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ORIGINAL ARTICLE

Development and Validation of a Household Satisfaction Instrument for Malaysia's Health Protection Programs

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ABSTRAK

Kepuasan isi rumah merupakan ukuran penting bagi menilai program perlindungan kesihatan (HPP). Namun begitu, instrumen yang telah disahkan dan disesuaikan dengan sistem penjagaan kesihatan Malaysia masih kurang. Kajian ini bertujuan untuk membangunkan dan mengesahkan satu instrumen bagi mengukur tahap kepuasan isi rumah terhadap HPP, dengan memberi tumpuan kepada Skim PeKa B40. Kajian keratan rentas ini dilaksanakan dalam dua fasa: pembangunan dan pengesahan instrumen. Sebanyak 70 item telah dibangunkan dalam fasa awal, dan 60 item dikekalkan selepas proses penilaian kandungan oleh tujuh orang pakar (skala-CVI ≥0.8) serta diuji untuk kesahan muka. Instrumen ini telah dirintiskan di daerah Hulu Langat, menyasarkan isi rumah rakyat Malaysia berumur 40 tahun dan ke atas dalam kumpulan pendapatan 40% terendah (B40). Sampel rawak mudah digunakan untuk merekrut 150 peserta bagi analisis faktor eksploratori (EFA) dan 200 peserta untuk analisis faktor pengesahan. Penilaian psikometrik melibatkan ujian kebolehpercayaan (Cronbach alpha, kebolehpercayaan komposit (CR)), kesahan konstruk, kesahan konvergen (AVE) dan kesahan diskriminan. EFA mengenal pasti struktur model lapan faktor yang menjelaskan sebanyak 79.93% daripada jumlah varians. Instrumen akhir mengekalkan 57 item yang menunjukkan ciri-ciri psikometrik yang kukuh serta indeks padanan model yang mencukupi ("Root mean square error of approximation" = 0.061, "Comparative fit index" = 0.910, "Tucker-Lewis index" = 0.904, Chi-square/df = 2.918), CR antara 0.897-0.972, AVE antara 0.637-0.777 dan kesahan diskriminan yang telah ditetapkan. Kajian ini telah berjaya membangunkan dan mengesahkan satu instrumen yang boleh dipercayai untuk mengukur tahap kepuasan isi rumah terhadap HPP di Malaysia berdasarkan lapan konstruk: penyampaian perkhidmatan, kebolehcapaian, komunikasi, tadbir urus, literasi kesihatan, tahap pengetahuan, kos dan kepuasan.

Kata kunci: *Insurans kesihatan; kepuasan; PeKa B40; pembangunan dan pengesahan, perlindungan kesihatan*

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ABSTRACT

Household satisfaction is an essential measure of health protection programs (HPPs). However, a validated instrument tailored to Malaysia's healthcare system is lacking. This study aimed to develop and validate an instrument to measure household satisfaction with HPPs, focusing on the PeKa B40 Scheme. This cross-sectional study was conducted in two phases: instrument development and validation. An initial pool of 70 items was generated, with 60 retained after content validation by seven experts (scale-CVI ≥0.8) and pre-tested for face validity. The instrument was piloted in Hulu Langat District, targeting Malaysian households aged 40 and above in the bottom 40% (B40) income group. Simple random sampling recruited 150 participants for Exploratory Factor Analysis (EFA) and 200 for confirmatory factor analysis. The psychometric evaluation assessed the test reliability (Cronbach's alpha, composite reliability (CR)), construct validity, convergent validity (AVE) and discriminant validity. EFA identified an eight-factor model structure that accounted for 79.93% of the total variance. The final instrument retained 57 items exhibiting solid psychometric properties with adequate fit indices (Root mean square error of approximation = 0.061, Comparative fit index = 0.910, Tucker-Lewis index = 0.904, Chi-square/df = 2.918), CR 0.897-0.972, AVE 0.637-0.777 and established a discriminant validity. The present study developed and validated a reliable instrument tailored to measure household satisfaction with Malaysia's HPPs using eight constructs: service delivery, accessibility, communication, governance, health literacy, knowledge level, cost and satisfaction.

Keywords: Development and validation; health insurance; health protection; PeKa B40; satisfaction

INTRODUCTION

Malaysia's healthcare system has advanced significantly toward Universal Health Coverage (UHC), with Health Protection Programs (HPPs) like the 'Skim Peduli Kesihatan untuk Kumpulan B40' (PeKa B40 Scheme) playing a central role (Wong et al. 2019). HPPs share the objective of national health insurance (NHI) by reducing financial barriers to healthcare access, particularly for vulnerable groups, through financial protection against out-of-pocket payments. However, HPPs differ in their broader, more flexible scope and funding structure, as they are financed through general taxation or public resources without requiring beneficiary contributions (Yokobori et al. 2023). In contrast, NHI typically operates as a structured insurance scheme with defined contributions, fully subsidised by the government, individuals or both (Ifeagwu et al. 2021; Yoon et al. 2023).

Malaysia has implemented several HPPs to address the health needs of different population segments, including MySalam, a takaful-based critical illness scheme; the Social Security Organisation (SOCSO) programs for formal sector employees with work-related health risks; and private health insurance, which is often limited in coverage and unaffordable for lower-income groups (Bakar et al. 2024; Loganathan et al. 2020). While these schemes serve specific functions, they often exclude informal sector workers or those with broader healthcare needs.

In contrast, PeKa B40 is a public, non-contributory scheme launched by Malaysia's Ministry of Health in 2019 to improve healthcare access for the bottom 40% (B40) income group (Mohd-Zuki et al. 2022). The program offers free health screenings, medical device support of up to RM20,000, cancer treatment completion incentives of up to RM1,000 and transportation assistance of up to RM1,000 initiatives that have facilitated early detection and management of chronic diseases within this population, contributing to improved health outcomes (Mohd-Zuki et al. 2022). Its publicly funded model and emphasis on improving access for low-income groups align with national strategies such as the National Strategic Plan for non-communicable diseases (NCDs) and reflect a broader government commitment to equitable

healthcare (Harris et al. 2019). With its nationwide reach and focus on NCD prevention, PeKa B40 has become a flagship initiative in Malaysia's UHC efforts. Given the high burden of NCDs among the B40 population, the scheme plays a critical role in addressing health disparities and serves as a meaningful case for understanding satisfaction with publicly funded HPP (Ab Majid et al. 2020). As one of the first schemes of its kind tailored specifically to low-income Malaysians, PeKa B40 marks a significant step in the country's health financing reforms.

Evaluating satisfaction with HPPs is vital for shaping policy and improving program outcomes, as higher satisfaction levels are linked to better adherence and service engagement (Ahmad 2023; Sharifah Zawani Syed Ahmad et al. 2021). However, studies specifically examining satisfaction with HPPs remain limited compared to the broader literature on NHI (Yokobori et al. 2023). While both aim to enhance equity and financial protection, most research focuses on NHI settings. Key satisfaction factors identified include program awareness, access, service quality and trust. For example, satisfaction in Thailand's Universal Coverage Scheme (UCS) and Indonesia's Jaminan Kesehatan Nasional (JKN) was shaped by entitlement awareness and provider responsiveness, while South Korea's National Health Insurance Scheme (NHIS) highlighted policy accountability, communication and public understanding of scheme benefits (Erlangga et al. 2019; Kaikeaw et al. 2023; Kang et al. 2012; Kennedy et al. 2014; Liu 2013). These findings point to the need for more focused research on satisfaction with HPPs to improve program design and uptake.

In Malaysia, studies examining satisfaction with HPPs, especially the PeKa B40 scheme are limited. Most existing research has focused on operational aspects like financial sustainability and participation rates, with little emphasis on beneficiary satisfaction (Jamal et al. 2023; Mohd-Zuki et al. 2022). While some studies assess satisfaction in the healthcare system, they tend to focus on patient experiences at specific facilities rather than household-level satisfaction among the B40 income group, which is the main target of PeKa B40 (Mat Din et al. 2024; Mustafa 2021; M Selvarajah et al. 2022).

Beyond the lack of research, there is also a methodological gap in how satisfaction with HPPs is measured in Malaysia. Most existing studies rely on generic satisfaction tools such as the Patient Satisfaction Questionnaire-18 (PSQ-18) and SERVQUAL, which are suitable for clinical settings but inadequate for assessing satisfaction with public health protection programs. These instruments overlook key elements such as claims processing, policy transparency and benefit clarity which are central to the HPP experience (Abdel Fattah et al. 2021). Without a robust, context-specific instrument, it is difficult to identify weaknesses in implementation or service delivery, limiting the ability of policymakers to make evidence-based improvements (Bhatt et al. 2024). This underscores the need to develop and validate a tailored instrument aligned with the structure and goals of Malaysia's HPPs, particularly PeKa B40 (Awang et al. 2020; Kawata & Salman 2022).

This study sought to answer the key question: What factors influence household satisfaction with Malaysia's HPPs? In this study, the objective was to develop and validate an instrument to measure household satisfaction with HPPs focused on PeKa B40 Scheme. This refined instrument provides a reliable measure of satisfaction, enabling policymakers to make evidence-based adjustments that improve its implementation.

MATERIALS AND METHODS

This cross-sectional study was conducted from December 2021 to October 2022 in Hulu Langat District, Selangor, Malaysia, and was carried out in two phases: (i) instrument development; and (ii) psychometric validation.

First Phase: Instrument Development

This phase involved two stages: (i) developing an item pool; and (ii) item reduction and refinement.

(i) Development of an item pool

An extensive literature review was conducted using Google Scholar to identify relevant national and international surveys and instruments. The findings from this review had been submitted as a standalone manuscript and were currently under peer review in another journal. Relevant instruments were reviewed, and an inventory of questions was thematically organised. Conceptualised of the latent construct for satisfaction with HPPs were based on multiple theoretical frameworks of satisfaction such as SERVQUAL and PSQ-18 which offered comprehensive insights into healthcare satisfaction and through iterative discussions with academician whose expertise in public health, psychometrics, and health economics, to ensure the constructs aligned with theoretical understanding as well as with Malaysia's healthcare context before further evaluation (Johnson & Fornell 1991).

A 70-item pool of questionnaires was developed to represent the constructs by employing clear and concise language while minimising ambiguity, double-barreled or negatively worded items, in accordance with DeVellis' guidelines (Devellis & Thorpe 2021). The questions were initially drafted in English and then translated into Malay. Both versions were reviewed by bilingual team members to ensure accuracy, consistency and linguistic equivalence.

(ii) Item reduction and refinement of the instrument

Content validity assessment was done for the 70-item pool of questionnaires by seven field specialists, including health economics academicians, Ministry of Health planners, public health specialists and medical officers as a diverse panel to provide a comprehensive perspective on health insurance and program evaluation. Based on the panel's feedback, 60 items were retained. Of these, 58 items had I-CVIs of 1.0, and two had I-CVIs of 0.86. The S-CVI/UA was 0.95, and the S-CVI/Ave was 0.99, indicating strong alignment with the underlying constructs.

The face validity assessment ensured that questionnaire items were clear, comprehensible and culturally appropriate for the target population. This stage involved a small group of ten participants representative of the study population, along with expert reviewers who assessed item clarity and relevance. Feedback from this phase informed refinements to the questionnaire before field testing (Baharuddin et al. 2024).

The refined instrument comprised two parts: the first part collected respondents' sociodemographic characteristics: age, sex, ethnicity, marital status and education level. The second part consisted of 60 items, across eight constructs: health literacy (9 items), knowledge (10 items), service delivery (7 items), health facility (7 items), communication (7 items), cost (7 items), governance (8 items) and satisfaction (5 items). The constructs of knowledge, service delivery, health facility, communication and governance were assessed using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree". In contrast, health literacy was measured using a scale labelled from "very difficult" to "very easy," while satisfaction was rated on a scale from "strongly dissatisfied" to "strongly satisfied".

Second Phase: Validating the Psychometrics Properties of the Instrument

This phase consisted of two stages: (i) pilot testing; and (ii) validation.

(i) Pilot testing

Following face validity assessment, pilot testing was conducted to assess the construct validity and reliability of the questionnaire. The target population was Malaysian households aged 40 from the B40 income group in Hulu Langat District, Selangor, Malaysia. Using a simple random sampling method, participants were selected from a sampling frame provided by the district office. Data collection was conducted between 1st December 2021 to 1st October 2022,

in a household setting, allowing participants to respond comfortably without fear or pressure. Eight trained enumerators facilitated data collection. Respondents took an average of 15–30 minutes to fill in the questionnaire.

(ii) Validation of the instrument

The instrument was validated using both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). EFA was conducted with data from 150 participants, following the recommended guidelines (Hair et al. 2019). Principal Component Analysis (PCA) with varimax rotation was applied to extract factors. Only factors with eigenvalues greater than 1 were retained. Items with factor loadings of 0.40 or higher were considered acceptable and retained in the model. Sampling adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) measure, with values above 0.50 indicating suitability. Bartlett's test of sphericity was also used to confirm the appropriateness of the factor analysis, with significance set at $p < 0.05$ (Kaiser 1974). The reliability of each construct was evaluated using Cronbach's alpha (α).

The CFA was conducted on a sample of 200 respondents to validate the measurement model identified during the EFA. The validation process focused on three key aspects: (i) unidimensionality; (ii) validity; and (iii) reliability. Unidimensionality was examined to confirm that each set of items measured a single underlying construct. This was assessed by checking all items loaded significantly onto their respective constructs without notable cross-loadings onto other factors.

The measurement model of the latent constructs had to pass three types of validity: construct validity, convergent validity and discriminant validity. Construct validity was evaluated using several model fit indices: relative chi-square ($\chi^2/df < 3$), root mean square error of approximation (RMSEA <0.08) (Joseph et al. 2009), comparative fit index (CFI > 0.9) (Bentler 1990), goodness of fit index (GFI > 0.9) (Segars & Grover 1993) and normed fit index (NFI > 0.9) (Bentler & Bonett 1980). These indices ensured the model's goodness-of-fit and structural integrity.

Convergent validity was supported by an average variance extracted (AVE) ≥0.5 (Fornell & Larcker 1981), while discriminant validity was confirmed when each construct's AVE exceeded its squared correlations with other constructs (Byrne 2010). Reliability was assessed using Composite Reliability (CR), with value of 0.7, indicating acceptable internal consistency (Joseph et al. 2009).

Statistical Analysis

Data were analysed using SPSS version 21 (IBM Corp., Armonk, New York, USA) and AMOS version 20 (IBM Corp., Armonk, New York, USA). SPSS was used for data screening and EFA. AMOS was used for CFA. Descriptive statistics, such as frequencies (n) and percentages (%), were used for categorical data. Measures of central tendency were applied to summarise numerical data.

RESULTS

Demographic Data

The demographic characteristics of respondents in EFA and CFA predominantly comprised middle-aged Malay individuals with secondary or tertiary education (Table 1). For EFA, 150 participants had a mean age of 52.6 years (SD = 6.43) with an equal gender distribution, while 200 participants in CFA had a mean age of 50.9 years (SD = 7.43) and a higher proportion of men (60.5%). Both samples were representative of Malaysia's population, enhancing the generalisability of findings. The CFA sample included slightly more non-Malay participants, increasing ethnic diversity. Most respondents in both analyses were married (78% in EFA and 76.5% in CFA), reflecting demographic stability. Participants with primary education increased from 8.7% in Exploratory Factor Analysis Exploratory Factor Analysis; to 12% in CFA, while tertiary education remained prominent in both samples.

TABLE 1: Characteristics of respondents for EFA and CFA

Factors	EFA (n = 150)	CFA (n = 200)
	n (%)	n (%)
Sociodemographic characteristics		
Age (years)	Mean (SD): 52.6 (6.43)	Mean (SD): 50.9 (7.43)
Gender		
Male	75 (50.0)	121 (60.5)
Female	75 (50.0)	79 (39.5)
Ethnicity		
Malay	119 (79.3)	140 (70.0)
Chinese	12 (8.0)	27 (13.5)
Indian	5 (3.3)	13 (6.5)
Others	14 (9.3)	11 (5.5)
Marital status		
Married	117 (78)	153 (76.5)
Single	10 (6.7)	22 (11.0)
Divorced	8 (5.3)	14 (7.0)
Widow/widower	15 (10.0)	11 (5.5)
Education level		
No formal education	3 (2.0)	12 (6.0)
Primary school	13 (8.7)	24 (12.0)
Secondary school	93 (62.0)	112 (56.0)
College or university	41 (27.3)	52 (26.0)

SD: Standard deviation

No questionnaire modifications were made after EFA, and demographic consistency across key characteristics suggested the instrument's robustness and suitability for both analyses.

Exploratory Factor Analysis

Prior to conducting EFA, data suitability was confirmed with excellent KMO values (range: 0.830-0.937) and significant Bartlett's tests ($p < 0.001$), supporting factorability (Table 2). Principal component analysis with varimax rotation was then applied.

The analysis yielded an eight-factor structure explaining 79.93% of the total variance, indicating strong explanatory power. All 60 items showed acceptable factor loadings (range: 0.43-0.87), and each construct retained its original items. Internal consistency was high, with Cronbach's alpha values ranging from 0.932 to 0.978 across all eight constructs (Table 3). Corrected item-total correlation (CITC) values exceeded 0.3, further confirming item reliability and coherence (Brzoska & Razum 2010; Maltby et al. 2014). These results support the validity and reliability of the eight-factor model, confirming its suitability for further validation through CFA.

Confirmatory Factor Analysis

CFA was conducted to validate the measurement model identified through EFA. After removing three low-loading items (Afthanorhan et al. 2019), the final model consisted of 57-items demonstrated unidimensionality, with all remaining items showing strong factor loadings (range: 0.652-0.932) onto their respective constructs (Table 4). The model showed good construct validity with acceptable fit indices, including RMSEA = 0.061 and CFI = 0.910 (Table 5). Convergent validity was established, as all AVE values exceeded 0.50, with the lowest at 0.637, while CR values were all above 0.70, confirming strong internal

TABLE 2: KMO and Bartlett's Test of sphericity results for constructs

Codes	Construct	KMO (> 0.5)	Bartlett's Test of Sphericity (p < 0.001)
HL	Health Literacy	0.830	< 0.001
HIL	Knowledge Level	0.937	< 0.001
SDQ	Service Delivery	0.889	< 0.001
HF	Accessibility & Convenience	0.888	< 0.001
Comm	Communication	0.917	< 0.001
Cost	Cost	0.910	< 0.001
HIG	Governance	0.893	< 0.001
HIS	Satisfaction Level	0.854	< 0.001

Principal component analysis and varimax rotation were used to extract factors.
HL: Health literacy; HIL: Knowledge level; SDQ: Service delivery; HF: Accessibility and convenience; Comm: Communication; HIG: Governance; HIS: Satisfaction level; KMO: Kaiser-Meyer-Olkin
Kaiser–Meyer–Olkin values > 0.5 indicate adequate sampling adequacy, and Bartlett's Test of Sphericity ($p < 0.001$) indicates statistical significance

TABLE 3: Retained items and reliability after exploratory factor analysis (EFA)

Construct	Items before EFA	Number of items removed	Items retained after EFA	Cronbach's alpha (α)	Minimum CITC
HL	9	0	9	0.932	0.653
HIL	10	0	10	0.974	0.833
SDQ	7	0	7	0.920	0.466
HF	7	0	7	0.930	0.589
Comm	7	0	7	0.974	0.882
Cost	7	0	7	0.960	0.733
HIG	8	0	8	0.978	0.868
HIS	5	0	5	0.935	0.769

CITC: Corrected item-total correlation; EFA: Exploratory Factor Analysis; HL: Health literacy; HIL: Knowledge level; SDQ: Service delivery; HF: Accessibility and convenience; Comm: Communication; HIG: Governance; HIS: Satisfaction level

TABLE 4: Factor loading of each item with their respective construct

Construct	Item	Factor Loading
HL	HL1	0.788
	HL2	0.740
	HL3	0.809
	HL4	0.825
	HL5	0.716
	HL6	0.808
	HL7	0.842
	HL8	0.852
	HL9	0.871
HIL	HIL1	0.865
	HIL 2	0.861
	HIL 3	0.873
	HIL 4	0.901
	HIL 5	0.871
	HIL 6	0.900

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Construct	Item	Factor Loading
	HIL 7	0.898
	HIL 8	0.880
	HIL 9	0.878
	HIL 10	0.866
SDQ	SDQ1	0.652
	SDQ 4	0.777
	SDQ 5	0.863
	SDQ 6	0.844
	SDQ 7	0.836
HF	HF1	0.831
	HF 2	0.865
	HF 3	0.749
	HF 4	0.752
	HF 5	0.815
	HF 6	0.836
HF	HF1	0.831
	HF 2	0.865
	HF 3	0.749
	HF 4	0.752
	HF 5	0.815
	HF 6	0.836
Comm	Comm1	0.799
	Comm 2	0.845
	Comm 3	0.861
	Comm 4	0.893
	Comm 5	0.890
	Comm 6	0.901
	Comm 7	0.826
Cost	Cost1	0.763
	Cost 2	0.851
	Cost 3	0.861
	Cost 4	0.914
	Cost 5	0.932
	Cost 6	0.892
	Cost 7	0.806
HIG	HIG1	0.807
	HIG 2	0.885
	HIG 3	0.929
	HIG 4	0.932
	HIG 5	0.924
	HIG 6	0.917
	HIG 7	0.813
	HIG 8	0.835
HIS	HIS 1	0.744
	HIS 2	0.918
	HIS 3	0.945
	HIS 4	0.857
	HIS 5	0.759

HL: Health literacy; HIL: Knowledge level; SDQ: Service delivery; HF: Accessibility and convenience; Comm: Communication; HIG: Governance; HIS: Satisfaction level

TABLE 5: Fitness indices

Fit Category	Fit Index Name	Index Value	Comment
Absolute Fit	RMSEA (< 0.08)	0.061	Meets the threshold
Incremental Fit	CFI (> 0.9)	0.910	Meets the threshold
	TLI (> 0.9)	0.904	Meets the threshold
Parsimony Fit	Chi-square/df (< 3)	2.918	Meets the threshold

CFI: Comparative fit index; TRMSEA: Root mean square error of approximation ; TLI: Tucker-Lewis index

consistency (Table 6). Discriminant validity was confirmed, as the square root of each construct's AVE was greater than its correlations with other constructs (Table 7).

The findings from both factor analyses confirm that the instrument had robust psychometric properties. The overall measurement model structure was illustrated in Figure 1, and a summary of the validation process was shown in Figure 2.

DISCUSSION

Key Constructs Defining Household Satisfaction with Malaysia's HPPs

This study developed and validated a comprehensive instrument to assess household satisfaction with publicly funded HPPs in Malaysia, specifically the PeKa B40 scheme. The final model, consisting of 57 items across eight constructs, demonstrated strong psychometric properties and practical relevance for assessing the satisfaction of beneficiaries. The instrument was guided by established models such as SERVQUAL and PSQ-18 while incorporating context-specific dimensions relevant to Malaysia's healthcare landscape (Awang et al. 2020; Hair et al. 2019).

The eight key constructs; service delivery, communication, accessibility & convenience, cost, governance, health literacy, knowledge level and satisfaction - collectively capture the multidimensional nature of household satisfaction. Constructs such as 'service delivery', 'communication', 'accessibility', and 'cost' mirror the elements in SERVQUAL and PSQ-18 satisfaction frameworks, while 'governance', 'health literacy' and 'knowledge level' reflect unique contextual challenges in Malaysia's HPPs (Hossain & Islam 2012; Joshi et al. 2021).

'Service delivery' captures aspects like provider competence, adherence to medical protocols, responsiveness and the overall quality of care delivered. These elements are widely recognised as key satisfaction drivers, particularly in low-income settings where reliable care significantly influences treatment adherence and

TABLE 6: Assessment of convergent validity (AVE) and composite reliability (CR)

Construct	AVE (> 0.45)	CR (> 0.6)
HL	0.777	0.965
HIL	0.651	0.944
SDQ	0.773	0.972
HF	0.637	0.897
Comm	0.655	0.919
Cost	0.740	0.952
HIG	0.742	0.953
HIS	0.720	0.927

HL: Health literacy; HIL: Knowledge level; SDQ: Service delivery; HF: Accessibility and convenience; Comm: Communication; HIG: Governance; HIS: Satisfaction level

TABLE 7: Summary of discriminant validity indices

Construct	HL	HIL	SDQ	HF	Comm	Cost	HIG	HIS
HL	0.882							
HIL	0.424	0.807						
SDQ	0.477	0.492	0.879					
HF	0.401	0.531	0.243	0.798				
Comm	0.483	0.590	0.338	0.780	0.809			
Cost	0.450	0.639	0.318	0.751	0.743	0.860		
HIG	0.600	0.328	0.322	0.428	0.468	0.473	0.862	
HIS	0.665	0.411	0.459	0.435	0.488	0.442	0.532	0.849

HL: Health literacy; HIL: Knowledge level; SDQ: Service delivery; HF: Accessibility and convenience; Comm: Communication; HIG: Governance; HIS: Satisfaction level

outcomes (Caner & Cilasun 2019; Liu et al. 2020; Ong et al. 2022; Yunus et al. 2024).

'Communication' crucial for patient-centered care, measures the clarity of information exchange between providers and patients which includes the ability of healthcare providers to explain diagnoses, discuss treatment plans, address concerns and ensure clarity in health-related information (Gao et al. 2022; Mandoura et al. 2017). Effective communication improves trust and engagement (Balsa et al. 2022), while poor communication is frequently linked to dissatisfaction and underuse of services, especially among socioeconomically disadvantaged groups (Blackburn et al. 2019; Gabay et al. 2022; Gandhi et al. 2000).

'Accessibility & convenience' relates to the ease of obtaining care, including physical accessibility of healthcare facilities, availability of appointments, waiting times and transportation

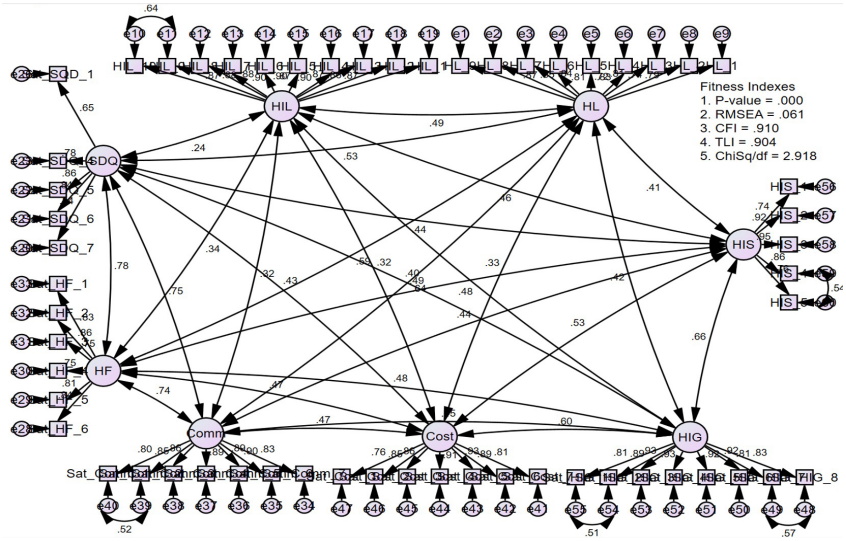

FIGURE 1: Confirmatory Factor Analysis eight-factor model; RMSEA: Root mean square error of approximation; CFI: Comparative fit index; TLI: Tucker-Lewis index; CHISq/df: Chi-square/degree of freedom

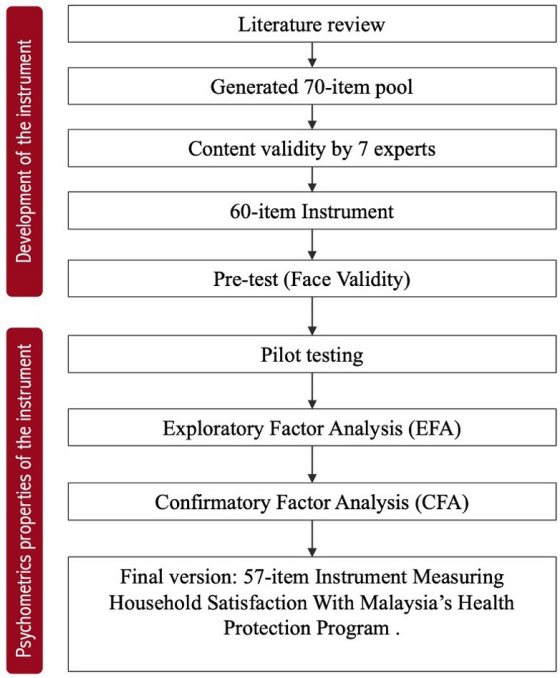

FIGURE 2: Flowchart of the development and validation of an instrument measuring household satisfaction with Malaysia's national health protection program

convenience which significantly influences satisfaction (Azuh et al. 2019; Azuhairi & Arshad 2020; Gao et al. 2018; Kim et al. 2024; Nguyen et al. 2021; Sarker et al. 2018; Wang et al. 2014; Wibowo et al. 2020). Studies also have shown that barriers in these areas disproportionately affect low-income populations and contribute to unmet health needs and lower satisfaction (Kantar et al. 2020; Rahimpour et al. 2024; Van et al. 2021).

'Cost' reflects the affordability and financial transparency of services, a major concern in healthcare access. While PeKa B40 aims to reduce out-of-pocket costs, perceptions of fairness in benefit coverage and hidden expenses remain important influencers of satisfaction (Chung 2022; Lu et al. 2022; Nguyen et al. 2021; Tang & Tan 2022; Trivedi et al. 2022; Wang et al. 2021).

'Governance', a construct rarely captured in traditional tools, reflects policy fairness, administrative efficiency and transparency (Azuhairi & Arshad 2020; Geng et al. 2021; Liu et al. 2020; Obin et al. 2022). Well-governed programs enhance satisfaction by fostering trust and ensuring equitable treatment (Acharya et al. 2023; Dumbela et al. 2024; Kebede & Mulugeta 2019; Shrestha et al. 2024), whereas weak governance undermines participation and public confidence (Jofre-Bonet et al. 2023).

'Health literacy' encompasses patients' ability to understand health information, navigate healthcare services and make informed health decisions (Boyer et al. 2021; Lynn et al. 2004; Nutbeam 2000). Previous studies have shown that low health literacy is associated with barriers in accessing care, poorer health outcomes, lower satisfaction and increased healthcare costs (Levy & Janke 2016).

The 'knowledge level' construct encompasses awareness of health protection schemes, eligibility criteria, benefits and program policies. It significantly influences satisfaction as well-informed participants shown to increase program utilisation, tend to have higher trust and satisfaction with healthcare programs (Geng et al. 2021; James et al. 2020; Kebede & Mulugeta 2019; Liu et al. 2020; Obin et al. 2022; Paez et al. 2014).

These constructs are particularly relevant not only in Malaysia but also in other low- and middle-income countries (LMICs) implementing similar government-led health schemes. As many LMICs strive toward UHC, tools that incorporate administrative, financial and communication factors-alongside traditional service quality metrics-can offer more nuanced insights into program effectiveness and equity (Park et al. 2021; Schutt & Woodford 2020).

Policy Implications

The validated instrument provides a comprehensive, evidence-based framework for evaluating household satisfaction with Malaysia's HPPs, particularly among the underserved B40 population. While not intended to replace general patient satisfaction measures, this tool addresses specific barriers and perceptions unique to government-sponsored health schemes like PeKa B40.

By incorporating multi-dimensional elements, the tool enables policymakers to pinpoint gaps in program delivery, whether related to service quality, administrative transparency or beneficiary awareness. These insights can inform more targeted interventions, enhance program responsiveness and support continuous quality improvement within the health system.

The instrument also provides a strategic platform for planning infrastructure and service delivery improvements, particularly in underserved regions (Hasan et al. 2024). Constructs such as 'accessibility & convenience' allow policymakers to assess the real-world reach of services (Fryatt et al. 2017; Gille et al. 2024; Strodel & Perry 2019), while 'health literacy' and 'knowledge level' offer insights into whether public education efforts are effectively enabling beneficiaries to understand and use available benefits (Fitzpatrick 2023).

In addition, this tool supports resource allocation by identifying priority areas where investment is most needed-be it workforce training, health communication strategies, or system-level reforms. By doing so, it helps to ensure that policies are aligned with beneficiary needs and that services are truly equitable and inclusive.

Internationally, this instrument has broader utility. LMICs implementing non-contributory health schemes often face similar challenges-low uptake, limited understanding of entitlements and administrative inefficiencies (Adebayo et al. 2015). A validated, context-sensitive tool such as this can guide evaluations across similar UHC initiatives in other settings, enhancing accountability and informing global policy dialogue on health protection (Gopinathan & Ottersen 2016; Roura et al. 2024).

Ultimately, this instrument equips policymakers and implementers with a robust mechanism to systematically capture beneficiaries' voices. Doing so not only promotes evidence-based program refinement but also fosters trust, improves participation and enhances the sustainability of Malaysia's health protection programs.

Limitation

The cross-sectional design limits the ability to assess satisfaction changes over time. Longitudinal studies are recommended to evaluate the instrument's stability and sensitivity to program changes. Additionally, the questionnaire's length may challenge participants, particularly those with lower education or limited attention spans. Although the instrument was simplified, its comprehensiveness required many items, potentially causing respondent fatigue. Future studies should refine the instrument further, balancing coverage and brevity, and explore

digital or interactive formats to enhance engagement and reduce response burdens.

CONCLUSION

This study successfully developed and validated a robust, context-specific instrument to measure household satisfaction with HPPs, with particular focus on the PeKa B40 scheme in Malaysia. The final instrument, comprising eight key constructs; health literacy, knowledge level, service delivery, accessibility and convenience, communication, cost, governance and satisfaction level - offers a comprehensive framework for understanding the multidimensional factors influencing beneficiary satisfaction. The instrument holds practical value for policymakers, implementers and researchers. It can be used to monitor program performance, identify service gaps, inform policy reforms, guide resource allocation and evaluate the impact of HPPs - particularly for underserved populations - in support of Malaysia's UHC agenda. Future research should explore the tool's use in longitudinal designs to assess sensitivity to program changes. Refinement may also be needed to reduce response burden and enhance usability, including digital adaptation. Broader validation across diverse communities is essential to ensure national applicability.

Overall, this validated instrument provides a timely mechanism for assessing satisfaction with Malaysia's HPPs and presents a transferable model for similar initiatives in other LMICs advancing UHC efforts.

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