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Validation of the Indonesian version of the Telehealth Usability Questionnaire (TUQ)

Gilbert Sterling Octavius[1*], Theo Audi Yanto[1]

[1]Department of Internal Medicine, Faculty of Medicine, Universitas Pelita Harapan, Karawaci, Tangerang, Banten, 15811 Indonesia.

*Corresponding author:
Gilbert Sterling Octavius;
Department of Internal Medicine, Faculty of Medicine, Universitas Pelita Harapan, Karawaci, Tangerang, Banten, 15811 Indonesia;
Sterlinggilbert613@hotmail.com

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ABSTRACT

Introduction: Indonesia is the 4th most populous country globally, with 250 million people across 17.508 islands. Despite its strong economic growth, the disparity in poverty increases as medical care costs shoot up. With inadequate medical care worker-to-patient ratio, telehealth is an alternative to providing healthcare in rural areas with similar or even better satisfaction rates. The lack of a standardized questionnaire in the Indonesian language encouraged the authors to validate Telehealth Usability Questionnaire (TUQ) in the Indonesian language.

Methods: A cross-sectional study via the e-survey method was done from 17th to 31st of July 2020, while telehealth usability questionnaires were translated and adapted according to WHO protocol. The inclusion criteria were telemedicine users above 18 years old who had at least used telemedicine once in the past six months. Exclusion criteria included minors who completed the questionnaire.

Results: A total of 102 data were obtained, comprising 73.5% female. The overall alpha coefficient was 0.958. The Kaiser–Meyer–Olkin (KMO) sampling test was satisfactory (KMO = 0.926), and the Bartlett test of sphericity was significant (Chi-square = 1835.043; df = 210; $p < 0.001$). Ease of use and learnability had the highest Cronbach's alpha coefficient (0.907), while reliability had the lowest Cronbach's alpha coefficient (0.794).

Conclusion: In conclusion, this paper presents TUQ in the Indonesian language, which had not been done before. This set of questions will help assess the usability of the expanding number of telehealth programs available in Indonesia and allow comparisons to determine which features make them more acceptable to users.

Keywords: Telemedicine, Telehealth Usability Questionnaire, Indonesia, Validity.
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INTRODUCTION

Indonesia is the 4th most populous country globally, with 250 million people across 17.508 islands.[1] Despite the strong growth in its gross domestic product (GDP) per capita every year from $823 in 2000 to $3,932 in 2018[2], there is an increasing gap in wealth inequality, with more people falling into poverty each year.[3] This means that not everyone can access healthcare equally, and medical fee in Indonesia is getting more costly each year. In 2005, the outpatient fee was $9.25 for primary hospital care, $13.12 for secondary hospital care, and $19.41 for tertiary hospital care. This fee did not include diagnostic tests and drugs or treatments needed.[4] Scarcity of medical healthcare professionals made healthcare not accessible to everyone. According to data in 2018, Indonesia only had 4.269 medical doctors (per 10.000 population), 24.149 nurses and midwives, 0.548 dentists (in 2017), and 0.852 pharmacists. Ideally, the ratio of doctor to patient is 1:600, according to World Health Organization (WHO). According to this ratio, the medical healthcare system in Indonesia was one of the worst in Southeast Asia.[5]

Telemedicine used interchangeably with telehealth, is two very different terms. Telehealth is described as providing technologies and related services from a distance to people at home to facilitate their empowerment, assessment, or provision of care and support for health (including clinical health) and well-being requirements.[6] Conversely, telemedicine is defined as using medical information transmitted electronically from one location to another to improve a patient's health.[7]

Telemedicine has several benefits for the patients that might solve Indonesia's healthcare problems in terms of the costs and inequality of healthcare access, such as reduced travel distance which leads to reduced travel costs and hence increased incremental travel savings[8], cost-effectiveness for home care and access to on-call hospital specialists as well as rural service delivery[9-11], increased satisfaction among patients[12,13] and providers[12], improving medication adherence[14], time savings from waiting for an appointment, decrease in loss of opportunity cost (missing work)[15,16], improved appointment rate[15,17], and improved short-term health outcomes (such as glycemic control[15,17] and reduced asthma attacks.[18] Numerous studies have been done outside of Indonesia to delineate the barriers to entry, benefits, and downsides from both patients' and doctors' perspectives.[19,20] However, very few studies have been done about telemedicine, especially in Indonesia. The lack of a standardized questionnaire in the Indonesian language is one of the problems in conducting a study. Since Langbecker et al.[21] recommended using an existing questionnaire rather

than developing one from scratch, this study aims to determine the reliability of the pre-constructed Telehealth Usability Questionnaire (TUQ)[22] in the Indonesian language.

METHODS

Translation of Telehealth Usability Questionnaire (TUQ) into Indonesian version

While the original questionnaire did not explicitly mention the Likert scale, analysis of Cronbach's coefficient alpha meant the Likert Scale was used. In this study, the Likert Scale ranged from 1 (totally disagree) to 5 (totally agree); the recommended Likert scale as questionnaires should use an odd number of answers.

Telehealth Usability Questionnaires had six components and 21 items such as usefulness (items 1-3), ease of use and learnability (items 4-6), interface quality (items 7-10), interaction quality (11-14), reliability (item 15-17), and satisfaction and future use (item 18-21). The term usefulness was used in this survey to describe how respondents thought the telehealth system worked to deliver a healthcare engagement that was akin to a regular in-person encounter. Ease of use and learnability meant the system had to be simple to understand and use to complete work quickly. The interaction between the patient and the telemedicine system was termed interface quality. On the other hand, interaction quality assessed the similarity of telehealth interactions between patients and clinicians to in-person encounters (both audio and video). The ease with which a user can recover from an error and how the system guides the user in the event of an error is characterized by reliability. In contrast, overall contentment with the telehealth system and willingness to use the system in the future defined satisfaction and future usage.[22]

This survey questionnaire had a total of 105 points. While there was no accepted boundary in terms of usability, we adopted the scoring system from Constanzo et al.[23] and graded them as follows: very low (≤ 13 points), low (14-36 points), moderate (37-59 points), high (60-82 points), and very high (83-105 points).

Translation and adaptation of the telehealth usability questionnaire were done according to WHO protocol.[24] The English questionnaire was forward-translated by a sworn translator (Appendix A) proficient in English and Indonesian. An expert panel convened to discuss the result of the questionnaire. After some changes and recommendations were made, the questionnaire was sent back for backward translation by another sworn translator fluent in English and Indonesian. An agreed Indonesian version of the questionnaire is shown in Appendix B.

Design and population

A cross-sectional study was done on 102 patients using an e-survey method from 17th to 31st July 2020. The questionnaire was sent together in Google Forms™ with background information about the study, confidentiality, and informed consent via email and Whatsapp using a non-probabilistic sampling of patients who have used telemedicine before. The non-probabilistic sampling employed in this research constitutes purposive sampling, where we sent the Google Forms to potential telemedicine users according to our inclusion and exclusion criteria. The inclusion criteria were telemedicine users above 18 years old who had at least used telemedicine once in the past six months. Exclusion criteria included minors who completed the questionnaire. Besides the data from the questionnaire, descriptive data include age, sex, duration of telehealth use, type of doctor consulted, and duration of telehealth use. The University of Pelita Harapan Ethics Committee approved the study protocol with protocol code 154/K-LKJ/ETIK/VIII/2020.

Statistical Analysis

Cronbach's coefficient alpha test was used to assess the questionnaire's internal consistency, yielding the following alpha ranges: excellent (≥0.9), good (>0.8), acceptable (>0.7), dubious (>0.6), and undesirable (0.5).[25] The Kolmogorov-Smirnov test determined the sample's normality. In contrast, the Kaise-Meyer Olkin (KMO) sample adequacy measure and Bartlett's sphericity test were used to determine the data's eligibility for structure detection. Using Argimon et al.'s methodology[26], we calculated the average and standard deviation (SD) to examine the variability in questionnaire responses and the frequencies to check for a floor and ceiling effect.[27] These values must be checked since they affect the questionnaire's validity, reliability, and responsiveness. They are used to determine the percentage of participants with extremely low or extremely high scores. This study discovered this effect if ≥15% of the responses were in higher or lower ranges.[28] The discriminative rate, which compares responses in two extreme groups (below the 33rd percentile and above the 66th percentile), was used to generate the item discrimination index (IDI). The items had the discriminating capability if the discriminative rate was more than 0.2.[27] Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) Version 26 (IBM Corp., Armonk, NY, USA). A significant finding is interpreted when the p-value is <0.05

RESULTS

Of the 110 questionnaires sent, only 102 responded (92.7% response rate), and 73.5% were female (Table 1). Overall, respondents expressed high satisfaction with telehealth, with 97 percent of men and women expressing high satisfaction levels. According to Kolmogorov-Smirnov's analysis, the sample, age, and sex did not have a normal distribution (p<0.05).

Cronbach's alpha coefficient analysis revealed that none of the items significantly changed the instrument's internal consistency with a value of 0.958 (Table 2). As none of the inter-item correlations falls below 0.15, all questionnaire items are well correlated. All discriminative rates were above 0.2, and item number 10, "This system can do everything I would want it to be able to do" (IDI=2.18) and item number 14, "Using the telehealth system, I can see the clinician as well as if we met in person" (IDI=2.14) had a score above 2. The lowest ceiling effect score was for item 4, "It was simple to use this system", and the highest score was for item 15, "I think the visits provided over the telehealth system are the same as in-person visits". None of the items was above the ceiling-

Table 1. Descriptive data of all the respondents

Variables	Results
Sex	
Male	27 (26.5%)
Female	75 (73.5%)
Age (Mean±SD)	23.6 (3.5)
Highest Education	
High School	15 (14.7%)
Bachelors' degree	85 (83.3%)
Masters' degree	2 (2%)
Place of Stay	
Urban	99 (97.1%)
Rural	3 (2.9%)
Monthly Income	
Above Regional Minimum Wage	56 (54.9%)
Below Regional Minimum Wage	46 (45.1%)
Reasons for Using Telehealth	
For myself	56 (54.9%)
Accompanying friends/parents/grandparents who did not understand telehealth	46 (45.1%)
Frequencies of Telehealth Usage (in the past six months)	
1 time	44 (43.1%)
2-5 times	47 (46.1%)
>5 times	11 (10.8%)
Media Used for Telehealth Consultation	
Communication platform (telephone or Whatsapp©)	40 (39.2%)
Social media (Instagram©)	1 (1.0%)
Meeting platform (Zoom©/Google Meet©/Webex©)	7 (6.9%)
Telehealth platform (AIDO©/Alodok©/HaloDoc©/Docquity©)	54 (52.9%)
Medical Conditions Requiring Telehealth Use	
Mild and/or acute diseases	82 (80.4%)
Chronic diseases	20 (19.6%)
Types of Doctors Consulted Via Telehealth	
General Practitioner	44 (43.1%)
Dentists	3 (3.0%)
Specialists	55 (53.9%)
Duration of Telehealth Use	
<3 months	56 (54.9%)
3-6 months	26 (25.5%)
6 months- 1 year	5 (4.9%)
> 1 year	15 (14.7%)

effect criterion of 15%.

Ease of use and learnability had the highest Cronbach's alpha coefficient (0.907), while reliability had the lowest Cronbach's alpha coefficient (0.794) (Table 3). The mean patient satisfaction score in the total of the surveyed population was 80.5 (±14.8) points; for females, it was 81.7 (±14.5) points, and for males, it was 77.3 (±15.2) points.

The sample count exceeds the suggested minimum of 100-200 responses for principal component analysis.[27] The Kaiser–Meyer–Olkin sampling test was satisfactory (KMO = 0.926), and the Bartlett test of sphericity was significant (Chi-square 1835.043; df = 210; p < 0.001), indicating that the items were suitable for factor analysis (Table 4). Factors with questions about the benefits and satisfaction (items 1-9, 11,19-21), in using telehealth were named "Benefits & Satisfaction", quality of telehealth (items 10,12-15,18) was named "Quality" while questions about technical difficulties (items 16-17) were named "Technical Issues". All loading factors were greater than 0.40, and the three constructs combined accounted for 70.8 percent of the total variation. The scree plot depicting the number of retrieved dimensions is shown in Figure 1. The intraclass correlation coefficient is 0.958 (95% CI 0.946-0.969).

DISCUSSION

The telehealth questionnaire for users was validated and found reliable and valid. All of the items on the questionnaire had discriminative values of more than 0.2, indicating that all of the questions were discriminative. Factor 3 (0.878) has the lowest Cronbach's alpha coefficient of the three factors, explained by the small number of components of the third factor. On the other hand, the Cronbach's alpha coefficient was still in the "good" range.[22]

Our findings suggest that the Indonesian version of the Telehealth Usability Questionnaire is statistically sound for assessing users' telehealth

Table 2. Psychometric Validation of the Indonesian Version of Telehealth Usability Questionnaire

		Item Parameter Estimates			Reliability	
Item No.	Variables	Item Discrimination Index	Celing Effect (%)	Floor Effect (%)	Cronbach's α if item is deleted	Item-Correlation
	Total survey with 21 questions				0.958	0.704
1	Telehealth improves my access to healthcare services	1.43	-	1.2	0.956	0.704
2	Telehealth saves me time travelling to a hospital or specialist clinic	1	-	1.1	0.957	0.644
3	Telehealth provides for my healthcare needs	1.57	-	1.2	0.956	0.745
4	It was simple to use this system	1.2	-	1.1	0.956	0.759
5	It was easy to learn to use the system	1.43	-	1.2	0.956	0.701
6	I believe I could become productive quickly using this system	1.64	-	1.3	0.956	0.742
7	The way I interact with this system is pleasant	1.89	-	1.3	0.956	0.744
8	I like using the system	1.96	-	1.3	0.955	0.777
9	The system is simple and easy to understand	1.43	-	1.2	0.956	0.736
10	This system is able to do everything I would want it to be able to do	2.18	-	1.4	0.956	0.732
11	I could easily talk to the clinician using the telehealth system	1.68	-	1.3	0.956	0.713
12	I could hear the clinician clearly using the telehealth system	1.79	-	1.3	0.956	0.759
13	I felt I was able to express myself effectively	1.79	-	1.4	0.957	0.632
14	Using the telehealth system, I can see the clinician as well as if we met in person	2.14	-	1.6	0.957	0.652
15	I think the visits provided over the telehealth system are the same as in-person visits	1.82	-	1.8	0.959	0.520
16	Whenever I made a mistake using the system, I could recover easily and quickly	1.25	-	1.4	0.957	0.635
17	The system gave error messages that clearly told me how to fix problems	1.25	-	1.4	0.957	0.657
18	I feel comfortable communicating with the clinician using the telehealth system	1.86	-	1.4	0.955	0.785
19	Telehealth is an acceptable way to receive healthcare service	1.39	-	1.3	0.956	0.779
20	I would use telehealth services again	1.64	-	1.3	0.955	0.774
21	Overall, I am satisfied with this telehealth system	1.54	-	1.3	0.955	0.837

experiences and perceptions. A positive discrimination rate of ≥1 was found in all of the questions, and especially for item number 10, "This system can do everything I would want it to be able to do", and item number 14, "Using the telehealth system, I can see the clinician as well as if we met in person" which both scored above 2 which meant that the questionnaire could distinguish the interface quality and interaction quality from the users' perspective in terms of using telehealth.

The findings demonstrate that factor analysis was adequate. The questionnaire had three dimensions, accounting for 70.8 percent of the total variance: one for benefits and satisfaction, another for quality, and a third for technical concerns. Hence, this questionnaire can be used to research telehealth with a target population of those residing in urban areas. This may include areas outside Java Island, as long as they are in urban areas. However, generalizability to rural areas is still limited and needs further research.

One study attempted to validate TUQ in Spanish and found that only 12 items were needed to validate the Spanish TUQ, making it considerably shorter. However, the authors found that the questionnaire has a low discriminant validity, making the Spanish TUQ one-dimensional.[29] One Turkish study tried to validate TUQ in multiple sclerosis (MS) patients and found that TUQ are both valid and reliable in MS patients.[30]

To summarize, this research presents TUQ as the first questionnaire to have been verified in the Indonesian language. This set of questionnaires will be valuable in assessing the usability of the expanding number of telehealth programs available in Indonesia and permitting comparisons between those tools to determine which features make them more acceptable to users.

Validated telehealth questionnaires generate valuable data that can be used for healthcare planning and resource allocation. As telehealth research is growing in Indonesia, using a validated

Table 3. Reliability analysis of the Indonesian Version of the Telehealth Usability Questionnaire of Each Component for Total Population and Gender

Item No.	Variables	Total (N=102)		Female (N=75)		Male (N=27)		α
		Mean	SD	Mean	SD	Mean	SD	
	Total Survey	80.5	14.8	81.7	14.5	77.3	15.2	0.958
	Usefulness							0.847
1	Telehealth improves my access to healthcare services	4.2	1.0	4.3	1.0	3.9	0.9	
2	Telehealth saves me time traveling to a hospital or specialist clinic	4.4	0.9	4.4	0.9	4.3	0.9	
3	Telehealth provides for my healthcare needs	4.1	0.9	4.1	0.8	3.8	1.0	
	Ease of Use & Learnability							0.907
4	It was simple to use this system	4.4	0.8	4.5	0.7	4.1	0.7	
5	It was easy to learn to use the system	4.2	0.9	4.4	0.8	3.7	1.1	
6	I believe I could become productive quickly using this system	4.0	0.9	4.2	0.9	3.6	1.0	
	Interface Quality							0.870
7	The way I interact with this system is pleasant	3.8	1.0	3.9	0.9	3.5	1.1	
8	I like using the system	3.8	1.0	3.9	1.0	3.6	1.0	
9	The system is simple and easy to understand	4.1	0.9	4.3	0.8	3.8	1.0	
10	This system is able to do everything I would want it to be able to do	3.6	1.1	3.6	1.1	3.5	1.2	
	Interaction Quality							0.839
11	I could easily talk to the clinician using the telehealth system	3.9	1.0	3.9	1.0	4.0	1.0	
12	I could hear the clinician clearly using the telehealth system	3.9	1.0	3.5	1.1	3.8	1.0	
13	I felt I was able to express myself effectively	3.5	1.1	3.1	1.2	3.4	1.0	
14	Using the telehealth system, I can see the clinician as well as if we met in person	3.1	1.2	2.8	1.2	3.1	1.1	
	Reliability							0.794
15	I think the visits provided over the telehealth system are the same as in-person visits	2.8	1.2	3.7	0.8	2.9	0.9	
16	Whenever I made a mistake using the system, I could recover easily and quickly	3.6	0.8	3.5	0.9	3.6	0.8	
17	The system gave error messages that clearly told me how to fix problems	3.5	0.9	3.7	1.0	3.5	0.8	
	Satisfaction and Future Use							0.906
18	I feel comfortable communicating with the clinician using the telehealth system	3.7	1.0	3.7	1.0	3.7	0.9	
19	Telehealth is an acceptable way to receive healthcare service	4.0	0.8	4.0	0.8	3.7	0.9	
20	I would use telehealth services again	3.9	0.9	4.0	0.9	3.9	0.8	
21	Overall, I am satisfied with this telehealth system	4.0	0.8	4.0	0.8	3.9	0.8	

questionnaire in the Indonesian language will undoubtedly help improve the accuracy and reliability of the results. Hence, more policies regarding telehealth will be doled out, which may directly or indirectly empower the community via a better health program.

There are various limitations to this study. The first drawback is that the community mostly comprises young metropolitan females who only use telemedicine occasionally. However, internet penetration in Indonesia is increasing, and more Indonesians are connected via internet. Hence, this questionnaire is presumably valid in rural communities, although more research is needed, especially in rural areas. We experienced survey bias since we only recruited participants who had previously used telehealth. Thus there were no controls. We cannot confirm whether they used telehealth because the survey was anonymous. Although within the range of sufficient respondents[25], the number of respondents could be increased to validate further other aspects, such as satisfaction with telehealth.

CONCLUSION

This is the first validation study of TUQ in the Indonesian language. Based on the

Table 4. Exploratory factor analysis (EFA): data on communalities of items, item loadings in Factor 1-3

Item No.	Questionnaire Items	Factor 1	Factor 2	Factor 3	Communalities (h^2)
5	It was easy to learn to use the system[a]	0.867	-	-	0.815
4	It was simple to use this system[a]	0.837	-	-	0.778
6	I believe I could become productive quickly using this system[a]	0.822	-	-	0.736
9	The system is simple and easy to understand[a]	0.804	-	-	0.729
1	Telehealth improves my access to healthcare services[a]	0.762	-	-	0.650
2	Telehealth saves me time[a] traveling to a hospital or specialist clinic[a]	0.684	-	-	0.539
7	The way I interact with this system is pleasant[a]	0.682	-	-	0.650
8	I like using the system[a]	0.650	-	-	0.666
21	Overall, I am satisfied with this telehealth system[a]	0.631	-	-	0.759
20	I would use telehealth services again[a]	0.628	-	-	0.689
19	Telehealth is an acceptable way to receive healthcare service[a]	0.625	-	-	0.658
3	Telehealth provides for my healthcare needs[a]	0.624	-	-	0.610
11	I could easily talk to the clinician using the telehealth system[a]	0.584	-	-	0.683
14	Using the telehealth system, I can see the clinician as well as if we met in person[b]	-	0.784	-	0.752
15	I think the visits provided over the telehealth system are the same as in-person visits[b]	-	0.770	-	0.748
13	I felt I was able to express myself effectively[b]	-	0.755	-	0.675
10	This system is able to do everything I would want it to be able to do[b]	-	0.684	-	0.691
18	I feel comfortable communicating with the clinician using the telehealth system[b]	-	0.609	-	0.688
12	I could hear the clinician clearly using the telehealth system[b]	-	0.601	-	0.694
16	Whenever I made a mistake using the system, I could recover easily and quickly[c]	-	-	0.828	0.849
17	The system gave error messages that clearly told me how to fix problems[c]	-	-	0.776	0.814
	Eigenvalue	11.81	1.97	1.10	
	Average variance explained (%)	56.24%	9.37%	5.21%	
	Cronbach's α reliability	0.953	0.889	0.878	

Factor analysis was performed using the principal component analysis extraction method and varimax with Kaiser Normalization.; a = Benefits & Satisfaction, b = Quality of Telehealth, c = Technical Difficulties

results, the Indonesian TUQ version has good reliability and validity. This set of questionnaires will help assess the usability of the expanding number of telehealth programs available in Indonesia and allow comparisons to determine which features make them more acceptable to users.

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CONFLICT OF INTEREST

There is no conflict of interest declared.

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SUMMARY POINTS

What has been already known

- Telehealth and telemedicine, compared to traditional face-to-face consultations, are similar in patient satisfaction.
- Telehealth usability questionnaire (TUQ) is widely adopted to assess patients' experience with telemedicine.

What this paper adds

- By validating the paper into the Indonesian version, this paper found that the Indonesian version of TUQ is reliable in assessing patients' experiences with telemedicine.
- This paper provides the Indonesian version of TUQ, which can be reproduced for further research progress in Indonesia, especially in telemedicine.

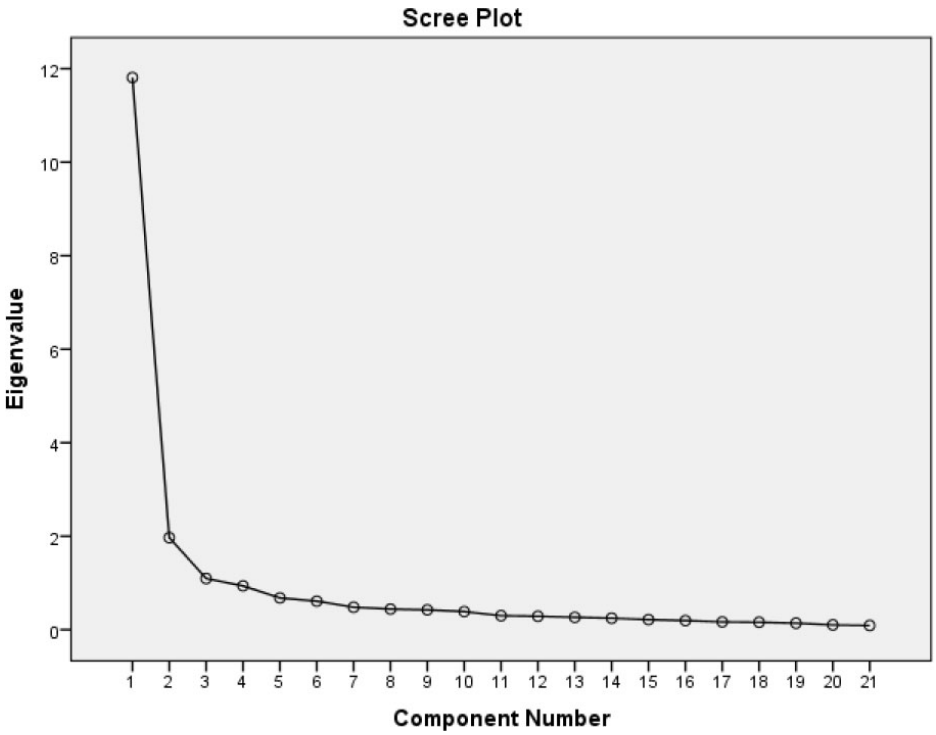

Figure 1. Scree plot.

REFERENCES

1. Octavius GS, Antonio F. Antecedents of Intention to Adopt Mobile Health (mHealth) Application and Its Impact on Intention to Recommend: An Evidence from Indonesian Customers. Int J Telemed Appl. 2021;2021:6698627. https://doi.org/10.1155/2021/6698627
2. The World Bank. The World Bank in Indonesia 2022 [cited 2023 27th May]. Available from: https://www.worldbank.org/en/country/indonesia/overview.
3. Badan Pusat Statistik. Persentase Penduduk Miskin September 2022 naik menjadi 9,57 persen 2023 [cited 2023 27th May]. Available from: https://www.bps.go.id/pressrelease/2023/01/16/2015/persentase-penduduk-miskin-september-2022-naik-menjadi-9-57-persen.html#:~:text=Abstraksi,persen%20poin%20terhadap%20September%202021.
4. World Health Organization. New cost-effectiveness updates from WHO-CHOICE 2021 [cited 2023 27th May]. Available from: https://www.who.int/news-room/feature-stories/detail/new-cost-effectiveness-updates-from-who-choice.
5. World Health Organization. State of Health Inequality Indonesia: Geneva: World Health Organization.; 2017 [cited 2023 27th May]. Available from: https://cdn.who.int/media/docs/default-source/gho-documents/12-dec-final-final-17220-state-of-health-inequality-in-indonesia-for-web.pdf?sfvrsn=54ae73ea_2.
6. Rudel D, Fisk M, Roze R. Definitions of Terms in Telehealth. Informatica Medica Slovenica. 2011;16(1):28-46. Available from: https://ims.mf.uni-lj.si/ims_archive/16-01/16a-21.pdf
7. Tuckson RV, Edmunds M, Hodgkins ML. Telehealth. N Engl J Med. 2017;377(16):1585-92. DOI: 10.1056/NEJMsr1503323.
8. Russo JE, McCool RR, Davies L. VA Telemedicine: An Analysis of Cost and Time Savings. Telemed J E Health. 2016;22(3):209-15. DOI: 10.1089/tmj.2015.0055
9. Wade VA, Karnon J, Elshaug AG, Hiller JE. A systematic review of economic analyses of telehealth services using real time video communication. BMC Health Serv Res. 2010;10:233. https://doi.org/10.1186/1472-6963-10-233
10. Persaud DD, Jreige S, Skedgel C, Finley J, Sargeant J, Hanlon N. An incremental cost analysis of telehealth in Nova Scotia from a societal perspective. J Telemed Telecare. 2005;11(2):77-84. DOI: 10.1258/1357633053499877
11. Hwei LRY, Octavius GS. Potential advantages and disadvantages of telemedicine: A literature review from the perspectives of patients, medical personnel, and hospitals. Journal of Community Empowerment for Health. 2021;4(3):180-6. https://doi.org/10.22146/jcoemph.64247
12. Nguyen M, Waller M, Pandya A, Portnoy J. A Review of Patient and Provider Satisfaction with Telemedicine. Curr Allergy Asthma Rep. 2020;20(11):72. DOI: 10.1007/s11882-020-00969-7
13. Le LB, Rahal HK, Viramontes MR, Meneses KG, Dong TS, Saab S. Patient Satisfaction and Healthcare Utilization Using Telemedicine in Liver Transplant Recipients. Dig Dis Sci. 2019;64(5):1150-7. DOI: 10.1007/s10620-018-5397-5
14. Schulze LN, Stentzel U, Leipert J, Schulte J, Langosch J, Freyberger HJ, et al. Improving Medication Adherence With Telemedicine for Adults With Severe Mental Illness. Psychiatr Serv. 2019;70(3):225-8. DOI: 10.1176/appi.ps.201800286
15. Xu T, Pujara S, Sutton S, Rhee M. Telemedicine in the Management of Type 1 Diabetes. Prev Chronic Dis. 2018;15:E13. DOI: 10.5888/pcd15.170168
16. Octavius GS, Hwei LRY. Clinical Usefulness of Telehealth: A Literature Review from the Perspective of Medical Specializations. Cermin Dunia Kedokteran. 2021;48(12):735-40. https://doi.org/10.55175/cdk.v48i12.174
17. Liu W, Saxon DR, McNair B, Sanagorski R, Rasouli N. Endocrinology Telehealth Consultation Improved Glycemic Control Similar to Face-to-Face Visits in Veterans. J Diabetes Sci Technol. 2016;10(5):1079-86. DOI: 10.1177/1932296816648343
18. Halterman JS, Fagnano M, Tajon RS, Tremblay P, Wang H, Butz A, et al. Effect of the School-Based Telemedicine Enhanced Asthma Management (SB-TEAM) Program on Asthma Morbidity: A Randomized Clinical Trial. JAMA Pediatr. 2018;172(3):e174938. DOI: 10.1001/jamapediatrics.2017.4938
19. Wijaya JH, Octavius GS, Hwei LRY. A Literature Review of Telemedicine in Indonesia: Past, Present, and Future Prospective. Indonesian Journal of Health Administration. 2022;10(2):261-72. DOI: 10.20473/jaki.v10i2.2022.261-272
20. Camarero L, Oliva J. Thinking in rural gap: mobility and social inequalities. Palgrave Communications. 2019;5(1):95. https://doi.org/10.1057/s41599-019-0306-x
21. Langbecker D, Caffery LJ, Gillespie N, Smith AC. Using survey methods in telehealth research: A practical guide. J Telemed Telecare. 2017;23(9):770-9. DOI: 10.1177/1357633X17721814
22. Parmanto B, Lewis AN, Jr., Graham KM, Bertolet MH. Development of the Telehealth Usability Questionnaire (TUQ). Int J Telerehabil. 2016;8(1):3-10. DOI: 10.5195/ijt.2016.6196
23. Constanzo F, Aracena-Sherck P, Hidalgo JP, Muñoz M, Vergara G, Alvarado C. Validation of a patient satisfaction survey of the Teleneurology program in Chile. BMC Res Notes. 2019;12(1):359.
24. Efstathiou G. Translation, Adaptation and Validation Process of Research Instruments. In: Suhonen R, Stolt M, Papastavrou E, editors. Individualized Care: Theory, Measurement, Research and Practice. Cham: Springer International Publishing; 2019. p. 65-78. DOI: 10.1111/j.1365-2753.2010.01434.x
25. Kellar SP, Kelvin E. Munro's Statistical Methods for Health Care Research: Wolters Kluwer; 2012. ISBN/ISSN: 9781451187946
26. Argimon-Pallàs JM, Flores-Mateo G, Jiménez-Villa J, Pujol-Ribera E, Foz G, Bundó-Vidiella M, et al. Study protocol of psychometric properties of the Spanish translation of a competence test in evidence based practice: the Fresno test. BMC Health Serv Res. 2009;9:37. https://doi.org/10.1186/1472-6963-9-37

27. Ware JE, Jr., Gandek B. Methods for testing data quality, scaling assumptions, and reliability: the IQOLA Project approach. International Quality of Life Assessment. J Clin Epidemiol. 1998;51(11):945-52. DOI: 10.1016/s0895-4356(98)00085-7
28. Rattray J, Jones MC. Essential elements of questionnaire design and development. J Clin Nurs. 2007;16(2):234-43. DOI: 10.1111/j.1365-2702.2006.01573.x
29. Bibiloni N, Torre AC, Angles MV, Terrasa SA, Vazquez Peña FR, Sommer J, et al. Validation of a Spanish questionnaire on telemedicine usability. Medicina (B Aires). 2020;80(6):649-53. Available from: https://www.medicinabuenosaires.com/PMID/33254109.pdf
30. Özkeskin M, Özden F, Ekmekçi Ö, Yüceyar N., et al. The reliability and validity of the Turkish version of the telehealth usability questionnaire and the telemedicine satisfaction questionnaire in patients with multiple sclerosis. Neurological Sciences and Neurophysiology. 2021;38(3):173-9. DOI: 10.1007/s10072-021-05519-1