



Translation and Cultural Adaptation of Multi-Attribute Utility Instrument (MAUI) Indonesian Version of the 15D Questionnaire

Dian Parwati¹, Libriansyah², Gesnita Nugraheni³, Yunita Nita^{3*}

¹Master Program of Pharmaceutical Science, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia

²Department of Internal Medicine, Dr. Ramelan Navy Hospital, Surabaya, Indonesia

³Department of Pharmacy Practice, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia

*Corresponding author: yunita-n@ff.unair.ac.id

Submitted: 8 August 2022

Revised: 28 November 2022

Accepted: 7 January 2023

Abstract

Background: Diabetes mellitus is a chronic metabolic disorder that cannot be cured and progressively develop into a complication affecting the patient's health-related quality of life (HRQoL). The utility is a measure of preference-based HRQoL. Indirect utility measurements can be measured using the Multi-Attribute Utility Instrument (MAUI) instrument, one of which is the 15D questionnaire that has never been translated and adapted culturally in Indonesian. **Objective:** Translating and culturally adapting the 15D questionnaire to Indonesian diabetes mellitus patients. **Methods:** The translation process was carried out through the stages of forward translation, reconciliation, and backward translation involving two qualified translators and three experts in their field. The pilot test stage involved eight respondents consisting of 6 diabetes mellitus patients and two healthy individuals. **Results:** Problems in the linguistic validation process led to more conformity of word equivalents from the original to the target language. The agreement found was in the area of semantic equivalence, idiomatic equivalence, and experiential equivalence. The problem was resolved by reconciliation during the Focus Group Discussion, which translators and experts in their field attended and discussed with the original author to get equality of meaning in terms of language and culture. The Indonesian version of the 15D questionnaire tested on eight respondents showed results that were easy to understand and straightforward. **Conclusion:** The Indonesian version of the 15D questionnaire is valid from the linguistic and cultural adaptation stage. Further research is needed relating to the validation and reliability of the questionnaire.

Keywords: 15D, backward translation, cultural adaptation, diabetes mellitus, forward translation

How to cite this article:

Parwati, D., Libriansyah, Nugraheni, G. & Nita, Y. (2023). Translation and Cultural Adaptation of Multi-Attribute Utility Instrument (MAUI) Indonesian Version of the 15D Questionnaire. *Jurnal Farmasi dan Ilmu Kefarmasian Indonesia*, 10(2), 162-172. <http://doi.org/10.20473/jfiki.v10i22023.162-172>

INTRODUCTION

Diabetes Mellitus is a chronic condition in which there is an increase in blood glucose levels caused by the inability of the body to produce sufficient insulin or insulin not working effectively. According to data from the International Diabetes Federation (IDF) in 2019, approximately 10% of the population has type 1 diabetes. In contrast to type 1 diabetes, type 2 diabetes is the most prevalent type of diabetes in the community, with a population of approximately 90%. Type 2 diabetes is caused by insulin resistance in muscles and the liver, and damage to pancreatic beta cells (Perkeni, 2019).

Diabetes mellitus is common in almost every part of the world. The countries with the highest number of diabetics, according to the International Diabetes Federation (IDF) in 2019 are China at 116.4 million, India at 77 million, the United States at 31 million, Brazil at 16.8 million, Mexico at 12.8 million, and Indonesia is in seventh place as many as 10.7 million. By region, the countries with the highest number of people with diabetes were North America (11%), Middle East and North Africa (10.8%), Southeast Asia (10.1%), Western Pacific (8.6%), and Central America (7.6%).

In Indonesia, the prevalence of diabetes mellitus diagnosed by a doctor by age > 15 years from to 2013-2018 was 2%. The prevalence of diabetes mellitus in East Java among residents aged > 15 years from to 2013-2018 was 2.6% (Silver *et al.*, 2018)

Diabetes mellitus (DM) is an incurable chronic metabolic disorder that can progressively become a complication. High blood glucose levels can cause vascular damage, affecting the heart, eyes, kidneys, and nerves (Cho *et al.*, 2017). Complications of diabetes can undoubtedly affect a patient's utility. Utility is a value that indicates a preference (chosen by a person) that reflects health conditions such as physical, mental, and social functions related to the weight of judgment. The best health condition was established with a value of 1.0, and mortality was characterized by a value of 0.0 (Rascati *et al.*, 2013).

Direct and indirect measurements can be used to obtain utility values. Direct measurement using the time trade-off (TTO) method, standard gamble (SG) method, and Rating Scale (RS) method. Indirect utility can be measured using a Multi-Attribute Utility Instrument (MAUI). The instruments used were EQ-5D, SF-6D, HUI, AQOL, QWB, and 15D (Brazier *et al.*, 2017). The Multi-Attribute Utility Instrument (MAUI) has been widely developed and adapted to various languages

worldwide, including the 15D versions of the Turkish questionnaire, the 15D version of the Japanese questionnaire and the 15D version of the Greek questionnaire. Generic instruments translated into Indonesians and made cultural adaptations were EQ-5D, SF-6D, and QWB.

The 15D questionnaire has the most detailed dimensions among all types of MAUI (Richardson *et al.*, 2011). Key measurements include mobility, vision, hearing, breathing, sleep, eating, speech, elimination, daily activities, mental function, discomfort and symptoms, depression, anxiety, vitality, and sexual activity (Sintonen, 2001). The questionnaire also has better sensitivity for diabetic patients with complications of Chronic Kidney Disease and Diabetic Retinopathy than the EQ-5D and SF-6D questionnaires (Kontodimopoulos *et al.*, 2012).

The 15D questionnaire, developed by Harri Sintonen in Finland, measures the perceived health condition of individuals developed by Harri Sintonen in Finland (Sintonen, 2001). In addition to the 15D questionnaire, there were 16D and 17D questionnaires. In contrast to the 15D questionnaire, the 16D questionnaire is aimed at adolescents aged 12-15 and covers 16 domains. The 17D questionnaire is aimed at children aged 8-11 years and covers 17 domains. The utility value generated by the 15D questionnaire can be helpful in pharmaco-economic studies in determining the outcome of Cost-Utility Analysis, measuring and monitoring the patient's health status, and assisting medical decision-making by identifying the patient's health problems (as a diagnostic tool) and setting spending goals for hospitals or clinics. This 15D profile can be used for drug evaluation, surgical treatment, and rehabilitation. The assessment system is based on the application of multi-attribute utility theory. This instrument can convert health status into estimated utility values (1= perfectly healthy to 0=death) using a set of preferences based on the population or utility weight (Sintonen, 2021).

Questionnaire 15D has never been translated and culturally adapted for diabetic patients in Indonesia. The translation and cultural adaptation process is needed to reduce the possibility of bias due to cultural differences and to obtain the same understanding between the original questionnaire and the Indonesian version of the 15D questionnaire. The above description encourages translational research, cultural adaptation, and validation of the Indonesian version of the 15D questionnaire.

MATERIALS AND METHODS

The linguistic validation of the questionnaire was conducted using international standards. There were two stages: The first stage was the translation process. The second stage was a pilot test or a respondent’s test. The results of each stage are reported and discussed with the original authors. The 15D questionnaire used in this study received permission and license from the original author.

Phase I forward translation

This stage was completed by two translators from the Airlangga University Language Center who translated the original (English) questionnaire into the target (Indonesian) language. One of the translators was a professional translator who taught TOEFL/IELTS and Indonesian for Foreign Speakers (BIPA). The other is a professional translator and proofreader for Airlangga University’s scientific literature on English. Both are Indonesian natives who live in Indonesia and speak both Indonesian and English fluently. The translator does not have a background in medicine, but has received explanations and guidance before beginning the forward translation process.

The goal was to produce a simple, clear, and understandable translation, without changing the meaning of the original language (English). Each translator had never heard of the 15D questionnaire and had worked independently or separately. Following the completion of each questionnaire, three experts in the field, one internal medicine specialist with expertise in endocrine, metabolic, and diabetes, two experts in questionnaire development and pharmacy practice, and two translators from the Airlangga University Language Center convened a meeting or Focus Group Discussion to reconcile or create an overview containing details of the translation reversals.

The report was initially emailed to the original author, along with the translator’s name, qualifications, and/or experience, and the reconciliation results in English. Furthermore, the original author researched the report to step it up later. The original author of the questionnaire provided feedback to the researcher through comments or suggestions during the work process, and the researcher resubmitted the reconciliation results to obtain a final result.

The series of forward translation processes are shown in Figure 1.

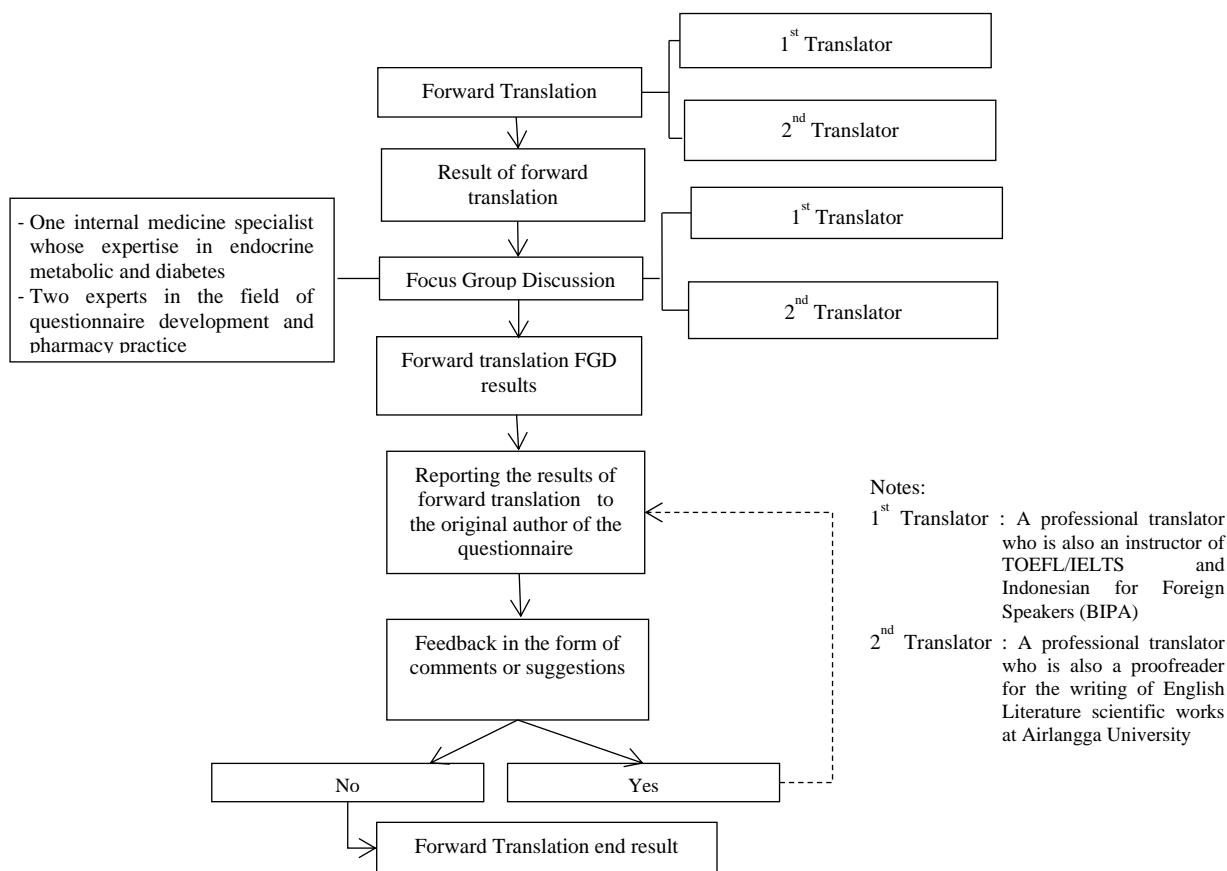


Figure 1. A series of forward translation processes

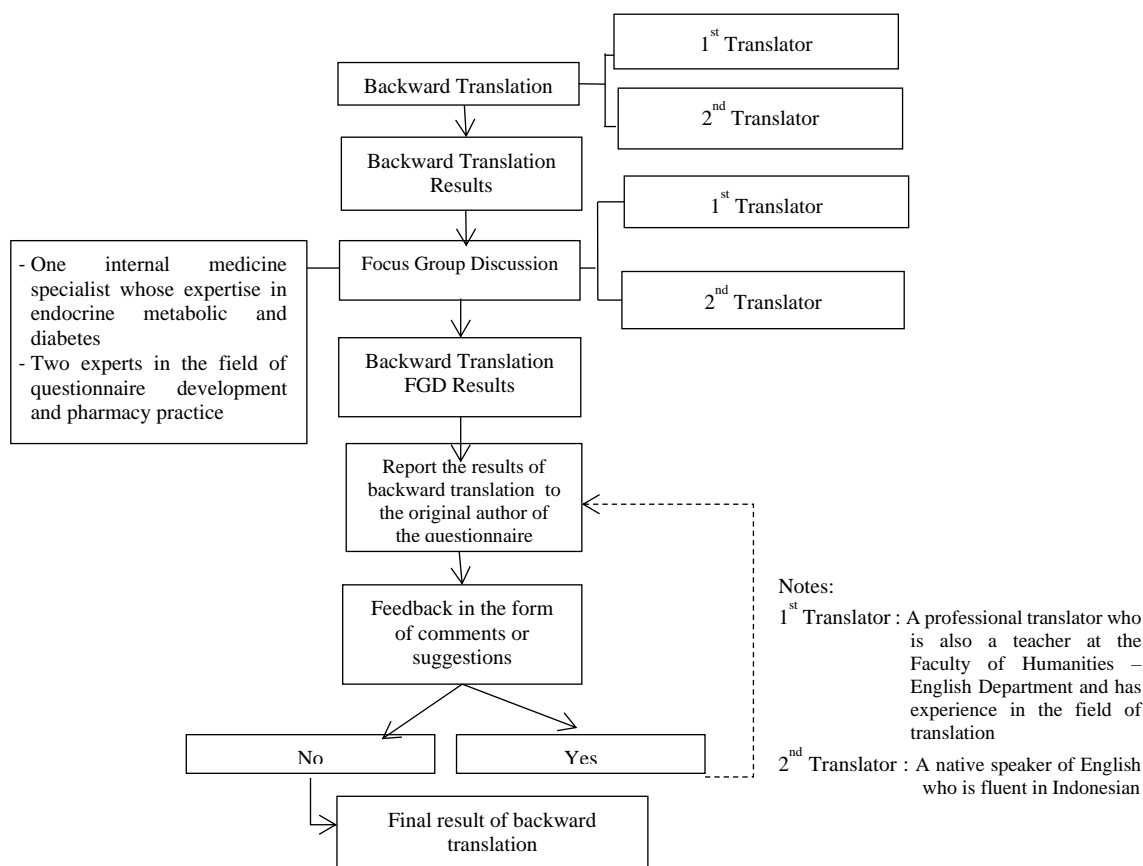


Figure 2. Backward Translation process sequence

Phase II backward translation

Two independent translators translated the Indonesian version of the 15D questionnaire, which was reconciled and then translated back into English. One translator is a professional translator who is also a teacher at the Faculty of Humanities – English Department—and has experience in translation. The other translator was a native English speaker fluent in Indonesian.

The translator then compared the backward translation results with the original version of the questionnaire. A meeting was held in the Focus Group Discussion, in which experts in the field attended to reconcile or create an overview containing details of the differences from the results of the translation, pay attention to the word structure, note the difficulties encountered, and seek the suitability of a simple language so that it has a conformity of meaning between Indonesian and English.

The reconciliation results in English were then emailed to the original author for review and permission to continue the pilot test phase. In the work process, the original author of the questionnaire provided feedback in the form of comments and suggestions. The

reconciliation results were resubmitted for the final results. The sequence of the backward translation process is shown in Figure 2.

Phase III pilot test or respondent test

Following permission from the original authors of the 15D questionnaire, a pilot test or respondent test was conducted in which the questionnaire was tested on eight fluent Indonesian respondents. Among those who responded, were patients and healthy people who had never heard of the 15D questionnaire. This pilot test aimed to assess the clarity and comprehension of meaning between the native language and target language..

The trial involved eight participants who completed the questionnaire and interviews. The sample size was eight respondents because it referred to the original author's guidelines and the ISPOR guidelines. The respondents signed informed consent forms and completed persuasion and demographic data sheets. The interviews were recorded, and a summary of demographic information was sent to the original author of the questionnaire. Figure 3 shows the sequence of the pilot test process.

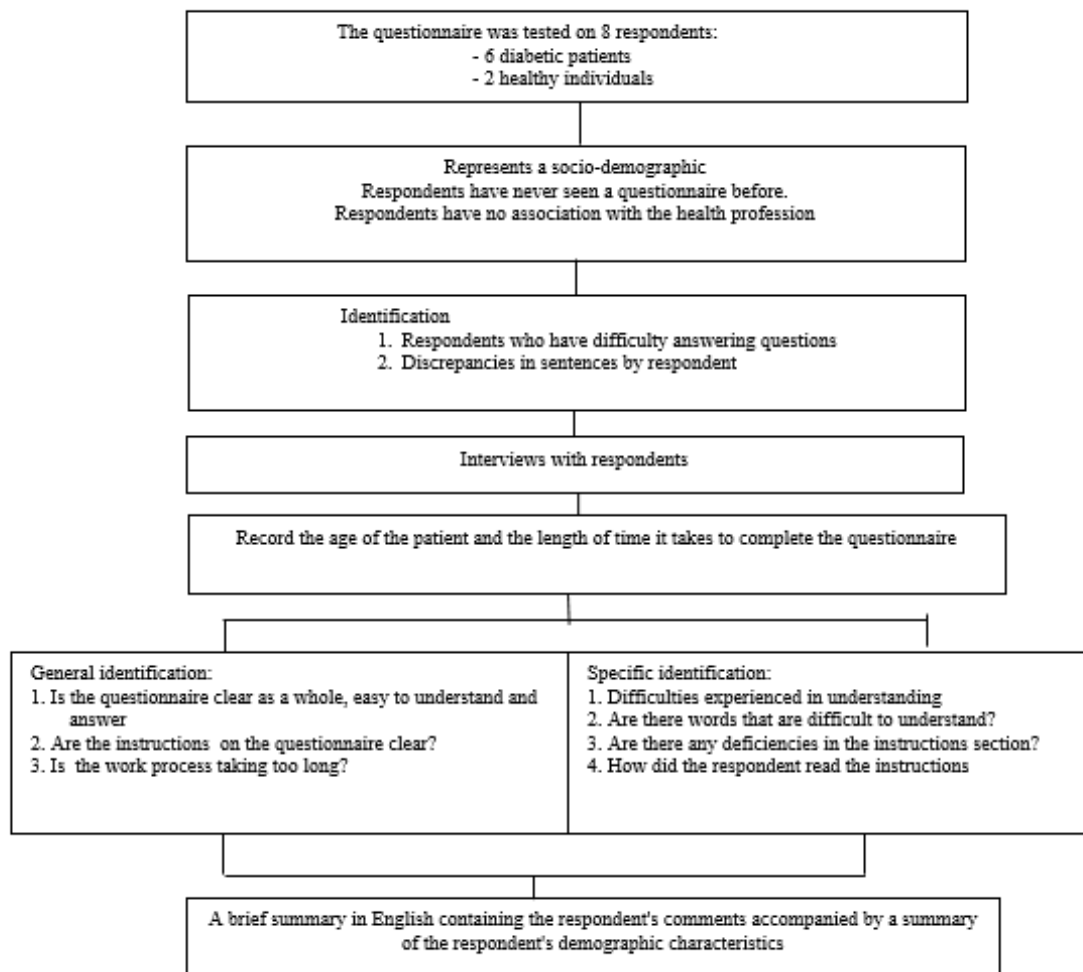


Figure 3. The pilot test process sequence

Ethics committee approval

This study was approved by the Health Research Ethics Committee, Faculty of Pharmacy, Universitas Airlangga (No.21/LE/2022).

RESULTS AND DISCUSSION

Forward translation

In translating health-related questionnaires into the target language, it is essential to ensure conformity of meaning between the words of the original language and the target language (Arnold *et al.*, 2005). some problems and actions taken during the translation and cultural adaptation of the Indonesian version of the 15D questionnaire are described in Table 1.

The selection of translators and expert panels was essential in, producing clear, simple translations of words and sentences that follow the original questionnaire's meaning. In the process of forward

translation of the 15D questionnaire to Turkish, three native Turkish people fluent in Turkish and a panel of experts were selected from a 40 years old female doctor and a 40 years old male health service administrator (Akinci *et al.*, 2005). One example of the result of changing the word 'I have moderate problems with sleeping (e.g., disturbed sleep or feeling I have not slept enough)' was changed to 'I have moderate problems like I have felt that my sleep is disturbed and I have not slept enough' (Akinci *et al.*, 2005).

In the process of forward translation of the 15D questionnaire to Japanese, a panel of experts selected three men and one native Japanese person, each professing as an epidemiologist, health economist, and public health expert (Okamoto *et al.*, 2013). However, this is not explained by the results of the forward translation.

Table 1. Problems and solutions of the forward translation process and cultural adaptation to Indonesian

Item	Original Version	Issues	Actions	Area
Instruction	<i>Please read through all the alternative responses to each question before placing a cross (x) against the alternative which best describes your present health status.</i>	Based on the content of the questionnaire, it does not describe "question" so the word "problem" is preferred.	The word "question" is translated into Indonesian as "question" and the addition of the word "statement" or "statement" after the word <i>alternative</i> .	Semantic
Statement 1 part 1	<i>I am able to walk normally (without difficulty) indoors, outdoors, and on stairs.</i>	The use of the word "stairs" is more about the meaning of "stairs", while "climb stairs" is more about "climbing stairs".	The word "climbing stairs" or "climbing stairs" is chosen because it is more following the meaning of the word "stairs" in Indonesian.	Experiential
Statement 4 part 4	<i>I get shortness of breath even after light activity, e.g. washing or dressing myself.</i>	The word "washing" in Indonesia is not a light activity	In the opinion of the original author of the questionnaire, if the word "washing" is difficult to translate in Indonesian, it can be ignored as an example of light activity	Experiential
Statement 5 part 5	<i>I suffer severe sleeplessness, e.g. sleep is almost impossible even with full use of sleeping pills or staying awake most of the night.</i>	The word "full use" is defined by the translator as the frequency or routine of taking the drug.	The word "maximum dose" or "full use" was chosen according to the original author's explanation of the questionnaire.	Semantic
Statement 7 part 3	<i>I can make myself understood, but my speech is e.g. disjointed, faltering, stuttering or stammering.</i>	The words "stuttering" and "summering" have almost the same meaning; it is recommended to use one of them.	The words "stuttering" and "summering" are interpreted as "pausing."	Semantic
Statement 8 part 4	<i>I have serious problems with my bladder and/or bowel function, e.g. routine "accidents" or need of catheterization or enemas.</i>	The word "catheterization" or "enemas" may not be understood by ordinary people.	The word "catheterization" is interpreted as "kateterisasi" or "enemas" is interpreted as "enema" even though ordinary people do not understand it.	Semantic
Statement 10 part 2	<i>I have little difficulty in thinking clearly and logically, or my memory sometimes fails me.</i>	The sentence "my memory sometimes fails me" is a metaphor that is difficult to find matches for words in Indonesian	Used the word "sometimes interrupted" or "sometimes impaired" to replace "sometimes fails me."	Idiomatic

Backward translation

The English version of the 15D translation and adaptation process was translated into Turkish through translation, cultural adaptation, validation, and reliability (Akinci *et al.*, 2005). In the backward

translation process, a research assistant was selected at the law faculty of a university who was also a *native speaker* because he was a native English speaker and a 36 years old male Turkish health service researcher.

Similar to the Indonesian version of the 15D questionnaire, several changes were made to resolve these problems. Some sentence arrangements have been changed from the original language to produce meaningful and easy sentences for Turks to understand (Akinçi *et al.*, 2005). Some of these problems are listed in Table 2.

Pilot test

The questionnaire was tested on a small sample to see if there were still some things missing from each item, and if respondents could provide responses and suggestions after reading the questionnaire. A 15D pilot test of the Indonesian version of the questionnaire was conducted on eight respondents. Respondent characteristics were obtained as described in the table. The following are the reasons for selecting diabetes

patients and healthy people. First, refer to the original author's guidelines and the ISPOR guidelines for translation and cultural adaptation, where the goal of the pilot test is to ensure comprehension of each sentence regarding the perceived health condition. Second, because the 15D questionnaire is a comprehensive generic instrument, the questions were not limited to diabetes mellitus. Third, subject selection seeks to determine the utility range. The best health condition is assigned a value of one, whereas death is assigned a value of zero (Rascati *et al.*, 2013). The utility value of healthy people is greater than that of patients (Pea-Longobardo *et al.*, 2017). The respondents' data obtained were grouped according to the type of respondent's demographic data, as described in Table 4.

Table 2. Problems and completion of the backward translation process and cultural adaptation of the 15D questionnaire to Indonesian

Item	Original Version	Issues	Actions	Area
Statement 2 part 3	I am able to walk without help indoors (with or without an appliance), but outdoors and/or on stairs only with considerable difficulty or with help from others.	After being translated back to English, the word "sufficient" or "considerable" changed to "moderate difficulties", while according to the original author of the questionnaire, the word "moderate difficulties" had a lower severity than "considerable."	Revised the Indonesian translation so that it is in accordance with what the original version means to be "quite a lot."	Semantic
Statement 2 part 5	I can't see enough to walk about without a guide, which is I am almost or completely blind.	The word "I can't see clearly" " <i>I can't see enough</i> " has a different meaning than " <i>I cant see clearly.</i> "	Revised the Indonesian translation to match what the original version meant "I can't see well" or " <i>I can't see well enough.</i> "	Experiential
Statement 7 part 3	I can make myself understood, but my speech is, e.g. disjointed, faltering, stuttering or stammering.	The words "stuttering" and "stammering" have almost the same meaning as "pause."	The word "stammering" is deleted.	Semantic
Statement 15 part 1	My state of health has no adverse effect on my sexual activity.	The word " <i>adverse effect</i> " is changed to " <i>negative effect.</i> "	Revised the Indonesian translation "My health level does not have a negative effect on my sexual activity."	Semantic

Table 3. Characteristics of respondents on pilot test

Respondent	Age (years)	Gender	Patient	Work	Time to fill in 15D
P1	66	L	DM with Cardiovascular Disease	Teacher	4 minutes
P2	72	P	DM with Neuropathy	Housewife	5 minutes
P3	45	P	DM with Cardiovascular Disease	Housewife	6 minutes
P4	59	L	DM with Cardiovascular Disease	Civil servant	4 minutes
P5	70	P	DM with Retinopathy	Housewife	6 minutes
P6	38	L	Healthy individuals	SOE Officer	5 minutes
P7	63	P	DM with Nephropathy	Housewife	4 minutes
P8	31	L	Healthy individuals	SOE Officer	4 minutes
Mean age: 55.5 years					Mean: 4 minutes
Median age: 61					Median: 4 minutes

Note: P = female, L= male, DM= Diabetes Mellitus, SOE= State Owned Enterprise

Table 4. Demographic characteristics of respondents

No.	Description	n (%) [#]
1	Gender	
	Male	4 (50)
	Female	4 (50)
2	Age	
	26-35	1 (12.5)
	36-45	2 (25)
	46-55	0 (0)
	56-65	2 (25)
	>65	3 (37.5)
3	Work	
	Employed	4 (50)
	Unemployed	4 (50)
4	Highest education	
	Primary school	0 (0)
	Junior High School	1 (12.5)
	High School	3 (37.5)
	Bachelors degree	4 (50)
5	Health Conditions	
	Diabetes Mellitus	6 (75)
	Healthy Individuals	2 (25)

Notes:

*) Age grouping divided by the Ministry of Health of the Republic of Indonesia in 2009

#) Percentage (%): represents the number of patients divided by the total number of subjects (5) times 100%.

In the process of translating and culturally adapting the Japanese version of the 15D questionnaire, a pilot or respondent test was conducted on eight respondents with an age range of 44 to 75 years, consisting of four men and four women (not from the health profession) (Okamoto *et al.*, 2013). The same number of respondents were also shown in translating and cultural adaptation of the Turkish version of the 15D

questionnaire, pilot test or respondent test conducted by eight respondents consisting of four men and four women with an age range of 26 to 75 years. The female professionals included retired high school teachers, economists, homemakers, and housekeepers. Men work as porters, drivers, engineers, and university employees (Akinci *et al.*, 2005).

The problem encountered in the Turkish version of the 15D translation process is that cultural differences cause researchers to modify or change the sentence from the original language 'I have moderate problems with sleeping (for example, disturbed sleep or feeling I have not slept enough)' to 'I have moderate problems like I have feelings that my sleep is disturbed and I have not slept enough.'. In addition, the word 'depressed' does not have a suitable word equivalent in Turkish; the term 'depressed' indicates a state of bad mood and morale.

The 15D questionnaire was also translated into Romanian (Adina & Mihaela, 2021) through *forward-backwards translation* stages and pilot tests conducted on 25 respondents, comprising 15 cancer patients and ten healthy individuals. The problem is the difference in meaning when translated into the target language, as in Domain 1 point 4, which is 'I am able to walk indoors only with help from others'. Translated differently by the first and second translators. Thus, the action taken by combining the results of the translation into a simpler sentence but still in accordance with its original meaning is 'Pot să merg în casă doar cu ajutorul unei alte persoane'. The same problem in the translation process between the Indonesian version of the 15D questionnaire and the 15 Romanian version is in the 7 point 3 domain, the word 'stuttering or stammering' has

the same meaning. Because the translation results from the second translator are more complete, the action taken in the Romanian version of the 15D translation process was to use them. In the Indonesian version, the word "stammering" was deleted and only used the word "stuttering" was used on the recommendation of the original author. Data related to word clarity in the questionnaire are presented in Table 5.

Table 5 shows the respondents' identification of word clarity, while Table 6 shows an overview of the problems encountered and the solutions in a simple language, according to the meaning of the original version of the 15D questionnaire.

The Indonesian version of the 15D questionnaire can be helpful in pharmaco-economic studies and can be used to determine a patient's health condition. This study is the first to translate 15D, and a cultural adaptation was made to Indonesian using international standards, involving several experts in the field. The limitations of this study were that the selected patients had diabetes with complications only and healthy people. In the 15D Turkish version of the study, the respondents had diabetes without complications. In addition, the 15D questionnaire has not been validated and its reliability has not been verified. Therefore, further studies are warranted.

Table 5. Identification of the word clarity in the Indonesian version of 15 D questionnaire

No	Question	Yes n (%)
General Impression		
1	Is it globally clear, easy to understand, easy to answer?	8 (100)
2	Is it too long	0 (0)
3	Are the instructions clear?	8 (100)
Instruction in the 15D		
1	Did you have difficulty understanding the instructions?	8 (100)
2	Are there words that you find difficult to understand?	8 (100)
3	How would you have worded the instructions?	8 (100)
4	is there anything missing from the instructions?	8 (100)
Question		
1	Did you have difficulty understanding this question?	6 (75)
2	What does it mean for you?	6 (75)
3	How would you have worded the question?	4 (50)
4	Are the response choices clear and consistent with the question?	8 (100)

Table 6. Problems and solutions to the Indonesian version of the 15D questionnaire derived from the pilot test

No	Item	Original version	Issues	Suggestion	Actions
1	Statement 12 part 1	I do not feel at all sad, melancholic or depressed.	The word "melankolis" translate into easily carried away in the situation	No suggestion given	No changes, "melankolis" is still chosen because the meaning matches the English version
2	Statement 8 part 1	My bladder and bowel work normally and without problems	The word "normal tanpa masalah" have a similar meaning	Choose one	Revised into "kandung kemih dan usus saya bekerja tanpa masalah"
3	Statement 4 part 4	I get shortness of breath even after light activity, e.g. washing or dressing myself.	The word "Napas Pendek" was not a daily term used daily and felt uncommon	Change to "Sesak Napas"	No changes, "napas pendek" or "shortness of breath" is still chosen because the meaning matches the English version
4	Statement 10 part 5	I am permanently confused and disoriented in place and time	The word "kehilangan orientasi" was difficult to understand	Word "kehilangan pandangan" is more easily understood	No changes, "kehilangan orientasi" or "disoriented" is still chosen because the meaning matches the English version
5	Statement 5 part 2	I have slight problems with sleeping, e.g. difficulty in falling asleep, or sometimes at night	The word "saya sulit jatuh tertidur" was difficult to understand	Word "saya sulit tertidur" is more easily understood	No changes, "Saya sulit jatuh tertidur" or "difficulty in falling asleep" is still chosen because the meaning matches the English version
6	Statement 6 part 5	I am unable to eat at all, so I am fed either by tube or intravenously.	The word "Intravena" can not be understood by laypeople	No suggestion given	No changes, "intravena" or "intravenously" is still chosen because the meaning matches the English version

CONCLUSION

The Indonesian version of the 15D questionnaire has been validated linguistically, and cultural adaptation has been performed using international standard methods with the participation of experts in the field using predetermined criteria.

ACKNOWLEDGMENT

Thank Prof. Harri Sintonen for granting permission to complete the 15D questionnaire. We also thank all translators (Sidarta Prasetyo, Ahmad Fauzi Rohman, Salimah, and Retno Wulandari) and the team of experts in their field (Yunita Nita, Gesnita Nugraheni, and Libriansyah) who gave the best advice in this study.

AUTHOR CONTRIBUTIONS

Conceptualization, Y. N., L., D. P.; Software, Y. N., L., D. P.; Validation, Y. N., L., D. P.; Formal Analysis,

Y. N., L., D. P.; Investigation, Y. N., L., D. P.; Resources, Y. N., L., D. P.; Data Curation, Y. N., L., D. P.; Writing - Original Draft, Y. N., D. P.; Writing - Review & Editing, Y. N., L., G. N.; Visualization, D. P.; Supervision, Y. N., L.; Project Administration, Y. N., L., D. P.; Funding Acquisition, Y. N., D. P.

FUNDING STATEMENT

This research did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

REFERENCES

Adina, T. & Mihaela, S. (2021). Translation of 15D Questionnaire into Romanian Language to Study

- Quality of Life of Cancer Patients in Romania. *Medico Oncology*; 2; 1-9; doi: 10.52701/monc.2021.v2i1.16.
- American Diabetes Association. (2019). Standards Of Medical Care In Diabetes 2019. Virginia: American Diabetes Association.
- Akinci, F., Deyneli, O. & Aydar, S. (2005). Translation, Cultural Adaptation, Initial Reliability, and Validation of Turkish 15D's Version. *Sage Publications*; 8; 53-66; doi: 10.1177/0163278704273078
- Brazier, J., Ratcliffe, J., Saloman, J. & Tsuchiya, A. (2017). Measuring and Valuing Health Benefits For *Economic Evaluation*. Oxford: Oxford University Press.
- International Diabetes Federation. (2019). IDF Diabetes Atlas, 9th Edition. Brussels: International Diabetes Federation.
- Kontodimopoulos, N., Pappa, E., Chadjiapostolou, Z., Arvanitaki, E., Papadopoulos, A. A. & Niakas, D. (2012). Comparing The Sensitivity Of Eq-5d, Sf-6d And 15D Utilities To The Specific Effect Of Diabetic Complications. *The European Journal Of Health Economics*; 13; 111-120.
- Kementerian Kesehatan RI. (2018). Hasil Riset Kesehatan Dasar (Riskesdas) 2018. <https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-riskesdas/> Accessed: 21 Desember 2019.
- Okamoto, N., Hisashige, A. & Tanaka, Y. (2013). Development of the Japanese 15D Instrument of Health-Related Quality of Life: Verification of Reliability and Validity among Elderly People. *Plos One*; 8; 1-6. doi: 10.1371/journal.pone.0061721
- Longobardo, L., Rodríguez-Sánchez, B., Mata-Cases, M., Rodríguez-Mañas, L., Capel, M. & Oliva-Moreno, J. (2017). Is Quality of Life Different Between Diabetic And Non-Diabetic People? The Importance Of Cardiovascular Risks. *Plos One*; 12; 1-12. doi: 10.1371/journal.pone.0189505
- Persatuan Endokrinologi Indonesia (PERKENI). (2019). Konsensus Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Di Indonesia. Indonesia: PERKENI.
- Rascati, K. (2013). Essentials Of Pharmacoeconomics. Philadelphia: Lippincott Williams & Wilkins.
- Richardson, J., Mckie, J. & Bariola, E. (2011). Review And Critique Of Health Related Multi Attribute Utility Instruments. Melbourne: Monash University, Business And Economics, Centre For Health Economics
- Silver, B., Ramaiya, K., Andrew, S. B., Fredrick, O., Bajaj, S., Kalra, S., Charlotte, B. M., Claudine, K. & Makhoba, A. (2018). Eadsg Guidelines: Insulin Therapy In Diabetes. *Diabetes Therapy*; 9; 449-492. doi: 10.1007/s13300-018-0384-6.