 10.1186/s12886-018-0743-0.
3. Schlenker MB, Minotti SC, Kabanovski A, *et al*. Catquest-9SF questionnaire and eCAPS: Validation in a Canadian population. *PLoS One*. 2020 Sep 25; 15(9): e0237788. doi: 10.1371/journal.pone.0237788.
4. Linacre JM. Optimizing rating scale category effectiveness. *J Appl Meas*. 2002; 3(1): 85-106.
5. Lundström M, Kugelberg M, Montan P, *et al*. Catquest-9SF functioning over a decade - a study from the Swedish National Cataract Register. *Eye Vis (Lond)*. 2020 Dec 1; 7(1): 56. doi: 10.1186/s40662-020-00220-4.
6. Lin X, Li M, Wang M, *et al*. Validation of Catquest-9SF questionnaire in a Chinese cataract population. *PLoS One*. 2014 Aug 1; 9(8): e103860. doi: 10.1371/journal.pone.0103860.
7. Lundström M, Manning S, Barry P, *et al*. The European registry of quality outcomes for cataract and refractive surgery (EUREQUO): a database study of trends in volumes, surgical techniques and outcomes of refractive surgery. *Eye Vis (Lond)*. 2015 Apr 30; 2: 8. doi: 10.1186/s40662-015-0019-1.
8. Lundström M, Pesudovs K. Questionnaires for measuring cataract surgery outcomes. *J Cataract Refract Surg*. 2011 May; 37(5): 945-959.
9. Adnan TH, Mohamed Apandi M, Kamaruddin H, *et al*. Catquest-9SF questionnaire: validation of Malay and Chinese-language versions using Rasch analysis. *Health Qual Life Outcomes*. 2018 Jan 5; 16(1): 5. doi: 10.1186/s12955-017-0833-3.