Patient Preference and Adherence

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Residents' Preferences for Inclusive Commercial Health Insurance: A Comparative Study of Discrete Choice Experiment and Best–Worst Scaling in Heilongjiang Province, China

Yanni Jia[1,*], Xiaoying Zhu[2,3,*], Xianna Liu[4,*], Wen Gu[1], Yiyin Cao[1], Haofei Li[1], Lijun Xu[1], Lei Leng[1], Hongjuan Yu[5], Tiemin Zhai[6], Weidong Huang[1]

[1]School of Health Management, Harbin Medical University, Harbin, People's Republic of China; [2]School of Elderly Care Services and Management, Nanjing University of Chinese Medicine, Nanjing, People's Republic of China; [3]Nossal Institute for Global Health, School of Population and Global Health, The University of Melbourne, Melbourne, Australia; [4]Office of the President, The Second Affiliated Hospital of Harbin Medical University, Harbin, People's Republic of China; [5]Department of Hematology, The First Affiliated Hospital of Harbin Medical University, Harbin, People's Republic of China; [6]Department of Health Economics and Security Research, China National Health Development Research Center, Beijing, People's Republic of China

*These authors contributed equally to this work

Correspondence: Weidong Huang; Hongjuan Yu, Email huangweidong@hrbmu.edu.cn; yuhongjuan2008@163.com

Objective: The primary objective of this study is to evaluate residents' preferences for inclusive commercial health insurance to inform policy optimization, as well as to assess the applicability of the Best-Worst Scaling (BWS) and Discrete Choice Experiments (DCE) methods.

Methods: A face-to-face survey incorporating both DCE and BWS tasks was conducted with residents recruited in Heilongjiang Province, China. The attributes include insurance liability, premium, reimbursement ratio, deductible, government involvement, and payment methods. Data from BWS and DCE tasks were analyzed using mixed logit and conditional logit models to estimate preference weights for each attribute level. The optimal measurement method was evaluated based on internal consistency, validity, and acceptability.

Results: A total of 415 respondents were included in the analysis. Comparative analysis of DCE and the BWS methodologies revealed a pronounced preference among respondents for a 90% reimbursement rate and a streamlined, one-stop claims settlement process. However, notable discrepancies emerged in the ranking of preferences for other attributes. Further analysis indicated a correlation between the preference weights derived from the two methods, although the concordance was only moderate. Additionally, the DCE method demonstrated superior validity and reliability compared to BWS-2.

Conclusion: This study reveals residents' preferences for inclusive commercial health insurance (ICHI), providing valuable insights for optimizing product design and informing policy development. It also provides the first comparative analysis of DCE and BWS methods in the context of ICHI, which validates the superior applicability of DCE for health insurance, offering new perspectives and methodological guidance for future studies.

Keywords: preferences, discrete choice experiment, best-worst scaling, inclusive commercial health insurance

Introduction

China is nearly achieving universal population coverage, with over 95% of its population now covered by social health insurance (SHI).[1] This comprehensive coverage has been enabled by the implementation of SHI schemes since 2010. For instance, measures such as the Urban Employee Basic Medical Insurance (UEBMI) and the Urban and Rural Resident Basic Medical Insurance (URRBMI) have benefited from steadily increasing government subsidies, which have in turn

Received: 6 August 2025
Accepted: 30 October 2025
Published: 6 November 2025

attracted higher enrollment. However, amid the implementation of this scheme, participants still shoulder a considerable portion of their healthcare costs.[2] According to the 2020 China National Health Accounts Report, total medical expenditures amounted to CNY 4.1 trillion, of which 44% were paid out-of-pocket (OOP) by patients. Furthermore, the SHI fund is already operating under considerable fiscal pressure amid a continuously aging population, which is expected to further constrain any future increases in reimbursement rates. Additionally, the "basic protection" design of SHI, which covers only essential health services and imposes ceilings on benefit amounts, inherently limits its capacity to address the population's diverse health service needs.[3] This underscores the urgent need to supplement the multi-level health insurance system, thereby alleviating pressure on the public healthcare system and enhancing its capacity to address residents' diverse healthcare needs.

Although Private Health Insurance (PHI) plays a critical role in complementing high-cost and catastrophic inpatient care in the multi-level health insurance system, its coverage in China remains low at roughly 10%, compared with 20–30% in developed countries such as France, the United States, and Canada.[4] Since 2020, the government has positioned PHI as a supplement to SHI, promoting its development to address cost and quality issues in inpatient care while diversifying the supply of medical resources.[5] However, the low participation rate makes it play a limited supportive role. This can be attributed to product design, such as high entry barriers, inflexible claim mechanisms, and limited renewal opportunities, as well as market structure challenges, including a narrow product offering and low consumer confidence. These issues underscore the urgent need for policy guidance and innovative products to improve the coverage level.

In this context, the Inclusive Commercial Health Insurance (ICHI) scheme was introduced in 2015 as a novel public-private partnership model in health insurance, and it experienced explosive growth in 2020. ICHI is a voluntary insurance scheme administered by commercial insurance companies and specially targets individuals enrolled in SHI. It aims to complement SHI coverage by compensating for out-of-pocket expenses within the designated benefit scope and for self-funded expenses that fall outside of that coverage.[6] Compared to other commercial health insurance products, ICHI is characterized by its low entry barriers, affordable premiums, high coverage, and extensive reach. This unique combination has enabled its widespread implementation across the country. There is no direct equivalent to the ICHI scheme in the international context. It is only similar in nature to the supplementary health insurance programs in some countries. For example, micro health insurance schemes in India[7] and Pakistan[8] as well as mutual health insurance in Rwanda,[9] charge small premiums based on the probability of risk events and associated costs. These schemes predominantly serve low-income populations in rural and remote areas, with an emphasis on ensuring commercial sustainability. In contrast, ICHI targets individuals enrolled in national social health insurance systems. Typically, government-guided, ICHI is supported by policy initiatives, data sharing, and regulatory oversight, all of which aim to expand social coverage and enhance risk diversification.

By the end of 2023, a total of 284 ICHI products had been launched across different areas, covering 300 million insured individuals in China. Despite the explosive growth of ICHI Insurance, it faces sustainability challenges in two aspects. First, the insufficient proportion of the overall population enrolled in ICHI products and the declining renewal rates could result in a strained premium pool cannot effectively spread medical costs, thereby necessitating premium increases and creating a vicious cycle.[10] Second, there are operational risks associated with broad coverage and high payout ratios.[11] To address these sustainability risks, it is crucial to enhance our understanding of residents' preferences and needs regarding this new type of commercial insurance. By accurately identifying market demands and developing flexible, diverse products that cater to the specific coverage requirements of different groups, it is helpful to attract a broader base of residents to participants.

In the context of quantitative decision-making techniques, two widely employed methods are Discrete Choice Experiments (DCE) and Best-Worst Scaling (BWS). Both approaches require individuals to make trade-offs between different priority attributes across a range of options, choosing between various levels of key features. These methods help to uncover residents' preference rankings and their decision-making processes when evaluating the multiple characteristics of insurance products.[11–13] DCE require respondents to evaluate a series of realistically based hypothetical choice sets, making selections between two or more simulated scenarios. This process captures "real" preferences in both economic and psychological terms.[14] In contrast, BWS directly measures preferences by asking respondents to identify

the "best" and "worst" options from a set of attributes or choices, clearly revealing their preferences. The options differ based on three task types BWS. In the object case (case 1 BWS), attributes are selected as best and worst. In the profile case (case 2 BWS), combinations of attribute levels are designated as the best and worst options, and in the multi-profile case (case 3 BWS), respondents are required to choose the best and worst profiles from a set of options.[15] While both methods offer distinct advantages, they also have different limitations. The complexity of DCE may compromise data quality, whereas BWS is more susceptible to social desirability bias. To mitigate these limitations, this study adopts a combined approach using both DCE and BWS, thereby providing complementary preference data through simulated choices and assessments of attribute importance. This strategy enhances the comprehensiveness and accuracy of the findings.

The international application of DCE and BWS in evaluating public preferences for various health insurance schemes provides a robust methodological foundation for this study. Previous research has frequently employed these methods to optimize the design of micro insurance or supplementary health insurance in low-and middle-income countries.[16] A study in Malawi adopted DCE to investigate rural residents' preferences for supplemental micro-health insurance schemes and to identify the core benefits most effective in attracting low-income populations to enroll in community-based health insurance programs.[17] For high-income countries, DCE and BWS have been widely applied to analyze consumer choices regarding supplementary private health insurance. Specific examples include assessing what American employees prioritize in their health plans and elucidating the coverage preferences of the general population in the Netherlands.[18,19]

Existing studies on ICHI schemes have primarily focused on macro-level aspects, including assessments of coverage,[20] explorations of product governance models,[21,22] and analyses of its sustainable development capabilities.[23–25] These studies examined the role and impact of ICHI in China's healthcare system from policy makers' perspective. However, micro-level research investigating residents' willingness to enroll in and their preference choices for ICHI remains relatively limited.[26] This study leverages DCE and BWS methodologies to construct an online survey framework, elucidating the salience and preference hierarchies of key ICHI attributes from a resident-centric analytical perspective. This approach facilitates the measurement of residents' utility assessments and preference distributions regarding the attributes of ICHI attributes, thereby effectively predicting their choice behaviors under diverse conditions. Moreover, this study systematically evaluates the efficacy of DCE and BWS within the context of ICHI to determine which method provides the most accurate preference measurements. This inquiry not only furnishes a rigorous basis for identifying the optimal preference elicitation instrument within specified research paradigm, but also introduces innovative perspectives and methodological refinements that may guide future research in this field.

Methods

Establishing Attributes and Levels

Our study identified and defined the key attributes and levels of ICHI products, as detailed in Figure 1. First, we conducted a comprehensive review of published literature on private health insurance and relevant ICHI documents to

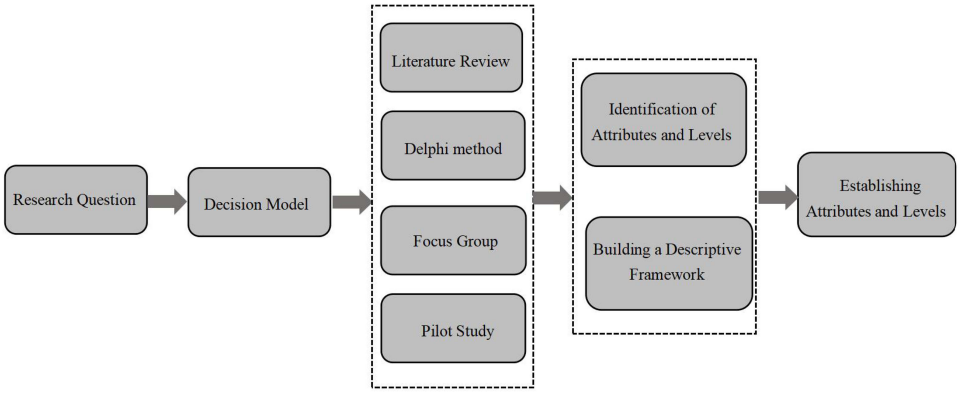

Figure 1 The development process of establishing Attributes and Levels.

https://doi.org/10.2147/PPA.S558869

identify potential attributes and levels for the choice experiment. This process initially generated a list of key attributes, government involvement, insurance coverage, premium, reimbursement ratio, deductible, coverage limit, compensation for pre-existing conditions, and claims settlement methods. Next, two rounds of Delphi expert consultations were conducted with fourteen senior insurance experts to systematically evaluatethe importance and feasibility of the identified attributes and their respective levels (see eTable 1 in Supplement Material 1). Sensitivity was not included as a scoring dimension, as the Delphi process aimed to identify conceptually relevant and practically feasible attributes, rather than to assess model robustness.[27] Based on expert ratings and feedback, adjustments were made to design, including the removal of "coverage limit" and "compensation for pre-existing conditions", the addition of a "payment method" attribute, and the reclassification of "premium" levels. The expert consensus indicated that, in practice, ICHI claims are processed only after SHI reimbursements have been applied, with the coverage limits of existing ICHI products typically defined within the insurer's underwriting scope, which means they feature a relatively high reimbursement ceiling to deliver meaningful supplementary protection. Consequently, this attribute was deemed redundant and excluded from the final model specification. Finally, a focus group discussion with six insurance industry practitioners and two health economics experts was held to review the experimental design in light of the actual ICHI products launched in the province, with a focus on their specific levels of "insurance coverage" and "government involvement". This step further validated and refined the applicability and discriminability of the final set of attributes and levels. A questionnaire was then developed in accordance with the finalized attributes and levels, featuring detailed descriptions of each attribute. This was followed by a pilot study among the target population to assess their comprehensibility and acceptability. Revisions were made based on feedback to enhance clarity and precision. Table 1 provides detailed descriptions of the final six attributes and levels used in the questionnaire.

Table 1 Attributes and Levels in the DCE and BWS

Attributes	Levels	Description
Insurance coverage	Inpatient coverage within the SHI catalog	The range of health care services and costs that a health insurer agrees to pay for on behalf of the insured extends beyond the coverage range of SHI.
	Inpatient coverage within the SHI catalog + Inpatient coverage outside the SHI catalog	
	Inpatient coverage within the SHI catalog + Inpatient coverage outside the SHI catalog + specialty drug costs outside of the SHI catalog	
	Inpatient coverage within the SHI catalog + Inpatient coverage outside the SHI catalog + specialty drug costs outside of the social health insurance catalog + health and medical services not covered by SHI	
Premium	89 CNY/year	Amount paid annually by the insured to purchase insurance coverage for the year.
	149 CNY/year	
	209 CNY/year	
Reimbursement ratio	50%	The proportion of eligible medical expenses that ICHI reimburses to the insured.
	70%	
	90%	
Deductible	10000 CNY	The fixed amount of eligible medical expenses that the insured must pay out-of-pocket before the insurer begins to reimburse covered costs.
	20000 CNY	
	30000 CNY	
Government involvement	Insurance company dominance	The extent of government intervention in ICHI markets, including policy support, data sharing, and regulatory oversight.
	Collaborative dominance between government and Insurance company	
	Government dominance	
Settlement Methods	Self-service settlement	The mechanisms insurers use to process, adjudicate, and disburse payment for claims.
	One-stop settlement	
Payment Methods	Cash payment	The mechanisms by which the insured remit premiums to purchase insurance coverage.
	SHI account payment	

Experimental Design and Choice Set Design

When designing choice sets for DCE, we assumed that respondents could evaluate the utility of various attributes and their levels across two or more choice sets to select the option that maximizes their overall utility. This approach allows us to more precisely capture participants' preferences for the attributes of inclusive insurance. By excluding opt-out choices (eg, "not purchasing" or "not participating"), the design compelled respondents to engage in a more deliberate weighing of trade-offs between attributes, directly reflecting their underlying preference structures and enhancing both data consistency and comparability. To alleviate respondents' cognitive burden, a Bayesian D-efficiency experimental design was employed in Stata 17.0 to generate 14 unique choice sets for the DCE, each comprising two alternatives. Participants were presented with two complete alternative profiles and asked to choose the one that they preferred. Table 2 shows an example of a DCE choice sets (all of the choice sets are provided in the Supplement Material 2).

In the design of BWS, an orthogonal main effect design was implemented using Ngene (version 1.2.1) to generate 14 unique choice tasks, which were then split into two modules. In contrast to DCE, participants in BWS-2 were required to identify and select the best and worst attribute- level combinations related to the ICHI product from each choice set. Table 3 shows an example of a BWS choice sets (all of the choice sets are provided in the Supplement Material 2).

Sampling and Data Collection

Data collection was conducted from December 2023 to March 2024. Participants aged 18 to 75 years, who were free of cognitive impairment and who were willing to provide informed consent were included. To enhance sample representativeness, this study was primarily conducted across five major cities in Heilongjiang Province. The sampling process incorporated predetermined quotas for age, sex, and place of residence, based on the population structure characteristics from the Seventh National Population Census in Heilongjiang Province. Although specific geographical distribution was not explicitly used as a sampling dimension, the resulting survey sample effectively covered the districts accounting for

Table 2 Illustrative Example of DCE Task

Attributes	Insurance A	Insurance B
Insurance liability	Inpatient coverage within the social health insurance catalog+Inpatient coverage outside the social health Insurance catalog	Inpatient coverage within the social health insurance catalog
Premium(CNY/year)	209CNY/year	89CNY/year
Reimbursement ratio	50%	90%
Deductible(CNY)	10000CNY	30000CNY
Government involvement	Insurance company dominance	Government dominance
Settlement Methods	One-stop settlement	Self-service settlement
Payment Methods	Cash payment	Social health insurance account payment
Which insurance would you prefer?	○	○

Table 3 Illustrative Example of BWS Task

Best	Insurance Characteristics	Worst
	Insurance liability: Inpatient coverage within the social health insurance catalog+Inpatient coverage outside the social health Insurance catalog Premium(CNY/year):89CNY/year Reimbursement ratio:50% Deductible(CNY):30000CNY Government involvement: Insurance company dominance Settlement Methods: One-stop settlement Payment Methods: Cash payment	

https://doi.org/10.2147/PPA.S558869

the largest proportion of the provincial population. According to the formula for the minimum sample size in the DCE proposed by Orme and Johnson, N>500c/ (t×a), the minimum sample size required for this study is 143. Here, c represents the maximum number of levels for any attribute, t denotes the number of choice sets, and a indicates the number of alternatives in each choice set (excluding exit options). To ensure robust parameter estimation, this study aims to collect data from at least 400 samples.

Trained enumerators conducted face-to-face surveys at recruitment sites. Before the survey, participants were provided with a detailed explanation of how their personal data would be used and were required to provide informed consent, ensuring transparency in data handling and protecting their privacy. During the survey, enumerators alternated between the two questionnaire versions to ensure balanced sample sizes across both groups. To ensure data quality, standardized operational support was provided on-site. Enumerators assisted participants in accessing the survey by scanning a QR code or clicking a link on an electronic device, clearly explained the conceptual framework and logic behind the questionnaire items, and guided them through 1–2 example questions to ensure a thorough understanding of the tasks and procedures. This approach effectively minimized issues arising from comprehension errors, response biases, or operational barriers, thereby enhancing the completeness and reliability of the data. In the questionnaire, the payment method was clearly defined and explicitly described in each choice scenario to ensure respondents understood how the premium would be paid. This framing minimized potential misperception of cost arising from non-cash payments.

Statistical Analysis

The DCE data were analyzed using mixed logit models, which accommodate random variation in parameters across individuals, thereby more flexibly capturing the heterogeneity of individual preferences. In the model, the dependent variable represents the binary choice within the hypothetical scenario, while the independent variables correspond to the combinations of attribute levels. Except for the premium, which is treated as a continuous variable, all other attributes are coded using dummy variables. The utility function for preferences toward ICHI products was formulated as a linear combination of attributes, which was given by:

$U_{DCEitj}=\beta_1$*Liability$_{itj}+\beta_2$*Premium$_{itj}+\beta_3$*Reimbursement$_{itj}+\beta_4$*Deductible$_{itj}+\beta_5$*Government$_{itj}+\beta_6$*Settlement$_{itj}+\beta_7$ *Payment$_{itj}+\varepsilon_{ijt}$

Where U_{DCEitj} represents the utility for individual i choosing alternative j in choice exercise t, and a significant coefficient $\beta_{1\text{-}7}$ represents that the attributes(level)is important for the respondents' preferences for ICHI products, and ε_{ijt} is the random error term.

The analysis of BWS-2 was conducted using a variant of the conditional logit model known as marginal sequential mode. This model assumes that respondents first choose the most important item from all attributes and then choose the least important item from the remaining attributes, allowing for the measurement of the utility difference between these extremes. The impact of choices was assessed by quantitatively analyzing the preference weights (β) for each attribute level, and the relative importance of each attribute was further calculated to quantify its relative influence in the decision-making process. Given the differences in parameter estimation and error structure between the DCE and BWS models, direct comparison is not feasible. To address this, we rescaled the data by transforming the coefficient values into a standardized probability scale ranging from 0 to 100. Alternatively, we used one attribute/level as a common denominator and rescaled all other levels to assess the relative magnitude of differences. For each option, we applied the following transformation: $e^{Ui}/(e^{Ui}+\alpha\text{-}1)$, where Ui denotes the zero-centered raw log weight of option i,e^{Ui} represents its exponentiated value, and α is the number of attributes per option. We then evaluated the consistency of preference weights between DCE and BWS by analyzing scatter plots derived from their main effects models. This rescaling allowed the comparison of preference weight consistency between DCE and BWS through scatter plot visualization of their main effects models. We then performed Spearman correlation analysis based on the characteristics of the data. We evaluated these two methods' effectiveness and acceptability to provide a comprehensive assessment of them. Effectiveness was assessed through continuity and stability analyses, while acceptability was evaluated based on participant feedback regarding task difficulty and preferences.

Results

Sample Characteristics

A total of 628 participants were recruited. Among these, 10 individuals under the age of 18, 12 individuals with cognitive impairments (eg, language barriers or impaired judgment), 153 participants who did not meet the questionnaire quality eligibility criteria were excluded. This standard included completion in less than 3 minutes or only selecting left/right options. From the 434 participants who met the quality standards, 14 were excluded for declining participation in the informed consent process. Ultimately, 415 eligible participants were included in the analysis (see eFigure 1 in the Supplement Material 1). In the process of quota design, we considered the enrollment characteristics of insurance products, including both health insurance and pension insurance. Given that individuals aged 50 years or older typically require medical examinations for enrollment, we stratified age into two groups to ensure a balanced age distribution in the sample. We then compared the demographic characteristics of our total sample with those of the Heilongjiang donor population and found no significant differences in age, gender, or residence ($P>0.05$). Table 4 details the specific characteristics of the participants.

Model Estimations for DCE and BWS

Preference

Table 5 presents the DCE analysis results, which indicate that respondents do not exhibit a significant preference for the payment method of ICHI products ($P>0.05$). However, respondents exhibit significant positive preferences for a 90% reimbursement ratio ($\beta=1.650$), inpatient coverage within/outside the SHI catalog and specialty drug costs outside of the SHI catalog ($\beta=0.600$), and one-stop settlement ($\beta=0.477$). Conversely, respondents exhibit lower preferences for a premium of 209 CNY/year ($\beta=-0.263$) and deductible of 30,000 CNY ($\beta=-0.633$), both of which show a negative influence ($P<0.05$). For BWS, respondents exhibit significant preferences for a 90% reimbursement rate ($\beta=1.014$), one-stop claims settlement ($\beta=0.906$), and a marked preference for SHI account payment ($\beta=0.323$). Additionally, respondents show a significant preference for payment methods using SHI account payment ($\beta=0.323$), while demonstrating lower preferences for a premium of 149 CNY/year ($\beta=-0.111$) and a deductible of 30,000 CNY ($\beta=-0.399$), both of which have negative impacts. The findings demonstrate that respondents prioritize higher reimbursement rates and streamlined claims processing when selecting ICHI products, whereas they exhibit a preference for avoiding options associated with elevated premiums and deductibles.

Relative Importance

Figure 2 presents a comparison of relative importance score calculation for the DCE and BWS methods. In the DCE, the reimbursement ratio emerged as the most important attribute, followed by the deductible, settlement method, premium, government involvement, insurance liability, and payment method. However, in the BWS analysis, the claims settlement method is considered the most important attribute, while the premium is the least considered.

Comparison of DCE and BWS Methods

Concordance

After rescaling the estimates for both DCE and BWS, scatter plots were generated to compare preference weights, and the correlation between preferences was subsequently assessed. As shown in Figures 3 and 4, the Spearman correlation coefficient between BWS and DCE was 0.758 ($P<0.01$), indicating a strong positive correlation between the preference results obtained from the two methods. The coefficient of determination (R^2) for the linear regression equation depicted in the scatter plots was 0.581, indicating moderate consistency between the preference results of the two methods. Additionally, the slope of the fitted line being less than 1 suggests that the weights derived from the DCE are amplified more than those from the BWS, which may imply lower decision uncertainty in the DCE.

Validity

To evaluate the effectiveness of the DCE and BWS methods, continuity and stability were compared. Continuity reflects the assumption that respondents compensate for deficiencies in one attribute by emphasizing strengths in others, implying

Table 4 The Characteristics of Participants

Characteristic	Survey Sample Characteristics	
	N	%
Age(years)		
<50	249	60
≥50	166	40
Gender		
Female	206	49.7
Male	209	50.3
Residence		
Urban	272	65.5
Rural	143	34.5
Educational attainment		
Primary and below	66	15.9
Middle and High School	230	55.4
University and above	119	28.7
Physical Examination Frequency		
Once a year	163	39.3
Once every two years	142	34.2
Once every five years	47	11.3
Never	63	15.2
Chronic Disease		
Yes	55	13.3
No	360	86.7
Commercial Health Insurance (Other)		
Yes	173	41.7
No	242	58.3
Self-assessed Health Status		
Excellent	108	26.0
Good	214	51.6
Fair	84	20.2
Poor	4	1
Very Poor	5	1.2

a compensatory decision-making process.[28] Lexicographic scores were used to identify respondents' dominant preferences for specific attributes. In the DCE and BWS (see eTable 2 in the Supplement Material 1), 31.1% (129/415) and 30.4% (126/415) of respondents, respectively, exhibited a dominant preference for a specific attribute, with the "reimbursement ratio" emerging as the dominant lexicographic preference. The stability of both DCE and BWS was also examined in this study, specifically assessing whether respondents made consistent choices when presented with identical tasks. Specifically, weak stability was investigated by comparing responses to Question 1 and Question 8. Findings revealed that 12.5% (52/415) of respondents failed the stability test in DCE, whereas this proportion was 35.7% (148/415) in the BWS (see eTable 3 in the Supplement Material 1). These findings indicate that, compared to the DCE,

Table 5 Attribute-Level Preference Weights for DCE and BWS

Attribute	Levels	DCE			BWS		
		β Coef	Rob. Se	95% CI	*β* Coef	Rob. Se	95% CI
Insurance liability	Inpatient coverage within the SHI catalog						
	Inpatient coverage within the SHI catalog + Inpatient coverage outside the SHI catalog	0.142	0.145	[0.142, 0.145]	0.181**	1.199	[1.049, 1.369]
	Inpatient coverage within the SHI catalog + Inpatient coverage outside the SHI catalog + specialty drug costs outside of the SHI catalog	0.600*	0.249	[0.600, 0.249]	0.187*	1.206	[1.043, 1.394]
	Inpatient coverage within the SHI catalog + Inpatient coverage outside the SHI catalog + specialty drug costs outside of the social health insurance catalog + health and medical services not covered by SHI	0.410*	0.185	[0.410, 0.185]	0.113	1.120	[0.971, 1.292]
Premium (CNY/year)	89CNY/year						
	149CNY/year	0.060	0.085	[0.060, 0.085]	−0.111*	0.895	[0.807, 0.992]
	209CNY/year	−0.263*	0.142	[−0.263, 0.142	−0.087	0.917	[0.821, 1.024]
Reimbursement ratio	50%						
	70%	0.101	0.115	[0.101, 0.115]	0.495***	1.641	[1.475, 1.826]
	90%	1.650***	0.392	[0.101, 0.115]	1.014***	2.756	[2.471, 3.074]
Deductible (CNY)	10000CNY						
	20000CNY	0.087	0.100	[0.087, 0.100]	−0.028	0.973	[0.876, 1.080]
	30000CNY	−0.633***	0.178	[−0.633, 0.178]	−0.399***	0.671	[0.600, 0.750]
Government involvement	Insurance company dominance						
	Collaborative dominance between government and Insurance company	0.009	0.119	[0.009, 0.119]	0.127*	1.136	[1.014, 1.272]
	Government dominance	0.379*	0.150	[0.379, 0.150]	0.179**	1.196	[1.059, 1.349]
Settlement Method	Self-service settlement						
	One-stop settlement	0.477***	0.127	[0.477, 0.127]	0.906***	2.474	[2.292, 2.671]
Payment Method	Cash payment						
	Social health insurance account payment	0.108	0.074	[0.108, 0.074]	0.323***	1.382	[1.280, 1.492]

Notes: *P<0.05; **P<0.01; ***P<0.001.

https://doi.org/10.2147/PPA.S558869

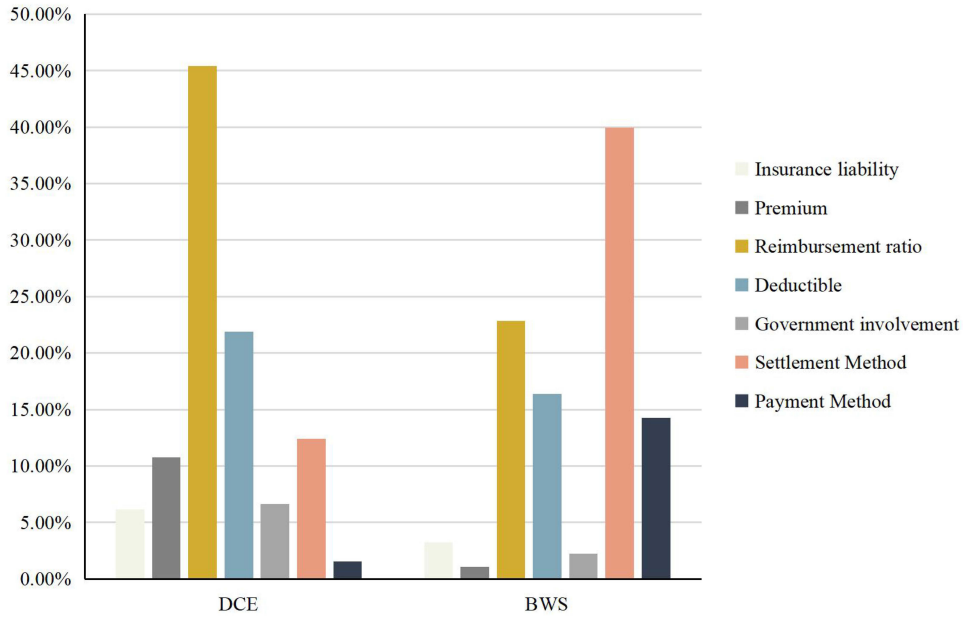

Figure 2 Relative importance of attributes for DCE and BWS.

the BWS method exhibited inferior stability, characterized by a higher propensity for inconsistent responses among participants.

Acceptability

Table 6 summarizes the acceptability assessment results for the DCE and BWS methods. Among respondents, 282 (67.95%) preferred completing the DCE questionnaire, while 133 (32.05%) favored the BWS questionnaire. In terms of comprehensibility, 283 respondents (74%) found the DCE choice tasks easier to understand, compared with only 132 respondents (31.81%) who found the BWS tasks easier to comprehend. Further analysis of the difficulty ratings revealed that DCE scores were generally lower than those for BWS, indicating a lower cognitive burden. Therefore, within the context of this study, DCE outperformed BWS in both acceptability and comprehensibility.

Discussion

To our knowledge, this study is the first to examine the differences between DCE and BWS in assessing consumer preferences for ICHI. The study reveals that a 90% reimbursement ratio and one-stop settlement are the main factors influencing participation in ICHI. It is noteworthy that, although consumer preference weights from DCE and BWS exhibit some consistency, significant differences arise in the ranking of specific key attributes. Moreover, DCE outperforms BWS in capturing the validity and acceptability of consumer preferences, thereby offering a more precise representation of actual consumer choice behavior.

The strong preference for a 90% reimbursement ratio was identified by both the DCE and BWS. This finding is consistent with those of previous related studies, with higher reimbursement levels having been consistently identified as a pivotal driver of enrollment decisions, as evidenced in studies of health insurance schemes in India.[29] It reflects respondents' concerns about alleviating the financial burden of medical expenses and their primary expectation regarding ICHI's supplementary role. Hence, the design of ICHI should prioritize enhancing the reimbursement ratio as a key dimension. Policymakers are encouraged to consider the implementation of fiscal subsidies and tax incentives to motivate insurance providers to offer products with a higher reimbursement ratio. The preference for one-stop settlement was also identified as an important attribute among respondents. This may be attributed to the complexity of the claims process in traditional way, where policyholders are required to first pay medical expenses out of pocket and then submit claims to the insurer, resulting in cumbersome procedures that preclude direct settlement.[30] In contrast, the one-stop settlement

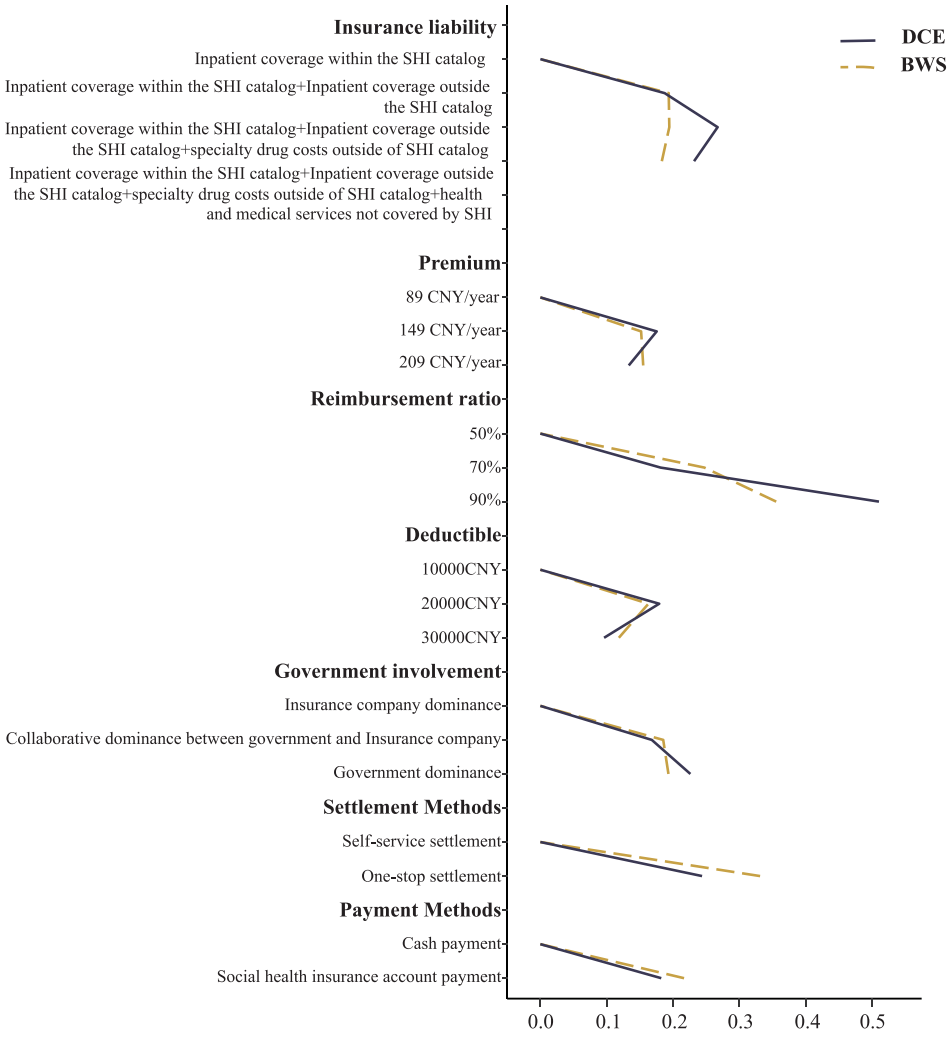

Figure 3 Scaled Preference Weights in DCE and BWS.

service offered by SHI facilitates direct settlement upon discharge, thereby enhancing the convenience of the claims process for respondents. This finding resonates with conclusions from a recent study on payment mechanisms in Tanzania's universal health insurance system, which confirmed that the reliability, timeliness, and adequacy of payment mechanisms are crucial factors affecting both healthcare provider engagement and system sustainability.[31] Accordingly, health insurance providers should integrate data systems with healthcare institutions and streamline claims and settlement processes to improve operational efficiency and service quality.

The study also found that respondents expressed a lower preference for higher premiums and deductibles, which reflect the inherent characteristics of ICHI. In essence, ICHI targets individuals facing significant financial challenges due to serious illnesses, as ordinary insured individuals seldom qualify for claims, and the premiums structured to remain highly affordable.[20] This is further evidenced by the observation that residents' participation in the ICHI decreased significantly as premium and deductible increased, which is consistent with previous insurance studies. Empirical evidence converging from micro insurance studies in Pakistan and Ethiopia, along with supplementary insurance research in some high-income countries, demonstrates the universal applicability of this finding.[32–35] The specific reasons can be explained by two key factors. First, under a rational decision-making framework, individuals' perceptions of economic costs lead them to favor insurance options that offer optimal cost-effectiveness.[36,37] Second, the psychology of risk aversion influences residents' insurance choices,[38] higher deductibles imply greater financial risk, which contradicts their natural preference to minimize risk. These findings inform several practical recommendations for product design and regulation. Insurance providers should consider establishing tiered premium systems aligned with regional economic

https://doi.org/10.2147/PPA.S558869

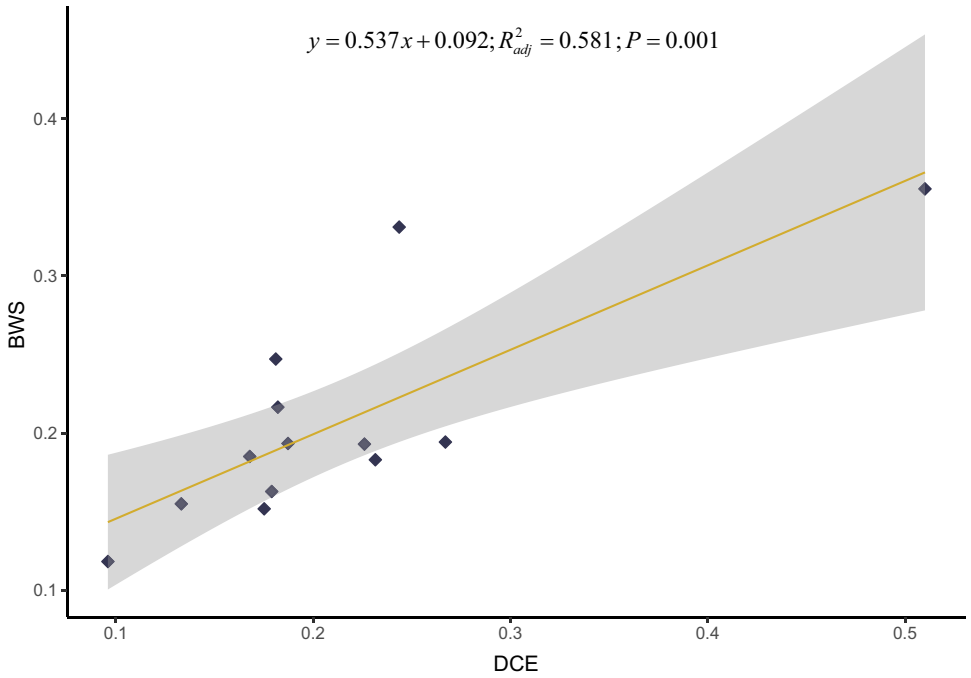

Figure 4 Scatter plot comparing preference weights between DCE and BWS.

conditions and residents' payment capacity, while also designing preferential premium schemes for low-income households. In addition, introducing dynamically adjustable deductibles with minimized thresholds could improve affordability. Regulators are encouraged to strengthen prudential supervision of ICHI product pricing to ensure premium rationality, and to promote innovation in deductible structures while maintaining sound risk control. Therefore, implementing refined risk assessment to adjust pricing strategies and deductible design is crucial for expanding ICHI coverage and enhancing overall social welfare.

In addition, we observed variations in preferences for payment methods across different measurement approaches. Specifically, within the DCE framework, respondents did not show a clear preference for the payment method of the ICHI, whereas the BWS measurement revealed a stronger inclination. Studies by Van Dijk et al[39] and Severin et al[40] reported consistent findings in their DCE and BWS, which stand in contrast to the outcomes of our study. This divergence may stem from the distinct institutional and policy framework of China's existing health insurance system. It is noteworthy that SHI account payment system is primarily available to UEBMI beneficiaries, extending coverage to family members' health insurance expenses, while this provision is excluded from the URRBMI. Under the DCE framework, which requires respondents to make trade-offs when evaluating complete profiles, respondents across different insurance types tended to concentrate on attribute levels perceived as highly attractive, while less appealing attributes were considered less relevant or even disregarded. In contrast, the BWS approach requires respondents to make explicit comparisons by identifying both the most and least preferred options, thereby emphasizing the relative importance of specific attributes such as payment methods. This

Table 6 Assessing the Acceptability of DCE and BWS

Method	DCE (N=415)		BWS (N=415)	
	Sample Size (N)	Percent (%)	Sample Size (N)	Percent (%)
Which Tool is More Acceptable	282	67.95	133	32.05
Which Tool is More Easily Understood	283	68.19	132	31.81
Score (X±S)	4.70± 2.74		4.82±2.51	

methodological contrast helps explain the divergence in preference patterns observed between the two approaches and provides useful insights for policymakers. It suggests that the significance of payment methods across various health insurance types should be considered to improve both the effectiveness and equity of policy measures. Methodologically, to further validate these methodological explanations and gain deeper insights into the cognitive processes underlying decision-making, future qualitative research employing structured or semi-structured interviews with residents is warranted. Such an approach would enable a direct exploration of how participants perceive and weigh different attributes and help determine whether the hypothesized differences between DCE and BWS are consistent with respondents'actual decision-making strategies.

The comparison between DCE and BWS revealed a marked correlation in the preference assessment of ICHI, despite only moderate overall consistency. Both methods effectively capture respondents' tendencies toward specific preferences, exhibiting broad alignment in the direction of preferences but only partial agreement in their prioritization. In this study, high correlations were observed between DCE and BWS when assessing certain preferences. However, inconsistencies were noted in the evaluation of other attributes, which may be attributed to fundamental differences in their measurement mechanisms: while DCE is based on simulated choice scenarios to assess preferences,[40] BWS employs direct comparisons to quantify preference intensity.[41]

Compared to BWS, DCE was found to be more valid and acceptable, making it more applicable for preference evaluation in ICHI. In terms of validity, no differences were observed between DCE and BWS regarding non-continuous differences. However, DCE exhibited greater stability. This finding is supported by studies from Whitty et al,[42] Krucien et al,[43] and Soekhai et al,[44] which emphasize the increased stability of DCE in preference assessments. Regarding acceptability, the majority of respondents reported that BWS was more challenging to complete, with DCE being preferred due to its reduced cognitive burden. Our study outcomes are in line with those of Himmler et al,[2] who found that more participants considered BWS difficult to understand compared to DCE. This emphasizes the advantages of DCE in evaluating the stability and respondent acceptability of ICHI preferences, further underscoring its suitability for assessing the strength and direction of individual preferences in complex contexts.

This study has several limitations. First, the study was conducted in only one province, the generalizability of the results may be limited. Future studies should include a broader range of regions or cities to improve the representativeness of the findings. Second, the study design may be subject to hypothetical bias, as respondents made choices based on hypothetical service options rather than actual scenarios, potentially leading to individual understanding biases. To reduce such biases, future studies could employ methods such as real-choice validation and diverse data collection approaches to improve the accuracy and reliability of the findings. Thirdly, this study did not add interaction analyses between personal characteristics and key attribute preferences. We therefore consider subgroup interaction analysis a critical next step and plan to address this in subsequent studies using targeted DCE designs to investigate heterogeneity in the ICHI domain.

Conclusions

This study identified the key factors shaping residents'preferences for ICHI, highlighting the dominant roles of reimbursement ratio and settlement method. To improve affordability and participation, insurers should design products with transparent and streamlined one-stop claims settlement processes, and reimbursement levels appropriately aligned with residents' payment capacities. Policymakers are advised to strengthen guidance on product pricing and promote innovations that balance inclusiveness and financial sustainability within the private health insurance sector.

Abbreviations

SHI, social health insurance; UEBMI, Urban Employee Basic Medical Insurance; URRBMI, Urban and Rural Resident Basic Medical Insurance; OOP, out-of-pocket; PHI, Private Health Insurance; ICHI, Inclusive Commercial Health Insurance; DCE, Discrete Choice Experiments; BWS, Best-Worst Scaling.

Data Sharing Statement

The data supporting this study's findings are available from the corresponding author, Weidong Huang, upon reasonable request.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the ethical standards outlined in the latest version of the Declaration of Helsinki and approved from the Ethics Committee of Harbin Medical University (HMUIRB2023005). Informed consent was obtained from all individual participants included in the study.

Acknowledgments

Yanni Jia, Xiaoying Zhu, and Xianna Liu are co-first authors for this study. The authors sincerely appreciate all participants in this study, as well as the invaluable efforts of the interviewers in the data collection process.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This work was supported by the National Natural Science Foundation of China (Grant No. 72274045, 71974048).

Disclosure

The authors declare no competing interests in this work.

References

1. Li L, Fu H. China's health care system reform: progress and prospects. *Int J Health Plann Manag*. 2017;32(3):240–253. doi:10.1002/hpm.2424
2. Zhu X, Mahal A, Tang S, McPake B. A Chinese conundrum: does higher insurance coverage for hospitalization reduce financial protection for the patients who most need it? *Health Policy Plan*. 2025;40(3):287–299. doi:10.1093/heapol/czae108
3. Ng ADC, Then F. *Private health insurance in China: finding the winning formula*. McKinsey & Company; 2012.
4. Shi YXY, Zhang Q. Analysis on the current situation and development direction of the commercial health insurance in China. *Med Soc*. 2016;29.
5. G X. Status and development of private health insurance in China. *Insurance Studies*. 2009;11:26–33.
6. Zhang LCW. *Research on the Development of Inclusive Commercial Medical Insurance in China*. Shanghai: Fudan University Press; 2021.
7. Savitha S, Kiran KB. Effectiveness of micro health insurance on financial protection: evidence from India. *Int J Health Econ Manag*. 2015;15(1):53–71. doi:10.1007/s10754-014-9158-5
8. Habib SS, Perveen S, Khuwaja HM. The role of micro health insurance in providing financial risk protection in developing countries--a systematic review. *BMC Public Health*. 2016;16(1):281. doi:10.1186/s12889-016-2937-9
9. Saksena P, Antunes AF, Xu K, Musango L, Carrin G. Mutual health insurance in Rwanda: evidence on access to care and financial risk protection. *Health Policy*. 2011;99(3):203–209. doi:10.1016/j.healthpol.2010.09.009
10. Rothschild MSJ. *Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information. Foundations of Insurance Economics*. New York: Academic Press; 1978:257–280.
11. Einav L, Finkelstein A, Ryan S, Schrimpf P, Cullen MR. Selection on moral hazard in health insurance. *Am Econ Rev*. 2013;103(1):178–219. doi:10.1257/aer.103.1.178
12. Ryan M, Gerard K. *Using Discrete Choice Experiments in Health Economics: Moving Forward*. John Wiley & Sons, Ltd; 2003.
13. Flynn TN, Louviere JJ, Peters TJ, Coast J. Best–worst scaling: what it can do for health care research and how to do it. *J Health Econ*. 2007;26(1):171–189. doi:10.1016/j.jhealeco.2006.04.002
14. Cleland J, Porteous T, Skåtun D. What can discrete choice experiments do for you? *Med Educ*. 2018;52(11):1113–1124. doi:10.1111/medu.13657
15. Muhlbacher AC, Kaczynski A, Zweifel P, Johnson FR. Experimental measurement of preferences in health and healthcare using best-worst scaling: an overview. *Health Econ Rev*. 2016;6(1):2. doi:10.1186/s13561-015-0079-x
16. Adebayo EF, Uthman OA, Wiysonge CS, Stern EA, Lamont KT, Ataguba JE. A systematic review of factors that affect uptake of community-based health insurance in low-income and middle-income countries. *BMC Health Serv Res*. 2015;15(1):543. doi:10.1186/s12913-015-1179-3
17. Abiiro GA, Torbica A, Kwalamasa K, De Allegri M. Eliciting community preferences for complementary micro health insurance: a discrete choice experiment in rural Malawi. *Soc Sci Med*. 2014;120:160–168. doi:10.1016/j.socscimed.2014.09.021
18. Poteet S, Craig BM. The value employees place on health insurance plans: a discrete-choice experiment. *Appl Health Econ Health Policy*. 2019;17(6):817–825. doi:10.1007/s40258-019-00507-1

19. Van der Wulp I, van den Hout WB, de Vries M, Stiggelbout AM, van den Akker-van Marle EM. Societal preferences for standard health insurance coverage in the Netherlands: a cross-sectional study. *BMJ Open*. 2012;2(2):e001021. doi:10.1136/bmjopen-2012-001021
20. Zheng L, Su Y. Inclusive insurance, income distribution, and inclusive growth. *Front Public Health*. 2022;10:890507. doi:10.3389/fpubh.2022.890507
21. K LY. The promotion mechanism and experience of inclusive health insurance governance model. *China Health Insurance*. 2024;8:107–112.
22. Yu BJY, Kong W, Li Y, Ji G. The present situation and future development suggestions of inclusive health insurance products in China. *Health Econ Res*. 2021;4:3–8.
23. Xu RSYT. The development of inclusive medical insurance: practical dilemma and optimization direction. *Southwest Fin*. 2022;1:40–51.
24. Su Z. Current situation, problems, and development suggestions of inclusive commercial health insurance. *Admin Reform*. 2021;11:90–99.
25. Li GJCL, Xi XY. Development status, practical challenges and countermeasures of universal health insurance. *Chin Health Econ*. 2023;42(7):17–20,6.
26. Shen T, Wang Y, Xie J, Han X, Shao R, Jiang R. Correlates of residents' enrolment intention toward inclusive commercial health insurance in China: involvement, perceived benefit, perceived sacrifice, and government participation. *Front Public Health*. 2023;11:1121783. doi:10.3389/fpubh.2023.1121783
27. de Bekker-Grob EW, Ryan M, Gerard K. Discrete choice experiments in health economics: a review of the literature. *Health Econ*. 2012;21(2):145–172. doi:10.1002/hec.1697
28. Ryan M, Watson V, Entwistle V. Rationalising the 'irrational': a think aloud study of discrete choice experiment responses. *Health Econ*. 2008;18(3):321–336. doi:10.1002/hec.1369
29. Karyani AK, Sari AA, Woldemichael A. Eliciting preferences for health insurance in Iran using discrete choice experiment analysis. *Int J Health Policy Manag*. 2019;8(8). doi:10.15171/ijhpm.2019.29
30. Wu J, Qiao J, Nicholas S, Liu Y, Maitland E. The challenge of healthcare big data to China's commercial health insurance industry: evaluation and recommendations. *BMC Health Serv Res*. 2022;22(1):1–13. doi:10.1186/s12913-022-08574-2
31. Guardian T. IHI study points at benefits snag in universal insurance. 2025.
32. Eline BA, Atherly A. Patient preferences for provider choice: a discrete choice experiment. *Patient*. 2020;1:13. doi:10.37765/ajmc.2020.43761
33. Kerssens JJ, Groenewegen PP. Consumer preferences in social health insurance. *Eur J Health Econ*. 2005;6(1):8–15. doi:10.1007/s10198-004-0252-3
34. Obse A, Ryan M, Heidenreich S, Normand C, Hailemariam D. Eliciting preferences for social health insurance in Ethiopia: a discrete choice experiment. *Health Policy Plann*. 2016;31(10):1423–1432. doi:10.1093/heapol/czw084
35. Habib SS, Zaidi S. Exploring willingness to pay for health insurance and preferences for a benefits package from the perspective of women from low-income households of Karachi, Pakistan. *BMC Health Serv Res*. 2021;21(1):380. doi:10.1186/s12913-021-06403-6
36. Varian HR. *Intermediate Microeconomics: A Modern Approach*. W. W. Norton & Company; 2009.
37. Wang Q, Abiiro GA, Yang J, Li P, Allegri MD. Preferences for long-term care insurance in China: results from a discrete choice experiment. *Soc Sci Med*. 2021;281:114104. doi:10.1016/j.socscimed.2021.114104
38. Abdus S, Selden TM, Keenan P. The financial burdens of high-deductible plans. *Health Affairs*. 2016;35(12):2297. doi:10.1377/hlthaff.2016.0842
39. van Dijk JD, Groothuis-Oudshoorn CG, Marshall DA, IJzerman MJ. An empirical comparison of discrete choice experiment and best-worst scaling to estimate stakeholders' risk tolerance for hip replacement surgery. *Value Health*. 2016;19(4):316–322. doi:10.1016/j.jval.2015.12.020
40. Severin F, Schmidtke JR, Mühlbacher A, Rogowski WH. Eliciting preferences for priority setting in genetic testing: a pilot study comparing best-worst scaling and discrete-choice experiments. *Eur J Human Genet*. 2013;21(11):1202–1208. doi:10.1038/ejhg.2013.36
41. Whitty JA, Ratcliffe J, Chen G, Scuffham PA. Australian public preferences for the funding of new health technologies: a comparison of discrete choice and profile case best-worst scaling methods. *Med Decis Mak*. 2014;34(5):638–654. doi:10.1177/0272989X14526640
42. Whitty JA, Walker R, Golenko X, Ratcliffe J. A think aloud study comparing the validity and acceptability of discrete choice and best worst scaling methods. *PLoS One*. 2014;9(4):e90635. doi:10.1371/journal.pone.0090635
43. Krucien N, Watson V, Ryan M. Is best-worst scaling suitable for health state valuation?: a comparison with discrete choice experiments. *Health Economics*. 2016;26(12):e1–e16. doi:10.1002/HEC.3459
44. Soekhai V, Donkers B, Johansson JV, et al. Comparing outcomes of a discrete choice experiment and case 2 best-worst scaling: an application to neuromuscular disease treatment. *Patient*. 2023;16(3):239–253. doi:10.1007/s40271-023-00615-0