Pangestu *et al.*
Health and Quality of Life Outcomes (2024) 22:89
https://doi.org/10.1186/s12955-024-02303-5

Health and Quality of Life Outcomes

RESEARCH

Open Access

Validity, test-retest reliability, and responsiveness of the Indonesian version of FACIT-COST measure for subjective financial toxicity

Stevanus Pangestu[1,2,3*], Fredrick Dermawan Purba[4], Hari Setyowibowo[4], Clara Mukuria[5] and Fanni Rencz[1]

Abstract

Background Financial toxicity describes the impairment of financial wellbeing in patients due to the burden of cancer diagnosis and care. The COST: A Functional Assessment of Chronic Illness Therapy Measure of Financial Toxicity (FACIT-COST) is the most widely used cancer-specific measure of subjective financial toxicity, having been validated in multiple languages, but not in Indonesian. This study aimed to validate the Indonesian version of FACIT-COST in a breast cancer sample.

Methods A single-center prospective cohort study was performed in Indonesia. Female breast cancer patients aged ≥ 18 undergoing treatment at baseline were invited to participate and followed for up to six months. The survey included the official Indonesian version of FACIT-COST (v2) which was administered to the patients by interviewers. Clinical information (e.g., metastasis status, disease duration) was provided based on medical records. The following measurement properties of FACIT-COST were tested: distributional characteristics, structural validity (principal component [PCA] and confirmatory factor analyses [CFA]), internal consistency reliability (Cronbach's alpha and McDonald's omega), known-groups validity (Mann-Whitney U or Kruskal-Wallis H test), test-retest reliability, and responsiveness to change.

Results Overall, 300 female patients participated at baseline. No patients reported the best or worst possible FACIT-COST total scores. The PCA proposed a two-factor model structure for the instrument, which was confirmed by the CFA (RMSEA = 0.042, SRMR = 0.049, CFI = 0.99, TLI = 0.99). The internal consistency reliability of the two factors was considered adequate (Cronbach's alpha = 0.774–0.882, McDonald's omega = 0.786–0.888). The FACIT-COST total score significantly discriminated across the following known-groups: age, education, residential setting, income, employment, metastasis status, number of symptoms, and financial coping strategies. The FACIT-COST demonstrated excellent test-retest reliability (intraclass correlation coefficient = 0.96) and satisfactory responsiveness to change (standardized response mean and effect size ranges=|0.39| to |0.92|).

Conclusions This is the first study to validate the FACIT-COST in patients with breast cancer and to present the measurement properties of the Indonesian version of FACIT-COST. The Indonesian FACIT-COST demonstrates acceptable psychometric performance and shows potential as a valid measure of subjective financial toxicity. The instrument

*Correspondence:
Stevanus Pangestu
pangestu@atmajaya.ac.id
Full list of author information is available at the end of the article

may serve as a valuable tool for informing health policies that focus on providing resource support to improve cancer care in Indonesia.

Keywords *Breast cancer*, *COST*, *Financial toxicity*, *Responsiveness*, *Test-retest reliability*, *Validity*

Introduction

Financial toxicity is the impairment of financial wellbeing in patients arising from the burden of cancer diagnosis and care. Experienced by patients with cancer around the world, unmitigated financial toxicity may lead to adverse consequences that include treatment non-adherence, impaired health-related quality of life, and poorer survival outcomes [1–4]. To better understand the burden of cancer, valid measurement of financial toxicity is essential. Generally, financial toxicity can be categorized into two forms: objective and subjective [5–7]. Objective financial toxicity is typically assessed using metrics, such as nominal of out-of-pocket cancer-related costs or its percentage to household income, and questions on financial coping mechanisms, e.g., borrowing money and selling possessions. Meanwhile, subjective financial toxicity (SFT) can be measured by assessing the perceived distress regarding the patient's cancer-related financial burden.

Recent systematic reviews revealed the heterogeneity of measures used, including the use of measures that had not been validated in assessing SFT in cancer [5, 7, 8]. The measures can either be generic or cancer-specific. Some generic measures that have been used to capture SFT include the InCharge Personal Financial Wellbeing, Personal Financial Wellness, and the Financial Distress Questionnaire [1, 8]. Additionally, there are cancer-specific measures that were developed to capture SFT, such as the Patient-Reported Outcome for Fighting Financial Toxicity (PROFFIT), Subjective Financial Distress Questionnaire (SFDQ), and Financial Index of Toxicity (FIT) [9–11]. So far, the most widely validated cancer-specific measure of SFT is the COST: A Functional Assessment of Chronic Illness Therapy Measure of Financial Toxicity (FACIT-COST) [1, 8, 12].

Standardized questionnaires that are translated and cross-culturally adapted from their source language necessitate psychometric testing before their use [13, 14]. In the case of SFT, differences in healthcare system, socioeconomic, and cultural contexts may affect the interpretation of the item content of the measure. While many studies have validated various language versions of the FACIT-COST in different countries or cultures (e.g., United States, Italy, Australia, China, and Japan), evidence for the Indonesian version is not yet available [15–24]. Indonesia is the fourth most populous country in the world, where cancer is a major cause of mortality and financial toxicity is very understudied. Cancer also ranks as the second most expensive chronic disease financed by the country's public healthcare system [25]. The considerable disparities in healthcare delivery quality, including the distribution of general practitioners, specialists, and medical equipment, further highlight the importance of measuring and addressing financial toxicity in Indonesia, as additional out-of-pocket costs may still incur despite existing national insurance coverage. Furthermore, factor structure differences of FACIT-COST have been found across validation studies of different language versions of the instrument [15, 17, 18, 24]. Certain psychometric properties (e.g., responsiveness) have also been rarely investigated in the financial toxicity literature [15–24, 26].

Therefore, the purpose of this study is to assess the psychometric properties of the official Indonesian version of FACIT-COST, including its distributional characteristics (floor and ceiling), structural and known-groups validity, internal consistency reliability, test-retest reliability, and responsiveness to change. This study focuses on breast cancer, which is the most prevalent cancer type both worldwide and in Indonesia [27].

Methods

Study design and patients

An observational prospective cohort study was conducted from September 2023 to March 2024 at the oncology department of Hasan Sadikin General Hospital, a primary referral center in Bandung, West Java province, Indonesia. The study was approved by the Research Ethics Committee of the hospital (LB.02.01/X.6.5/284/2023). Soft quotas were applied to allow for diverse stages of cancer and treatment cycle. The inclusion criteria were as follows: female of at least 18 years of age with a breast cancer diagnosis of any type and stage, undergoing any type of treatment (e.g., immunotherapy and chemotherapy), had the cognitive capacity to complete the questionnaire, fluent in the Indonesian language, and signed a written informed consent. The recruitment of patients was performed by three trained research assistants under the oversight of the oncologist and team of nurses. Patients were recruited in the clinic waiting area prior to their treatment session. The first half of the recruited patients consisted of patients in active treatment cycle ('T1' follow-up group) and the remaining half comprised

patients in their last round of treatment cycle ('T2' follow-up group).

Data collection

The target sample size for this study was 300, which met the requirements for the planned main statistical analyses [28, 29]. Two structured paper questionnaires were prepared for this study, one to be completed by the patients and the other by the nurses. At all time points, the patient questionnaire was distributed by research assistants in the Indonesian language to the patients, who then completed it themselves using paper-and-pencil. The research assistants were available to provide explanations during the completion process when needed. For the T1 group, the follow-up questionnaire was completed during their subsequent treatment cycle, while the T2 group completed the follow-up during their post-treatment consultation. A pilot test was performed to assess the feasibility and comprehensibility of the questionnaire. Five patients with breast cancer (aged 35–60 with diverse types of treatment) were involved and no modifications were made to the questionnaire afterward. All patients received a compensation of IDR 100,000 (equivalent to approximately USD 6.3) after completing each of the baseline and follow-up questionnaires. Meanwhile, the oncology nurses' questionnaire was self-completed by the nurses to provide additional clinical information on the patients obtained from the computerized hospital records, namely disease duration and metastasis status.

Patient questionnaire

The questionnaire included the FACIT-COST and an extensive set of other outcome measures, as part of a study comparing the psychometric performance of preference-accompanied measures in breast cancer. The measures were presented in a fixed order, with all items being required to be responded by the patients: EQ Health and Wellbeing (EQ-HWB), EQ-5D-5L, FACIT-COST, Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) and Functional Assessment of Cancer Therapy – General (FACT-G). Results of the outcome measures other than the FACIT-COST will be reported elsewhere. Patients also responded to questions on socio-demographic characteristics (age, education level, employment status, classification of residence, number of children aged < 17 living in the same household, net monthly household income, and health insurance use), symptoms experienced during the last week (e.g., fatigue, weight loss, and hair loss), and a question on financial coping strategies. The financial coping strategy referred to the economic actions performed by the patients to mitigate cancer-related costs: incurring debt, withdrawing savings or pension, selling assets, and closing business or declaring bankruptcy.

FACIT-COST

The official Indonesian version of FACIT-COST (v2) was used to measure SFT [30]. The current second version has 12 items with 0–4 response scale: 'not at all' (0), 'a little bit' (1), 'somewhat' (2), 'quite a bit' (3), and 'very much' (4). The items relate to financial adequacy, worry, and control, among others. The difference between the 11-item v1 and 12-item v2 FACIT-COST is the addition of the twelfth item (FT12), 'financial hardship to my family and me.' FT12, a global summary item, is not included in the total score calculation [30]. Following the current scoring guideline, the FACIT-COST total score is calculated by summing items 1 through 11, where items 2, 3, 4, 5, 8, 9, 10 are scored in reverse. Therefore, the possible theoretical score for both v1 and v2 is between 0 and 44, where lower scores indicate worse SFT.

Statistical analyses

The analysis strategy was guided by previous studies on the validation of the translated FACIT-COST [17–19]. All variables were descriptively summarized using frequency and percentage for categorical variables, and mean and standard deviation for continuous variables. Baseline characteristics for patients that belonged to the T1 and T2 follow-up groups were compared using chi-square test. All analyses were performed using Stata 18 (StataCorp LLC), unless indicated otherwise, with a p-value of < 0.05 being considered statistically significant.

Distributional characteristics

The response distribution of each FACIT-COST item was detailed along with their corresponding ceiling and floor. Ceiling or floor effects were considered present if more than 15% of the patients scored the highest or lowest possible FACIT-COST total score [31].

Structural validity

Structural validity of the FACIT-COST was first assessed using the principal component analysis (PCA). The appropriateness of PCA was assessed using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity, with a KMO value of at least 0.80 and $p < 0.05$ for the Bartlett's test indicating suitability for analysis [29]. The number of retained principal components was determined using the parallel analysis technique [32]. Rotation was performed using the oblique Promax method to allow for potential correlations among components. Factor loadings, which indicate how strongly the items were associated with the construct they are intended to measure, were interpreted as: ≤0.32 (unacceptable), 0.33–0.44 (poor), 0.45–0.54 (fair),

0.55–0.62 (good), 0.63–0.70 (very good), and ≥0.71 (excellent) [33]. Item communalities (i.e., the extent to which an item correlates with all other items) of ≥0.5 were deemed acceptable [29]. Afterward, the structure of the instrument was further evaluated using the confirmatory factor analysis (CFA). Prior to testing the two-factor model proposed by the PCA output, we also experimented with other models (e.g., one-factor and bifactor models). The two-factor model was ultimately selected based on goodness-of-fit statistics and item loading sizes. CFA parameters were estimated using diagonally weighted least squares method due to the ordinal nature of item responses in FACIT-COST [34]. Modification indices (MIs) were inspected to identify error covariances, and correlations were allowed between pairs of items with MIs > 3.84 [35]. The goodness-of-fit of the model was evaluated using multiple criteria: (i) Root mean square error of approximation (RMSEA), (ii) Standardized root mean square residual (SRMR), (iii) comparative fit index (CFI), and (iv) Tucker-Lewis index (TLI). In addition, 95% confidence intervals were computed around the goodness-of-fit values using 1000 bootstrap resampling. The model fit was deemed good with values of: RMSEA < 0.06, SRMR < 0.08, and CFI and TLI, each > 0.95 [36]. The PCA and CFA were conducted using the 'lavaan' R package in RStudio (Posit Software, PBC) [37].

Internal consistency reliability

Item discrimination or the extent to which individual items contributed to the overall scale, was assessed by calculating Cronbach's alpha (α) and McDonald's omega (ω) values if the item was removed [38, 39]. The internal consistency reliability of the identified FACIT-COST factors was also evaluated using Cronbach's α and McDonald's ω, with internal consistency considered adequate if α or ω was between 0.70 and 0.90, inclusive [40, 41].

Known-groups validity

Known-groups validity was evaluated by comparing the average FACIT-COST scores of patient groups based on their socio-demographic, clinical characteristics, financial coping strategies, and responses of FT12 item, which was not included in the computation of FACIT-COST total score. The FACIT-COST total scores were compared across subgroups using the Mann-Whitney or Kruskal-Wallis test. We hypothesized that patients who were younger, low-educated, living in a rural area, had lower income, not actively working, had metastatic cancer, and experienced more symptoms to have lower FACIT-COST total score (or higher SFT) [15, 18, 19, 42]. We also predicted that patients who used more financial coping strategies and scored higher (i.e., worse) on FT12 of FACIT-COST would have lower FACIT-COST score.

Evaluation of changes in SFT status

The FT12 item, which asked whether illness had been a financial hardship to study participants and their families, was adopted to evaluate changes in the patients' SFT and further utilized as an anchor for test-retest reliability and responsiveness analyses. To determine the appropriateness of the FT12 as anchor, a Spearman's rank correlation of ≥0.30 between FT12 and FACIT-COST total score was required [43]. Changes in FT12 were classified into three subgroups: (i) 'unchanged,' if baseline FT12 item score was equal to the follow-up, (ii) 'improved,' if baseline FT12 item score was greater than the follow-up, and (iii) 'worsened,' if baseline FT12 item score was lower than the follow-up. The test-retest reliability analysis included only patients with an 'unchanged' status, while the responsiveness analysis considered patients with 'improved' and 'worsened' statuses.

Combining the T1 and T2 group responses for test-retest reliability and responsiveness analyses

Initially, different follow-up time points were used to increase the likelihood that one group (T1) would remain stable, serving for test-retest reliability analysis, while the other group (T2) would experience change, designated for responsiveness analysis. However, ultimately, the responses from T1 and T2 were combined due to minimal differences between the groups' responses, as well as to increase statistical power.

Test-retest reliability and responsiveness

Test-retest reliability was evaluated using Gwet's AC2 coefficient for the items and intraclass correlation coefficient for the instrument [44, 45]. The coefficients were interpreted as: slight agreement (0-0.20), fair agreement (0.21–0.40), moderate agreement (0.41–0.60), strong agreement (0.61–0.80), and almost-perfect agreement (0.81-1.00) [46].

Responsiveness to change was assessed using standardized response mean (SRM) and effect size (SES). The SRM was estimated as the mean change in FACIT-COST total scores between baseline and follow-up and divided by the standard deviation of the score change. The SES was computed as the mean change between baseline and follow-up scores divided by the standard deviation of the baseline score. The SRM and SES results were interpreted as small (< 0.50), moderate (0.50–0.79), and large (≥0.80) [47].

Results

Patient characteristics

A total of 300 female patients with breast cancer (mean age 51 ± 10) participated completed the baseline questionnaire (response rate = 96.8%). Out of 300 patients,

150 were in active treatment cycles at baseline and invited to the T1 follow-up, which was completed by 148 patients (mean follow-up duration = 5.8 ± 3.0 weeks, range = 1.9–13.0 weeks). The remaining 150 patients, consisting of those in their final round of treatment cycle, were invited to the T2 follow-up, with all 150 completing the follow-up questionnaire (mean follow-up duration = 11.6 ± 4.0 weeks, range = 4.0-25.9 weeks). Two patients died during the study period. There were no statistically significant differences in socio-demographic or clinical characteristics between the patients in T1 and T2 groups except for disease duration (Table 1).

Table 1 Baseline characteristics of the patients

Characteristic	Overall sample (*n* = 300)		T1 follow-up group (*n* = 148)		T2 follow-up group (*n* = 150)		*p*-value
	N	%	*N*	%	*N*	%	
Socio-demographic characteristic							
Age							
< 50 years	132	44.0%	67	45.3%	64	42.7%	0.642
50 years and above	168	56.0%	81	54.7%	86	57.3%	
Education							
Primary or less	92	30.7%	46	31.1%	45	30.0%	0.893
Secondary	157	52.3%	78	52.7%	78	52.0%	
Tertiary	51	17.0%	24	16.2%	27	18.0%	
Employment status							
Employed	55	18.3%	32	21.6%	23	15.3%	0.400
Homemaker	221	73.7%	104	70.3%	115	76.7%	
Unemployed and job-seeking	4	1.3%	2	1.4%	2	1.4%	
Retired	20	6.7%	10	6.8%	10	6.7%	
Residential setting							
Rural	179	59.7%	91	61.5%	86	57.3%	0.410
Urban	121	40.3%	57	38.5%	64	42.7%	
Children (aged < 17) living in the same household							
0	144	48.0%	65	43.9%	78	52.0%	0.235
1	80	26.7%	40	27.0%	40	26.7%	
2 or more	76	25.3%	43	29.1%	32	21.3%	
Net monthly household income[a]							
Up to 5 million IDR	270	90.0%	131	88.5%	137	91.3%	0.441
> 5 million IDR	30	10.0%	17	11.5%	13	8.7%	
Health insurance coverage	299	99.7%	147	99.3%	150	100.0%	0.317
Clinical characteristic							
Disease duration							
1 year or less	144	48.0%	60	40.5%	83	55.3%	0.011*
> 1 year	156	52.0%	88	59.5%	67	44.7%	
Current metastasis status[b]							
No	276	92.0%	136	91.9%	140	93.3%	0.395
Yes	24	8.0%	12	8.1%	10	6.7%	
Number of symptoms experienced during the past week[c]							
None	17	5.7%	12	8.1%	5	3.3%	0.311
1–5 symptoms	119	39.7%	61	41.2%	58	38.7%	
6–10 symptoms	93	31.0%	43	29.1%	49	32.7%	
> 10 symptoms	71	23.7%	32	21.6%	38	25.3%	

T1 follow-up = completed during the subsequent treatment cycle, T2 follow-up = completed during the post-treatment consultation. There were no missing responses as all questions were mandatory. Total of the percentages may not add up to 100% due to rounding

* Chi-square (χ^2) test $p < 0.05$

[a] IDR= Indonesian Rupiah, 324.34 USD = 5 million IDR (based on the closing 2023 middle exchange rate, Bank Indonesia)

[b] Most common sites were bone, lung, and liver

[c] Most commonly self-reported symptoms included fatigue, dizziness, muscle pain, sleep problem, and anxiety

Distributional characteristics

The FACIT-COST items with the highest ceiling (i.e., no SFT) were 'frustrated about unable to continue/work as usual' (54.7%), 'concerned about keeping income' (45.7%), and 'out-of-pocket expenses were more than thought' (42.3%), while the items with highest floor (i.e., highest SFT) were 'have enough money to cover treatment' (37.7%), 'satisfied with current finances', and 'in control of finances' (19.0% each) (Table 2). Complete FACIT-COST responses are presented in Table 2 (baseline) and Appendix 1 (follow-up). The mean FACIT-COST total scores were 24.29 ± 8.66 and 24.50 ± 8.68 at baseline and follow-up, respectively. No patients reported the best or worst possible total score (i.e., both ceiling and floor were 0%).

Structural validity

The PCA resulted in a two-component model, with the first and second components accounting for 37.3% and 23.3% of the variance in FACIT-COST, respectively (Table 3). Component 1 consisted of the seven negatively worded items related to adverse reactions to financial burden, whereas Component 2 comprised the four positively worded items related to the perceived ability to manage financial burden. Overall, seven items exhibited excellent factor loadings (range = 0.755–0.896), while the rest were very good (0.633–0.698). Two items did not pass the threshold for acceptable communalities in relation to the factor on which they loaded, i.e., 'have enough money to cover treatment (0.436) and 'feel financially stressed' (0.380).

The results of the CFA confirmed a good fit for the two-factor model, reflecting the underlying construct of subjective financial toxicity, as indicated by the following indices: RMSEA = 0.042 (95%CI = 0.019–0.063), SRMR = 0.049 (95%CI = 0.048–0.074), CFI = 0.998 (95%CI = 0.990–0.999), and TLI = 0.997 (95%CI = 0.987–0.997) (Table 4). Three covariance parameters were added to this model. Items with the highest factor loadings included 'able to meet monthly expenses' (0.899), 'satisfied with current finances' (0.847), and 'reduced financial satisfaction due to treatment/disease' (0.846), while 'have enough money to cover treatment' and 'out-of-pocket expenses are more than thought' items had the lowest factor loadings at 0.509 and 0.474, respectively.

Internal consistency reliability

The two factors of the FACIT-COST demonstrated adequate internal consistency reliability (Appendix 2). For the first factor (i.e., the seven negatively worded items), Cronbach's α was 0.882 (95%CI: 0.861–0.901) and McDonald's ω was 0.888 (95%CI: 0.868–0.907). The second factor (i.e., the four positively worded items) yielded lower reliability coefficients, with α = 0.774 (95%CI: 0.729–0.813) and ω = 0.786 (95%CI: 0.747–0.825). Trivial improvements were observed in the first factor's reliability if FT2 was removed (α = 0.893, ω = 0.896), and in the second factor if FT1 was removed (α = 0.795, ω = 0.800).

Known-groups validity

As hypothesized, patients who were younger, lower-educated, resided in a rural area, earned lower income,

Table 2 FACIT-COST item distribution at baseline

Code	FACIT-COST item[a]	Baseline responses, *n* = 300 (n, %)					Ceiling (*n*, %)	Floor (*n*, %)
		Not at all	A little bit	Somewhat	Quite a bit	Very much		
FT1	Have enough money to cover treatment	113 (37.7%)	86 (28.7%)	80 (26.7%)	19 (6.3%)	2 (0.7%)	2 (0.7%)	113 (37.7%)
FT2[b]	Out-of-pocket expenses are more than thought	127 (42.3%)	53 (17.7%)	56 (18.7%)	47 (15.7%)	17 (5.7%)	127 (42.3%)	17 (5.7%)
FT3[b]	Worry about future financial problems	86 (28.7%)	50 (16.7%)	76 (25.3%)	52 (17.3%)	36 (12.0%)	86 (28.7%)	36 (12.0%)
FT4[b]	No choice about money spent	104 (34.7%)	48 (16.0%)	68 (22.7%)	57 (19.0%)	23 (7.7%)	104 (34.7%)	23 (7.7%)
FT5[b]	Frustrated about inability to contribute/work as usual	164 (54.7%)	52 (17.3%)	52 (17.3%)	24 (8.0%)	8 (2.7%)	164 (54.7%)	8 (2.7%)
FT6	Satisfied with current finances	57 (19.0%)	62 (20.7%)	135 (45.0%)	39 (13.0%)	7 (2.3%)	7 (2.3%)	57 (19.0%)
FT7	Able to meet monthly expenses	45 (15.0%)	64 (21.3%)	141 (47.0%)	43 (14.3%)	7 (2.3%)	7 (2.3%)	45 (15.0%)
FT8[b]	Feel financially stressed	70 (23.3%)	65 (21.7%)	93 (31.0%)	41 (13.7%)	31 (10.3%)	70 (23.3%)	31 (10.3%)
FT9[r]	Concerned about keeping income	137 (45.7%)	58 (19.3%)	50 (16.7%)	38 (12.7%)	17 (5.7%)	137 (45.7%)	17 (5.7%)
FT10[b]	Reduced financial satisfaction due to treatment/disease	89 (29.7%)	57 (19.0%)	84 (28.0%)	46 (15.3%)	24 (8.0%)	89 (29.7%)	24 (8.0%)
FT11	In control of finances	57 (19.0%)	79 (26.3%)	118 (39.3%)	37 (12.3%)	9 (3.0%)	9 (3.0%)	57 (19.0%)
FT12	Financial hardship to my family and me	101 (33.7%)	47 (15.7%)	67 (22.3%)	53 (17.7%)	32 (10.7%)	101 (33.7%)	32 (10.7%)

FACIT-COST COST: A FACIT Measure of Financial Toxicity

[a] Labeled by the authors based on the FACIT-COST items

[b] Items coded in reverse for the FACIT-COST total score computation

Table 3 Principal component analysis results

Code	FACIT-COST item[a]	Component loadings		Communalities
		Component 1	Component 2	
FT4	No choice about money spent	0.896	-	0.740
FT3	Worry about future financial problems	0.828	-	0.701
FT9	Concerned about keeping income	0.787	-	0.652
FT10	Reduced financial satisfaction due to treatment/disease	0.755	-	0.654
FT5	Frustrated about inability to contribute/work as usual	0.698	-	0.540
FT2	Out-of-pocket expenses are more than thought	0.672	-	0.603
FT8	Feel financially stressed	0.633	-	0.380
FT7	Able to meet monthly expenses	-	0.818	0.728
FT6	Satisfied with current finances	-	0.792	0.690
FT11	In control of finances	-	0.756	0.540
FT1	Have enough money to cover treatment	-	0.697	0.436
Component characteristic		**Promax rotation**		
		Eigenvalue		**Proportion variance**
Component 1		4.102		37.3%
Component 2		2.560		23.3%
PCA appropriateness check				
Kaiser-Meyer-Olkin overall measure		0.883		
Bartlett's test for sphericity		$\chi2 = 1542.459$ (df = 55), $p < 0.001$		

FACIT-COST COST: A FACIT Measure of Financial Toxicity

[a] Labeled by the authors based on the FACIT-COST items

not actively employed, suffered from metastatic cancer, and reported more symptoms had significantly lower FACIT-COST total scores (i.e. higher SFT) (Table 5). Significant differences were found in FACIT-COST total scores across patients who implemented financial coping strategies as follows: incurring debt, selling assets, and closing business. The FACIT-COST also significantly discriminated across the responses of FT12 item. However, the FACIT-COST score did not discriminate across known-groups based on the number of children, disease duration, and withdrawing savings/pension to cope with financial challenges.

Changes in SFT status

Overall, 45 (15%), 66 (22%), and 187 (63%) patients experienced improved, worsened, and unchanged SFT based on the FT12 item, respectively (Table 6). A strong correlation (Spearman's rho = 0.80) was found between the FT12 item and FACIT-COST total score at baseline, therefore supporting its use as an anchor for test-retest reliability and responsiveness analyses.

Test-retest reliability and responsiveness

Strong agreement was found for all items (Gwet's AC2 range = 0.64–0.79), with 'concerned about keeping income' as the best-performing item (Table 6). At the instrument level, the FACIT-COST indicated excellent agreement, with an ICC of 0.96. Furthermore, it demonstrated responsiveness with large SRM and SES in the 'improved' subgroup ($n = 45$, SRM = 0.92, SES = 0.75). While in the 'worsened' subgroup, small to borderline moderate SRM and SES were found ($n = 66$, SRM=-0.50, SES=-0.39). The Gwet's AC2, ICC, SRM, and SES for each follow-up group are presented in Appendix 3.

Discussion

This study evaluated the measurement properties of the Indonesian version of FACIT-COST. Our findings show that the FACIT-COST is a psychometrically valid and reliable measure, as indicated by the absence of ceiling and floor effects at the scale level, good structural validity, adequate internal consistency reliability, discriminatory power across multiple key known-groups,

Table 4 Confirmatory factor analysis results

Factor loadings				
Factor	**FACIT-COST item**[a]		**Estimate**	***p*-value**
Factor 1	FT2	Out-of-pocket expenses are more than thought	0.474	$p < 0.001$
	FT3	Worry about future financial problems	0.819	$p < 0.001$
	FT4	No choice about money spent	0.791	$p < 0.001$
	FT5	Frustrated about inability to contribute/work as usual	0.739	$p < 0.001$
	FT8	Feel financially stressed	0.808	$p < 0.001$
	FT9	Concerned about keeping income	0.810	$p < 0.001$
	FT10	Reduced financial satisfaction due to treatment/disease	0.846	$p < 0.001$
Factor 2	FT1	Have enough money to cover treatment	0.509	$p < 0.001$
	FT6	Satisfied with current finances	0.847	$p < 0.001$
	FT7	Able to meet monthly expenses	0.899	$p < 0.001$
	FT11	In control of finances	0.641	$p < 0.001$
Factor 1 ↔ Factor 2 covariance = -0.577				
Correlations in the model				
FT5 ↔ FT9				0.178
FT2 ↔ FT4				0.178
FT3 ↔ FT4				0.146
Goodness-of-fit statistics (95% confidence interval)				
RMSEA		**SRMR**	**CFI**	**TLI**
0.042 (0.019–0.063)		0.049 (0.048–0.074)	0.998 (0.990–0.999)	0.997 (0.987–0.997)

CFI Comparative Fit Index, *FACIT-COST* COST: A FACIT Measure of Financial Toxicity, *RMSEA* Root mean square error of approximation, *SRMR* Standardized root mean square residual, *TLI* Tucker-Lewis Index

[a] Labeled by the authors based on the FACIT-COST items

excellent instrument-level test-retest reliability, and evidence of responsiveness to change. The absence of ceiling and floor effects suggests a good coverage of the FACIT-COST items across the whole range of the underlying construct.

Our findings suggest a two-factor structure for the Indonesian version of FACIT-COST (v2). The factors and their corresponding items align with the structures found in the Simplified Chinese, Arabic, and Vietnamese (v1) versions, which were validated across various types of cancer [18, 20, 48]. The two-factor model suggests that financial toxicity encompasses both the negative experiences of financial burden and the ability to manage one's finances. This model provides healthcare providers with a better understanding of patients' financial toxicity and supports more targeted interventions, such as providing resources to reduce financial burden or financial navigation programs to improve financial management skills [49–55]. The results of our internal consistency reliability analysis align with the range observed in previous validations of translated FACIT-COST instruments with two-factor solutions ($\alpha = 0.77–0.92$) [18, 20, 48], even though some of these figures are lower than those reported in the original US validation study, which used a one-factor solution ($\alpha = 0.92$) [15].

Structural variations in FACIT-COST have been observed, including a one-factor model for the original US (v1) and Italian (v2) versions, and a three-factor model for the Persian (v1) version [17, 24, 56]. Interestingly, a study in Hong Kong failed to confirm either a one- or two-factor structure for the Traditional Chinese (v2) version [19]. Originating in the US, the FACIT-COST may not universally apply due to differences in health systems, socioeconomic factors, and cultural contexts. In the case of the Indonesian FACIT-COST, two items—'have enough money to cover treatment' and 'out-of-pocket expenses are more than thought'—did not fit the model well, while also showing high item floor/ceiling. This outcome could be attributable to the public referral hospital setting of our study. Moreover, the women in our sample were predominantly not the primary earners in their families and may have perceived financial hardship differently from the main income provider. Nevertheless, we support the use of the two-factor structure based on the good model fit. Factorial structure differences are not uncommon in outcome measures, both in original and translated versions [57–60]. Therefore, future translations and cross-cultural adaptations

Table 5 Differences in FACIT-COST scores across known-groups

Characteristics	*n*	%	Mean (SD) FACIT-COST total score	*p*-value
Socio-demographic grouping				
Age				
< 50 years	132	44.0%	22.1 (8.6)	$p < 0.001$
50 years and above	168	56.0%	25.9 (8.3)	
Education				
Primary or less	92	30.7%	21.8 (7.9)	$p < 0.001$
Secondary	157	52.3%	24.0 (8.5)	
Tertiary	51	17.0%	29.4 (8.3)	
Residential setting				
Rural	179	59.7%	22.5 (8.5)	$p < 0.001$
Urban	121	40.3%	26.8 (8.2)	
Net monthly household income				
Up to 5 million IDR	270	90.0%	23.3 (8.4)	$p < 0.001$
> 5 million IDR	30	10.0%	32.5 (5.8)	
Children (aged < 17) living in the same household				
0	144	48.0%	24.8 (8.9)	$p = 0.082$
1	80	26.7%	22.4 (8.5)	
2 or more	76	25.3%	25.1 (8.2)	
Employment status				
Employed	55	18.3%	25.9 (8.5)	$p = 0.002$
Homemaker (incl. $n = 4$ seeking for work)	225	75.0%	23.4 (8.6)	
Retired	20	6.7%	28.9 (7.4)	
Clinical grouping				
Disease duration (in years)				
1 year or less	144	48.0%	25.2 ± 8.4	$p = 0.079$
> 1 year	156	52.0%	23.3 ± 8.8	
Metastasis (current)				
No	276	92.0%	24.5 (8.7)	$p = 0.042$
Yes	24	8.0%	20.8 (7.6)	
Number of symptoms in the past 7 days				
None	17	5.7%	26.82 (87.84)	$p < 0.001$
1–5 symptoms	119	39.7%	26.29 (8.39)	
6–10 symptoms	93	31.0%	24.15 (7.96)	
> 10 symptoms	71	23.7%	20.31 (8.88)	
Financial coping strategies:				
Debt				
Incurred loan	90	30.0%	18.6 (7.8)	$p < 0.001$
Did not incur loan	210	70.0%	26.6 (7.8)	
Savings/pension withdrawal				
Withdrew pension/savings	77	25.7%	24.6 (9.3)	$p = 0.645$
Did not withdraw pension/savings	223	74.3%	24.1 (8.4)	
Asset sale				
Sold assets	33	11.0%	19.7 (9.2)	$p = 0.002$
Did not sell assets	267	89.0%	24.8 (8.4)	
Closing business				
Closed business	10	3.3%	18.8 (9.1)	$p = 0.047$
Did not close business	290	96.7%	24.4 (8.6)	
Number of financial coping strategies used				
0	147	49.0%	26.4 (7.9)	$p < 0.001$
1	116	38.7%	23.3 (8.8)	
2	21	7.0%	21.8 (7.0)	
3–4	16	5.3%	12.7 (5.7)	

Table 5 (continued)

Characteristics	*n*	%	Mean (SD) FACIT-COST total score	*p*-value
FACIT-COST item 12 responses				
0: Not at all	101	33.7%	32.1 (6.1)	$p < 0.001$
1: A little bit	47	15.7%	25.5 (4.0)	
2: Somewhat	67	22.3%	23.2 (4.2)	
3: Quite a bit	53	17.7%	16.7 (6.0)	
4: Very much	32	10.7%	12.2 (5.0)	

Total of the percentages may not add up to 100% due to rounding

FACIT-COST COST: A FACIT Measure of Financial Toxicity

can consider qualitative testing to inform the further development of the instrument.

Patients who were younger, living in a rural area, had lower income, and not actively employed were shown to have higher SFT. These differences in socio-demographic factors have been well-documented [1, 18, 42, 61]. Younger patients or those who are not actively employed could be more susceptible to have financial toxicity due to lower or no earning capacity. Meanwhile, those living in rural area may incur higher transportation costs to reach the medical facility for treatment [62]. Higher SFT was also reported by patients with metastatic cancer and experiencing more symptoms. Studies have shown that financial toxicity was related to cancer symptom burden [63, 64], and that patients with more advanced stage of cancer experienced higher financial burden due to their more complex treatment [65]. Furthermore, as hypothesized, patients who implemented more coping strategies had higher SFT, as their high cancer-related costs may have required them to prepare more funds through actions such as making loans, which could be associated with higher perceived SFT.

The excellent instrument-level test-retest reliability of the Indonesian FACIT-COST (ICC = 0.96) was similar to that of the Chinese (ICCs = 0.80–0.89) and Japanese (ICC = 0.85) versions [18, 66], and higher than the US version (ICC = 0.80), which was assessed in a small sample size of 20 [15]. In comparison, the responsiveness that we observed (SRM= |0.50| to |0.92|) was larger than what was reported in the Chinese validation study (SRM = 0.2–0.3) in patients with lung, stomach, colorectal, and breast cancer [18]. However, it should be noted that the Chinese study had a longer follow-up period of six months and involved all patients without using an anchor for assessing change in the patients.

We acknowledge some limitations of our study. First, the sample comprised exclusively female patients with one type of cancer. Second, the study was performed at a public referral hospital where almost all patients (99.7%) were covered by insurance, which may explain why there were no worst possible scores. However, it is important to note that public health insurance coverage did not guarantee exemption from financial toxicity, as certain expenses such as transportation, specific medical procedures and supplies, may not have been covered. Moreover, patients may have also experienced productivity loss due to treatment. The use of financial coping strategies reported by patients further supported the presence of financial toxicity. Third, some analyses may have been underpowered due to the limited sample size of subgroups. Future studies can consider larger sample size, involving other or multiple cancer types, and populations from private hospitals where patients may incur higher out-of-pocket cancer expenditures. Longer follow-up periods (e.g., 6–12 months) can also be considered for future testing.

Conclusions

This study is the first to validate the FACIT-COST solely in a breast cancer population and to report on the measurement properties of the Indonesian version of FACIT-COST. We conclude that the Indonesian version of FACIT-COST (v2) shows acceptable psychometric performance and may be applied for assessing patient financial toxicity. Healthcare providers can use this instrument to better understand and address the financial challenges their patients may face during treatment, integrating these considerations into personalized care plans. This can be help prevent serious consequences of financial toxicity, such as treatment non-adherence. Additionally, patients identified as experiencing high financial toxicity can be referred to existing social aid resources for further support.

Table 6 Test-retest reliability and responsiveness of the FACIT-COST

Code	FACIT-COST item[a]	Gwet's AC2 for T1 and T2 follow-up groups combined ($n = 187$)
FT1	Have enough money to cover treatment	0.72
FT2	Out-of-pocket expenses are more than thought	0.71
FT3	Worry about future financial problems	0.71
FT4	No choice about money spent	0.71
FT5	Frustrated about inability to contribute/work as usual	0.76
FT6	Satisfied with current finances	0.69
FT7	Able to meet monthly expenses	0.64
FT8	Feel financially stressed	0.69
FT9	Concerned about keeping income	0.79
FT10	Reduced financial satisfaction due to treatment/disease	0.68
FT11	In control of finances	0.65

Patient subgroups	n	%	Mean (SD) FACIT-COST total score			ICC (95% CI)	SRM (95% CI)	SES (95% CI)
			Baseline	Follow-up	Change			
T1 and T2 combined	*298*	*100%*	24.29 (8.66)	24.50 (8.68)	0.21 (4.96)			
Improved in FT12	45	*15%*	19.47 (6.85)	24.60 (6.25)	5.13 (5.59)	-	0.92 (0.67, 1.18)	0.75 (0.51, 1.01)
Worsened in FT12	*66*	*22%*	24.17 (6.54)	21.62 (6.64)	-2.55 (5.13)	-	-0.50 (-0.77, -0.22)	-0.39 (-0.59, -0.19)
Unchanged in FT12	*187*	*63%*	25.49 (9.31)	25.49 (9.57)	0.00 (3.75)	0.96 (0.95, 0.97)	-	-

1. T1 follow-up = completed during the subsequent treatment cycle, T2 follow-up = completed during the post-treatment consultation

2. Gwet's AC2 was computed for patients with unchanged FT12 response at the follow-up compared to the baseline

3. Test-retest reliability (Gwet's AC2) for item FT12 was not computed because it was used as an anchor

4. Improved in FT12 = baseline item score greater than follow-up, worsened = follow-up item score greater than baseline, unchanged = baseline item score equaled to follow-up

CI Confidence interval, *FACIT-COST* COST: A FACIT Measure of Financial Toxicity, *FT12* twelfth item of the FACIT-COST ('financial hardship to my family and me'), *ICC* Intraclass correlation coefficient, *SD* Standard deviation, *SEM* Standard error of measurement, *SES* Standardized effect size, *SRM* Standardized response mean

[a] Labeled by the authors based on the FACIT-COST items

Appendix 1

Item response distribution for T1 and T2 follow-up groups

Code	FACIT-COST item[a]	T1 follow-up (*n*=148)					T2 follow-up (*n*=150)				
		Not at all	A little bit	Somewhat	Quite a bit	Very much	Not at all	A little bit	Somewhat	Quite a bit	Very much
FT1	Have enough money to cover treatment	55 (37.2%)	40 (27.0%)	40 (27.0%)	12 (8.1%)	1 (0.7%)	62 (41.3%)	44 (29.3%)	32 (21.3%)	12 (8.0%)	0 (0.0%)
FT2	Out-of-pocket expenses are more than thought	67 (45.3%)	21 (14.2%)	25 (16.9%)	24 (16.2%)	11 (7.4%)	54 (36.0%)	33 (22.0%)	33 (22.0%)	22 (14.7%)	8 (5.3%)
FT3	Worry about future financial problems	42 (28.4%)	31 (20.9%)	30 (20.3%)	29 (19.6%)	16 (10.8%)	40 (26.7%)	33 (22.0%)	40 (26.7%)	26 (17.3%)	11 (7.3%)
FT4	No choice about money spent	64 (43.2%)	21 (14.2%)	32 (21.6%)	20 (13.5%)	11 (7.4%)	37 (24.7%)	34 (22.7%)	45 (30.0%)	25 (16.7%)	9 (6.0%)
FT5	Frustrated about inability to contribute/work as usual	84 (56.8%)	30 (20.3%)	20 (13.5%)	6 (4.1%)	8 (5.4%)	79 (52.7%)	36 (24.0%)	24 (16.0%)	7 (4.7%)	4 (2.7%)
FT6	Satisfied with current finances	33 (22.3%)	32 (21.6%)	60 (40.5%)	22 (14.9%)	1 (0.7%)	24 (16.0%)	35 (23.3%)	69 (46.0%)	18 (12.0%)	4 (2.7%)
FT7	Able to meet monthly expenses	18 (12.2%)	35 (23.6%)	69 (46.6%)	22 (14.9%)	4 (2.7%)	13 (8.7%)	35 (23.3%)	73 (48.7%)	25 (16.7%)	4 (2.7%)
FT8	Feel financially stressed	36 (24.3%)	31 (20.9%)	42 (28.4%)	24 (16.2%)	15 (10.1%)	33 (22.0%)	36 (24.0%)	43 (28.7%)	26 (17.3%)	12 (8.0%)
FT9	Concerned about keeping income	65 (43.9%)	23 (15.5%)	31 (20.9%)	15 (10.1%)	14 (9.5%)	72 (48.0%)	26 (17.3%)	31 (20.7%)	13 (8.7%)	8 (5.3%)
FT10	Reduced financial satisfaction due to treatment/disease	51 (34.5%)	28 (18.9%)	33 (22.3%)	22 (14.9%)	14 (9.5%)	39 (26.0%)	25 (16.7%)	48 (32.0%)	29 (19.3%)	9 (6.0%)
FT11	In control of finances	26 (17.6%)	33 (22.3%)	65 (43.9%)	19 (12.8%)	5 (3.4%)	19 (12.7%)	45 (30.0%)	62 (41.3%)	19 (12.7%)	5 (3.3%)
FT12	Financial hardship to my family and me	44 (29.7%)	33 (22.3%)	26 (17.6%)	26 (17.6%)	19 (12.8%)	46 (30.7%)	18 (12.0%)	35 (23.3%)	37 (24.7%)	14 (9.3%)

T1 follow-up= completed during the subsequent treatment cycle, T2 follow-up= completed during the post-treatment consultation

FACIT-COST COST: A FACIT Measure of Financial Toxicity

[a] Labeled by the authors based on the FACIT-COST items

Appendix 2

Internal consistency reliability results

Factor	FACIT-COST item[a]		Cronbach's alpha (95% CI)	McDonald's omega (95% CI)	Cronbach's alpha if item dropped[b]	McDonald's omega if item dropped[b]
Factor 1	FT2	Out-of-pocket expenses are more than thought	0.882 (0.861-0.901)	0.888 (0.868-0.907)	0.893	0.896
	FT3	Worry about future financial problems			0.853	0.859
	FT4	No choice about money spent			0.852	0.857
	FT5	Frustrated about inability to contribute/work as usual			0.871	0.877
	FT8	Feel financially stressed			0.867	0.873
	FT9	Concerned about keeping income			0.859	0.868
	FT10	Reduced financial satisfaction due to treatment/disease			0.859	0.867
Factor 2	FT1	Have enough money to cover treatment	0.774 (0.729-0.813)	0.786 (0.747-0.825)	0.795	0.800
	FT6	Satisfied with current finances			0.670	0.694
	FT7	Able to meet monthly expenses			0.659	0.679
	FT11	In control of finances			0.740	0.761

CI Confidence interval, *FACIT-COST* COST: A FACIT Measure of Financial Toxicity

[a] Labeled by the authors based on the FACIT-COST items

[b] Dropped from its corresponding factor

Appendix 3

Test-retest reliability and responsiveness for T1 and T2 follow-up groups

Code	FACIT-COST item[a]	Gwet's AC2 coefficient	
		T1 only (*n*=79)	T2 only (*n*=108)
FT1	Have enough money to cover treatment	0.60	0.81
FT2	Out-of-pocket expenses are more than thought	0.57	0.80
FT3	Worry about future financial problems	0.60	0.79
FT4	No choice about money spent	0.59	0.80
FT5	Frustrated about inability to contribute/work as usual	0.67	0.83
FT6	Satisfied with current finances	0.51	0.81
FT7	Able to meet monthly expenses	0.53	0.72
FT8	Feel financially stressed	0.57	0.77
FT9	Concerned about keeping income	0.70	0.84
FT10	Reduced financial satisfaction due to treatment/disease	0.62	0.73
FT11	In control of finances	0.52	0.75

Code	FACIT-COST item[a]					Gwet's AC2 coefficient		
						T1 only (*n*=79)		T2 only (*n*=108)
Patient subgroups	**n**	**%**	**Mean (SD) FACIT-COST total score**			**ICC (95% CI)**	**SRM (95% CI)**	**SES (95% CI)**
			Baseline	**Follow-up**	**Change**			
T1 follow-up group	*148*	*100%*	*23.97 (8.40)*	*24.55 (9.03)*	*0.58 (5.74)*			
Improved in FT12	24	*16%*	19.33 (6.43)	25.46 (5.82)	6.13 (6.19)	-	0.99 (0.60, 1.42)	0.95 (0.53, 1.37)
Worsened in FT12	45	*30%*	23.42 (6.81)	21.13 (7.60)	-2.29 (5.44)	-	-0.42 (-0.79, -0.11)	-0.34 (-0.58, -0.09)
Unchanged in FT12	79	*53%*	25.70 (9.20)	26.23 (10.07)	0.53 (4.47)	0.89 (0.84, 0.93)	-	-
T2 follow-up group	*150*	*100%*	*24.59 (8.93)*	*24.44 (8.33)*	*-0.15 (4.03)*			
Improved in FT12	21	14%	19.62 (7.45)	23.62 (6.73)	4.00 (4.69)	-	0.85 (0.59, 1.16)	0.54 (0.30, 0.87)
Worsened in FT12	21	14%	25.76 (5.75)	22.67 (3.81)	-3.10 (4.47)	-	-0.69 (-0.98, -0.41)	-0.54 (-0.97, -0.24)
Unchanged in FT12	108	72%	25.33 (9.42)	24.94 (9.20)	-0.39 (3.10)	0.94 (0.92, 0.96)	-	-

1. T1 follow-up= completed during the subsequent treatment cycle, T2 follow-up= completed during the post-treatment consultation

2. Gwet's AC2 was computed for patients with unchanged FT12 response at the follow-up compared to the baseline

3. Test-retest reliability (Gwet's AC2) for item FT12 was not computed because it was used as an anchor

4. Improved in FT12= baseline item score greater than follow-up, worsened= follow-up item score greater than baseline, unchanged= baseline item score equaled to follow-up

CI Confidence interval, *FACIT-COST* COST: A FACIT Measure of Financial Toxicity, *FT12* twelfth item of the FACIT-COST ('financial hardship to my family and me'), *ICC* Intraclass correlation coefficient, *SD* Standard deviation, *SEM* Standard error of measurement, *SES* Standardized effect size, *SRM* Standardized response mean

[a] Labeled by the authors based on the FACIT-COST items

Acknowledgements
We are grateful to the team of research assistants who were involved in the data collection.

Role of funder
The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Authors' contributions
Conceptualization and design: SP, FDP, HS, CM, FR; Acquisition of data: FDP, HS; Statistical analysis: SP, FR; Interpretation of data: SP, FDP, HS, CM, FR; Drafting of the manuscript: SP; Critical revision of the paper for important intellectual content: SP, FDP, HS, CM, FR. All authors reviewed and approved the final version of the manuscript.

Funding
Data collection was supported by the EuroQol Research Foundation (Project no. 1644-RA). Open access funding was provided by Corvinus University of Budapest.

Data availability
The data that support the findings of this study are available from the corresponding author upon reasonable request and with the permission of FDP.

Declarations

Ethics approval and consent to participate
Ethics approval was granted by the Research Ethics Committee of the Hasan Sadikin General Hospital, Bandung, Indonesia (LB.02.01/X.6.5/284/2023). All patients provided written informed consent prior to participation in the study.

Consent for publication
Not applicable.

Competing interests
FDP, CM, and FR are associate editors at Health and Quality of Life Outcomes and were not involved in the editorial or peer review process. SP and HS declare no competing interests.

Author details
[1]Department of Health Policy, Corvinus University of Budapest, Fővám tér 8, Budapest 1093, Hungary. [2]Doctoral School of Business and Management, Corvinus University of Budapest, Budapest, Hungary. [3]Faculty of Economics and Business, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia. [4]Department of Psychology, Faculty of Psychology, Universitas Padjajaran, Bandung, Indonesia. [5]School of Medicine and Population Health, University of Sheffield, England, United Kingdom.

Received: 6 July 2024 Accepted: 2 October 2024
Published online: 19 October 2024

References

1. Pangestu S, Rencz F. Comprehensive score for financial toxicity and health-related quality of life in patients with cancer and survivors: a systematic review and meta-analysis. Value Health. 2023;26:300–16.
2. Bhanvadia SK, Psutka SP, Burg ML, de Wit R, Dhillon HM, Gyawali B, Morgans AK, Goldstein DA, Smith AB, Sun M, Penson DF. Financial toxicity among patients with prostate, bladder, and kidney Cancer: a systematic review and call to action. Eur Urol Oncol. 2021;4:396–404.
3. Ritter J, Allen S, Cohen PD, Fajardo AF, Marx K, Loggetto P, Auste C, Lewis H, de Sá Rodrigues KE, Hussain S, et al. Financial hardship in families of children or adolescents with cancer: a systematic literature review. Lancet Oncol. 2023;24:e364-75.
4. Sitlinger A, Zafar SY. Health-related quality of life: the impact on morbidity and mortality. Surg Oncol Clin N Am. 2018;27:675–84.

5. Witte J, Mehlis K, Surmann B, Lingnau R, Damm O, Greiner W, Winkler EC. Methods for measuring financial toxicity after cancer diagnosis and treatment: a systematic review and its implications. Ann Oncol. 2019;30:1061–70.
6. Carrera PM, Kantarjian HM, Blinder VS. The financial burden and distress of patients with cancer: understanding and stepping-up action on the financial toxicity of cancer treatment. CA Cancer J Clin. 2018;68:153–65.
7. Gordon LG, Merollini KMD, Lowe A, Chan RJ. A systematic review of Financial Toxicity among Cancer survivors: we can't pay the co-pay. Patient. 2017;10:295–309.
8. Jiang H, Lyu J, Mou W, Jiang Q, Du J. Association between financial toxicity and health-related quality of life in cancer survivors: a systematic review. Asia Pac J Clin Oncol. 2023;19:439–57.
9. Riva S, Arenare L, Di Maio M, Efficace F, Montesarchio V, Frontini L, Giannarelli D, Bryce J, Del Campo L, De Lorenzo F, et al. Cross-sectional study to develop and describe psychometric characteristics of a patient-reported instrument (PROFFIT) for measuring financial toxicity of cancer within a public healthcare system. BMJ Open. 2021;11: e049128.
10. Dar MA, Chauhan R, Murti K, Trivedi V, Dhingra S. Development and Validation of Subjective Financial Distress Questionnaire (SFDQ): a patient reported Outcome measure for Assessment of Financial Toxicity among Radiation Oncology patients. Front Oncol. 2021;11:819313.
11. Hueniken K, Douglas CM, Jethwa AR, Mirshams M, Eng L, Hope A, Chepeha DB, Goldstein DP, Ringash J, Hansen A, et al. Measuring financial toxicity incurred after treatment of head and neck cancer: development and validation of the Financial Index of Toxicity questionnaire. Cancer. 2020;126:4042–50.
12. Zhu Z, Xing W, Zhang X, Hu Y, So WKW. Cancer survivors' experiences with financial toxicity: a systematic review and meta-synthesis of qualitative studies. Psychooncology. 2020;29:945–59.
13. Eremenco SL, Cella D, Arnold BJ. A comprehensive method for the translation and cross-cultural validation of health status questionnaires. Eval Health Prof. 2005;28:212–32.
14. Acquadro C, Conway K, Hareendran A, Aaronson N. Literature review of methods to translate health-related quality of life questionnaires for use in multinational clinical trials. Value Health. 2008;11:509–21.
15. de Souza JA, Yap BJ, Wroblewski K, Blinder V, Araújo FS, Hlubocky FJ, Nicholas LH, O'Connor JM, Brockstein B, Ratain MJ, et al. Measuring financial toxicity as a clinically relevant patient-reported outcome: the validation of the COmprehensive score for financial toxicity (COST). Cancer. 2017;123:476–84.
16. Durber K, Halkett GK, McMullen M, Nowak AK. Measuring financial toxicity in Australian cancer patients - validation of the COmprehensive score for financial toxicity (FACT COST) measuring financial toxicity in Australian cancer patients. Asia Pac J Clin Oncol. 2021;17:377–87.
17. Ripamonti CI, Chiesi F, Di Pede P, Guglielmo M, Toffolatti L, Gangeri L, Allocca E. The validation of the Italian version of the COmprehensive score for financial toxicity (COST). Support Care Cancer. 2020;28:4477–85.
18. Yu HH, Yu ZF, Li H, Zhao H, Sun JM, Liu YY. The COmprehensive score for financial toxicity in China: validation and responsiveness. J Pain Symptom Manage. 2021;61:1297-1304.e1291.
19. Chan DNS, Choi KC, Ng MSN, Xing W, Law BMH, Ho PS, Au C, Chan M, Tong M, Ling WM, et al. Translation and validation of the traditional Chinese version of the COmprehensive score for financial toxicity-functional Assessment of Chronic Illness Therapy (Version 2). Health Qual Life Outcomes. 2021;19:17.
20. Mejri N, Rachdi H, Mnif A, Berrazega Y, Benna HE, Labidi S, Boussen H. Translation and validation of the Comprehensive score of Financial Toxicity for Cancer patients into Arabic. J Nurs Meas. 2022;30:673–82.
21. Honda K, Gyawali B, Ando M, Kumanishi R, Kato K, Sugiyama K, Mitani S, Masuishi T, Narita Y, Bando H, et al. Prospective survey of Financial Toxicity measured by the Comprehensive score for financial toxicity in Japanese patients with Cancer. J Glob Oncol. 2019;5:1–8.
22. Fradelos EC, Prapa PM, Tsaras K, Papagiannis D, Chatzi M, Papathanasiou IV, Guillen B, Saridi M, Souliotis K. The validation of the COmprehensive score for Financial Toxicity (COST) scale in Greek Language. Adv Exp Med Biol. 2023;1425:191–7.
23. de Alcantara Nogueira L, Koller FJ, Marcondes L, de Fátima Mantovani M, Marcon SS, Guimarães PRB, Kalinke LP. Validation of the comprehensive score for financial toxicity for Brazilian culture. Ecancermedicalscience. 2020;14:1158.
24. Pahlevan Sharif S, Moshtagh M, Sim OF, Naghavi N, Sharif Nia H. Psychometric evaluation of the comprehensive score for financial toxicity scale among Iranian cancer patients. J Cancer Policy. 2021;30: 100308.
25. Kosen S. Coverage and implementation of healthcare delivery for cancer under national health insurance, experience of Indonesia. Lancet Reg Health Southeast Asia. 2022;6:100065.
26. Fiala MA, Leblanc MR, Coccia KW, Bandaru S, Silberstein AE, Coles T, Vij R. Mixed-methods study on the responsiveness of the comprehensive score for financial toxicity among people with multiple myeloma. JCO Oncol Pract. 2024;20(6):Op2300645.
27. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer statistics 2020: GLOBOCAN estimates of incidence and Mortality Worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71:209–49.
28. Mokkink LB, Prinsen CAC, Patrick DL, Alonso J, Bouter LM, de Vet HCW, Terwee CB. COSMIN Study Design checklist for Patient-reported outcome measurement instruments (Version July 2019). Amsterdam, the Netherlands: COSMIN; 2019. https://www.cosmin.nl/wp-content/uploads/COSMIN-study-designing-checklist_final.pdf. Accessed 19 Aug 2024.
29. Hair JF, Babin BJ, Black WC, Anderson RE. Multivariate data analysis. Boston: Cengage; 2019.
30. FACIT-COST. https://www.facit.org/measures/facit-cost. Accessed 3 Apr 2024.
31. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, Bouter LM, de Vet HC. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007;60:34–42.
32. Franklin SB, Gibson DJ, Robertson PA, Pohlmann JT, Fralish JS. Parallel analysis: a method for determining significant principal components. J Veg Sci. 1995;6:99–106.
33. Comrey AL, Lee HB. A first course in factor analysis. Hove, East Sussex, United Kingdom: Psychology press; 2013.
34. Li CH. The performance of ML, DWLS, and ULS estimation with robust corrections in structural equation models with ordinal variables. Psychol Methods. 2016;21:369–87.
35. Whittaker TA. Using the modification index and standardized expected parameter change for model modification. J Experimental Educ. 2012;80:26–44.
36. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. Methods Psychol Res Online. 2003;8:23–74.
37. Rosseel Y. Lavaan: an R Package for Structural equation modeling. J Stat Softw. 2012;48:1–36.
38. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika. 1951;16:297–334.
39. Hayes AF, Coutts JJ. Use omega rather than Cronbach's alpha for estimating reliability. But…. Commun Methods Measures. 2020;14(1):1–24.
40. McNeish D. Thanks coefficient alpha, we'll take it from here. Psychol Methods. 2018;23:412–33.
41. Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ. 2011;2:53–5.
42. Xu RH, Wang LL, Zhou LM, Wong EL, Wang D. Urban-rural differences in financial toxicity and its effect on cancer survivors' health-related quality of life and emotional status: a latent class analysis. Support Care Cancer. 2022;30:4219–29.
43. Revicki D, Hays RD, Cella D, Sloan J. Recommended methods for determining responsiveness and minimally important differences for patient-reported outcomes. J Clin Epidemiol. 2008;61:102–9.
44. Gwet KL. Handbook of inter-rater reliability: the definitive guide to measuring the extent of agreement among raters. Gaithersburg: Advanced Analytics, LLC; 2014.
45. Koo TK, Li MY. A Guideline of selecting and reporting Intraclass correlation coefficients for Reliability Research. J Chiropr Med. 2016;15:155–63.
46. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33:159–74.
47. Cohen J. Statistical power analysis for the behavioral sciences. Cambridge: Academic; 2013.
48. Tran BT, Le DD, Nguyen TG, Nguyen MT, Nguyen MH, Dang CK, Tran DT. Validation of the COmprehensive score for Financial Toxicity (COST) in Vietnamese patients with cancer. PLoS ONE. 2024;19: e0306339.

49. Carrera PM, Curigliano G, Santini D, Sharp L, Chan RJ, Pisu M, Perrone F, Karjalainen S, Numico G, Cherny N, et al. ESMO expert consensus statements on the screening and management of financial toxicity in patients with cancer. ESMO Open. 2024;9: 102992.
50. Khan HM, Ramsey S, Shankaran V. Financial toxicity in cancer care: implications for clinical care and potential practice solutions. J Clin Oncol. 2023;41:3051–8.
51. Liang MI, Harrison R, Aviki EM, Esselen KM, Nitecki R, Meyer L. Financial toxicity: a practical review for gynecologic oncology teams to understand and address patient-level financial burdens. Gynecol Oncol. 2023;170:317–27.
52. Yuan X, Zhang X, He J, Xing W. Interventions for financial toxicity among cancer survivors: a scoping review. Crit Rev Oncol Hematol. 2023;192:104140.
53. Aviki EM, Thom B, Braxton K, Chi AJ, Manning-Geist B, Chino F, Brown CL, Abu-Rustum NR, Gany FM. Patient-reported benefit from proposed interventions to reduce financial toxicity during cancer treatment. Support Care Cancer. 2022;30:2713–21.
54. Fitch MI, Sharp L, Hanly P, Longo CJ. Experiencing financial toxicity associated with cancer in publicly funded healthcare systems: a systematic review of qualitative studies. J Cancer Surviv. 2022;16:314–28.
55. Smith GL, Banegas MP, Acquati C, Chang S, Chino F, Conti RM, Greenup RA, Kroll JL, Liang MI, Pisu M, et al. Navigating financial toxicity in patients with cancer: a multidisciplinary management approach. CA Cancer J Clin. 2022;72:437–53.
56. de Souza JA, Yap BJ, Hlubocky FJ, Wroblewski K, Ratain MJ, Cella D, Daugherty CK. The development of a financial toxicity patient-reported outcome in cancer: the COST measure. Cancer. 2014;120:3245–53.
57. Bridger Staatz C, Kelly Y, Lacey RE, Hardy R. Investigating the factorial structure and measurement invariance of the parent-reported strengths and difficulties questionnaire at 11 years of age from the UK Millennium Cohort Study. Eur Child Adolesc Psychiatry. 2024;33:255–66.
58. Boothroyd L, Dagnan D, Muncer S. PHQ-9: one factor or two? Psychiatry Res. 2019;271:532–4.
59. Jiang R, Plunkett SW, Ainsworth AT. Factor structure and validity of the affective style questionnaire. J Health Psychol. 2020;25:1805–15.
60. Smith W, Vitoratou S, McCrone P, Patel A. Exploring the factor structure of the Health of the Nation outcomes Scale (HoNOS) in a sample of patients with schizophrenia, schizotypal and delusional disorders. Health Qual Life Outcomes. 2017;15:141.
61. Corrigan KL, Fu S, Chen YS, Kaiser K, Roth M, Peterson SK, Shih YT, Jagsi R, Giordano SH, Volk RJ, et al. Financial toxicity impact on younger versus older adults with cancer in the setting of care delivery. Cancer. 2022;128:2455–62.
62. Pangestu S, Harjanti EP, Pertiwi IH, Rencz F, Nurdiyanto FA. Financial toxicity experiences of patients with Cancer in Indonesia: an interpretive phenomenological analysis. Value Health Reg Issues. 2023;41:25–31.
63. Perni S, Azoba C, Gorton E, Park ER, Chabner BA, Moy B, Nipp RD. Financial Toxicity, Symptom Burden, illness perceptions, and communication confidence in Cancer clinical trial participants. JCO Oncol Pract. 2022;18:e1427-1437.
64. Chan RJ, Gordon LG, Tan CJ, Chan A, Bradford NK, Yates P, Agbejule OA, Miaskowski C. Relationships between financial toxicity and symptom burden in cancer survivors: a systematic review. J Pain Symptom Manage. 2019;57:646-e660641.
65. Rotter J, Spencer JC, Wheeler SB. Financial toxicity in advanced and metastatic cancer: overburdened and underprepared. J Oncol Pract. 2019;15:e300-307.
66. Kajimoto Y, Shibutani T, Nagao S, Yamaguchi S, Suzuki S, Mori M, Tsubouchi H, Nakao K, Azuma A, Koyanagi T, et al. Validity of the COmprehensive Score for financial Toxicity (COST) in patients with gynecologic cancer. Int J Gynecol Cancer. 2022;32(9).

Publisher's Note