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Patient Preferences and Willingness to pay for Traditional Chinese Medicine Formula Granules in Southwest China: A Discrete Choice Experiment

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Background and Objective

- TCM formula granules are a modern, ready-to-drink dosage form of TCM decoction pieces — dose-accurate, easy to carry, store and prepare.
- A 2021 national policy ended the 20-year pilot and brought granules into routine clinical and medical-insurance management; 369 national standards have been issued.
- Compared with traditional decoctions, granules show higher medication adherence and a lower risk of adverse events — yet patient acceptance is uneven and use still lags.
- Patient-side quantitative preference evidence remains scarce, which limits patient-centered pharmaceutical care and medical-insurance design.

Objective: Quantify patients' preferences and willingness to pay (WTP) for TCM formula granules, and explore preference heterogeneity across population subgroups, to support personalized pharmaceutical care and medical-insurance policy.

Methods

- A discrete-choice experiment (DCE), a stated-preference technique, was employed to address this evidence gap. This approach enables quantification of attribute-level values, willingness-to-pay, and preference heterogeneity, complementing real-world prescription data.

Identification of attributes and levels

- The identification of attributes and levels was based on a literature review, semi-structured expert interviews and focus-group discussions (ISPOR guidance), through which six core attributes with 3-4 levels were finalized; see Table 1.

Table 1. Attributes and Levels

Attribute	Level	Description
Therapeutic Efficacy / Symptom Improvement	Complete relief	Symptoms completely disappear; return to normal daily life and work.
	Significant relief	Symptoms markedly reduced; only mild impact on daily life.
	Partial relief	Symptoms somewhat reduced, but certain discomfort still needs to be tolerated.
Adverse Reaction Rate	Rare risk	Almost no adverse reactions (<0.05%).
	Low risk	Occasional mild gastrointestinal reactions (0.1%–1%).
	Moderate risk	Occasional mild gastrointestinal reactions or allergic symptoms such as skin itching (1%–5%).
Medication Convenience	High convenience	Available immediately; simple brewing or no special operation required; easy to carry when going out.
	Moderate convenience	Decocted herbal decoction (proxy-prepared); requires simple heating; convenient for home use; not easy to carry.
	Low convenience	Requires self-decoction and waiting for half a day to 1 day; not easy to carry.
Physician Recommendation Degree	High recommendation	Physician proactively prescribes Chinese medicine formula granules / decoction pieces / ready-to-use decoction and recommends its use: "This is most suitable for your condition and works best."
	Moderate recommendation	Physician prescribes "as needed"; physician states: "Formula granules, ready-to-use decoctions, and herbal decoction pieces are all available, with similar efficacy; it depends on your convenience."
	Low recommendation	Physician does not proactively mention it; prescribed only upon patient inquiry, or advises prioritizing other dosage forms.
Monthly Out-of-Pocket Cost	¥ 500	Monthly out-of-pocket cost after deducting reimbursement / insurance coverage: ¥500.
	¥ 800	Monthly out-of-pocket cost after deducting reimbursement / insurance coverage: ¥800.
	¥ 1,200	Monthly out-of-pocket cost after deducting reimbursement / insurance coverage: ¥1200.
	¥ 1,500	Monthly out-of-pocket cost after deducting reimbursement / insurance coverage: ¥1500.
Taste	Good palatability	Sweet taste; easy to take.
	Fairly good palatability	Slightly bitter; does not affect administration.
	Average palatability	Rather bitter; difficult to swallow.

Choice sets and questionnaire

- Ngene 1.2.1 D-efficient partial-factorial design generated 24 choice sets, split into two blocks of 12; each respondent answered one block (validated in a pre-survey).

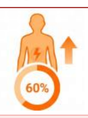
Attribute	Option A	Option B
Therapeutic Efficacy / Symptom Improvement		
	Partial relief	Complete relief
Adverse Reaction Rate		
	Moderate risk	Rare risk
Physician Recommendation Degree	Physician did not proactively mention or recommend any other dosage forms	Prescribed by a physician as needed
	Low recommendation	Moderate recommendation
Monthly Out-of-Pocket Cost		
	¥ 500	¥ 1500
Taste		
	Good palatability	Average palatability
Medication Convenience		
	High convenience	Moderate convenience
Which option do you prefer?	☐	☐

Figure 1. Example of a DCE choice set

Study population and sampling methods

- A multi-center cross-sectional survey was conducted in Chengdu and Kunming, two representative provincial capitals in Southwest China.
- The two cities feature mature TCM healthcare systems and are national pilot sites for herbal formula granules.
- Patients were recruited from three medical institutions providing herbal formula granule services via convenience sampling; questionnaires were distributed on-site.

Data Analysis

- Data analysis was performed using a mixed logit model (random-parameters logit), in which all variables were specified as categorical.

Results

Study Population and Sample Characteristics

- In total, 529 individuals completed the survey; 363 participants were retained for final analysis. This sample size meets or exceeds Orme's rule-of-thumb for DCE studies. Basic demographic characteristics of the analysed sample are presented below (Figure 2).

Table2. Survey Response Status for the Traditional Chinese Medicine (TCM) Granule Preference Questionnaire

Medical institution	Patient questionnaires		Valid questionnaires		Valid response rate
	Questionnaire1	Questionnaire2	Questionnaire1	Questionnaire2	
Pilot survey	5	5	5	4	90.00%
Sheng'ai Chinese Medicine Clinic (Chengdu)	37	35	21	27	66.67%
Sichuan Provincial People's Hospital (Chengdu)	118	118	80	86	70.33%
Sheng'ai Chinese Medicine Clinic (Kunming)	103	108	66	74	66.35%
Total	263	266	172	191	68.62%
	529		363		

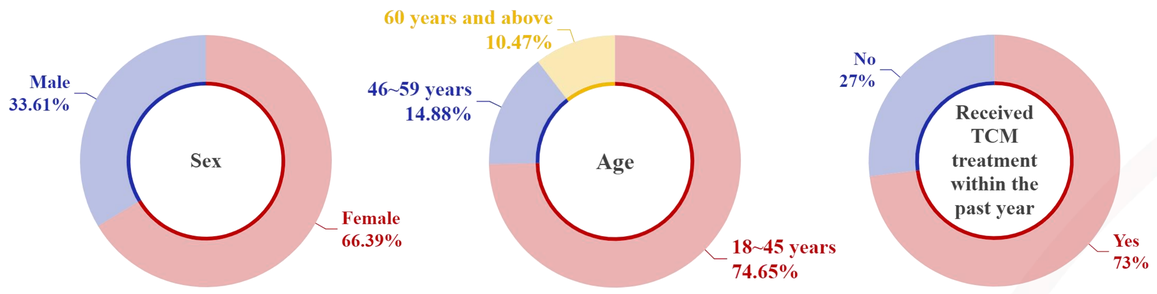


Figure 2. Results of Relative Attribute Importance

Random Parameter Model

- Efficacy (39.0%) and monthly out-of-pocket cost (27.0%) are the two dominant drivers of granule choice; doctor recommendation (14.1%) ranks third.
- All levels above the reference were preferred in the expected direction, and each step-up in level added significant utility; all six attributes show significant preference heterogeneity (largest for cost, SD = 1.45, and efficacy, SD = 1.08).

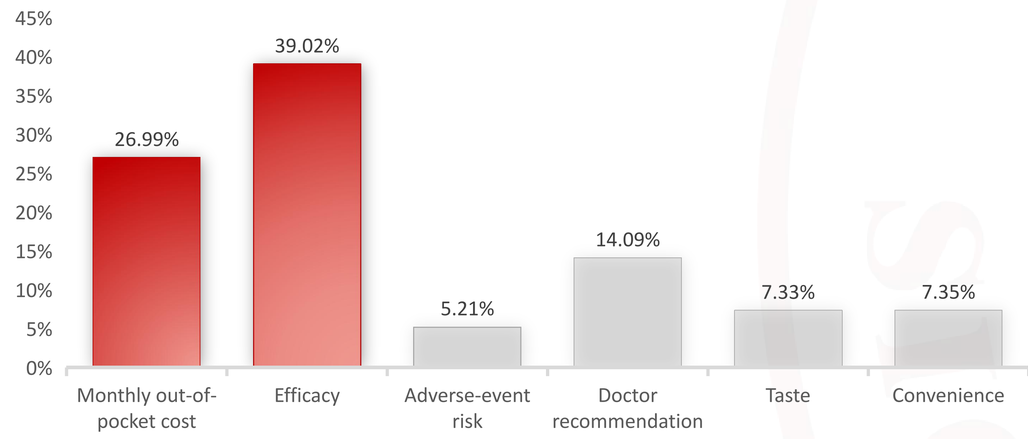


Figure 3. Results of Relative Attribute Importance

Subgroup Preferences

Table 3. Subgroup interaction results

Interaction term	Interaction coefficient (β)	p-value	Direction of preference difference
Sex (male) × Efficacy (significant remission)	-0.4191	0.0082	females > males
Sex (male) × Convenience (high)	-0.4666	0.0142	females > males
Sex (male) × Convenience (moderate)	-0.4534	0.0398	females > males
Occupation (employed) × Convenience (moderate)	0.4418	0.0364	employed > non-employed
Education (higher educational attainment) × Efficacy (significant remission)	-0.7410	0.0134	junior high or below >higher educational attainment
Education (higher educational attainment) × Convenience (high)	-0.7211	0.044	junior high or below >higher educational attainment
Insurance type (URRBMI) × Monthly out-of-pocket cost (low level)	0.6321	0.009	URRBMI > EBMI

- No significant interactions were found for age, income, residence or TCM-use history (all p > 0.05).

Willingness to pay

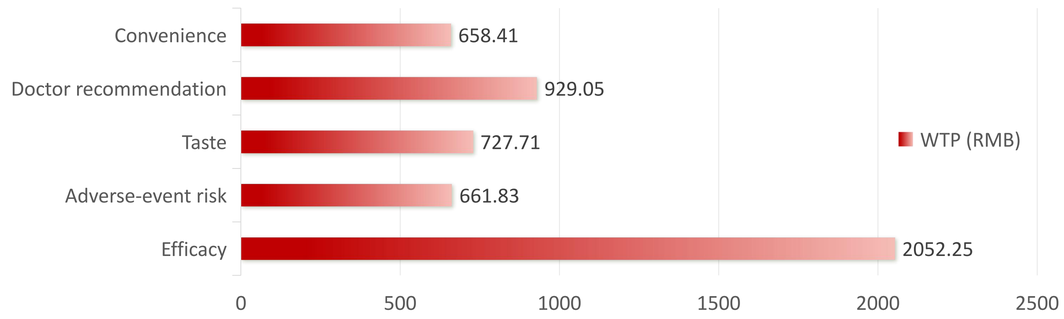


Figure 4. WTP for worst to best attribute improvements (RMB)

- Efficacy improvement (partial → complete relief) carries the highest WTP (¥ 2,052.25) — extrapolated beyond the ¥1,500 cost range and not a basis for pricing decisions.
- Other improvements cluster at ¥ 650–750 / month — likely the psychological price anchor for most patients.
- When monthly out-of-pocket cost exceeds ¥600–800, insurance cost-sharing, stronger doctor recommendation or clearly superior efficacy is needed.

Conclusion

- Efficacy and monthly out-of-pocket cost are the two most influential factors affecting patients' choices.
- Attribute preferences vary across population subgroups. These results enable clinicians and patients to select therapies consistent with patient preferences.
- WTP for attribute improvements provide an evidence-based rationale for pricing of TCM formula granules and formulating medical insurance policies.

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