Study on Primary Healthcare Technicians' Preferences for Appropriate Traditional Chinese Medicine Technologies: Based on a Discrete Choice Experiment Post-print

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Abstract

Background: Promoting appropriate traditional Chinese medicine (TCM) techniques in primary-level healthcare institutions constitutes an important undertaking for "equal emphasis on Chinese and Western medicine" and represents a significant initiative for advancing the inheritance and development of TCM. Objective: To analyze the preferences of primary-level health technicians regarding the utilization of appropriate TCM techniques and to provide policy recommendations for their promotion and application in primary-level healthcare institutions. Methods: From July to August 2021, a multistage random cluster sampling method was employed to select 23 primary-level healthcare institutions from eastern and western regions of China, enrolling 319 health technicians who were on duty for a questionnaire survey. Among the 319 questionnaires collected, 295 passed the consistency test, yielding a valid response rate of 92.5%. The discrete choice experiment questionnaire incorporated 7 attributes, utilizing an efficient orthogonal design to generate 18 choice sets, which were evenly distributed across 3 questionnaire versions. Each version comprised 6 choice sets (including an opt-out option) and 1 consistency test question. Additionally, basic demographic information of the primary-level health technicians was collected, including gender, age, education level, and professional technical title. Preference analysis for appropriate TCM technique utilization among primary-level health technicians was conducted using conditional Logit and latent class models. Willingness-to-pay was employed to monetize changes in utility resulting from attribute-level variations. Results: In the conditional Logit model, coverage by medical insurance, duration per procedure, impact on income, impact on workload, assistance with professional title (position) promotion, technical efficacy, and impact on patient expenditure all significantly influ-

enced health technicians' preferences for utilizing appropriate TCM techniques (P<0.05). The latent class model identified a wait-and-see group (16.2%) with an opt-out coefficient of -3.660 (P<0.001) and a supportive group (83.8%) with an opt-out coefficient of 2.189 (P<0.001). The wait-and-see group demonstrated greater willingness to use appropriate TCM techniques with established efficacy (β=1.275), whereas the supportive group showed no significant preference for techniques with unchanged efficacy (β=0.054). Conclusion: Primary-level health technicians exhibit preferences for appropriate TCM techniques that increase income, maintain workload unchanged, reduce or preserve patient costs, facilitate promotion, are covered by medical insurance, and possess superior efficacy. Integrating appropriate TCM techniques into the medical insurance reimbursement catalog and linking their utilization to the promotion system for technicians can effectively enhance primary-level health technicians' motivation to use these techniques, with differentiated incentive approaches warranted for distinct technician groups.

Full Text

Preamble

Preferences for the Use of Appropriate Traditional Chinese Medicine Techniques among Primary Health Workers: A Discrete-Choice Experiment-Based Study

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Abstract

Background
The promotion of appropriate traditional Chinese medicine (TCM) techniques in primary care institutions represents a crucial initiative for achieving "equal emphasis on Chinese and Western medicine" and advancing the inheritance and development of TCM.

Objective
To analyze primary health workers' preferences for using appropriate TCM techniques and provide policy recommendations for their promotion and utilization in primary healthcare institutions.

Methods
Between July and August 2021, we conducted a questionnaire survey using multistage random cluster sampling. A total of 23 primary healthcare institutions were selected from eastern and western China, enrolling 319 health technicians who were on duty during the survey period. Among 319 collected questionnaires, 295 passed consistency checks, yielding a valid response rate of 92.5%. The discrete choice experiment questionnaire included seven attributes, designed using an efficient orthogonal approach to generate 18 choice sets, which were evenly distributed across three questionnaire versions. Each version contained six choice sets (including an opt-out option) and one consistency test question. The survey also collected basic demographic information including gender, age, education level, and professional title. We analyzed preferences using conditional Logit models and latent class models, and monetized utility changes through willingness-to-pay (WTP) calculations.

Results
The conditional Logit model revealed that all seven attributes significantly influenced health workers' preferences ($P<0.05$): medical insurance coverage, operation duration, impact on income, impact on workload, assistance with professional title promotion, technical efficacy, and impact on patient expenditures. The latent class model identified two distinct groups: a "wait-and-see" group (16.2%) with an opt-out coefficient of -3.660 ($P<0.001$), and a "supportive" group (83.8%) with an opt-out coefficient of 2.189 ($P<0.001$). The wait-and-see group showed stronger preference for techniques with proven efficacy ($\beta=1.275$), while the supportive group exhibited no significant preference for techniques with unchanged efficacy ($\beta=0.054$).

Conclusion
Primary health workers prefer appropriate TCM techniques that increase income, maintain workload, reduce or stabilize patient costs, facilitate promotion, fall within medical insurance coverage, and demonstrate superior efficacy. Expanding insurance reimbursement for TCM techniques and linking their use to promotion systems could effectively enhance adoption enthusiasm. Differentiated incentive strategies should be implemented for different worker categories.

Keywords
Traditional Chinese medicine therapy; Community health services; Community health workers; Preference; Discrete choice experiment; Conditional logistic regression analysis; Latent class analysis

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Introduction

Appropriate traditional Chinese medicine techniques constitute an essential component of TCM services, typically referring to safe, effective, low-cost, and easily learned TCM modalities characterized by simplicity, convenience, proven efficacy, and affordability. The "Opinions on Promoting Inheritance, Innovation, and Development of Traditional Chinese Medicine" issued by the Central Committee of the Communist Party of China and the State Council emphasizes "equal emphasis on Chinese and Western medicine," with promoting appropriate TCM techniques in primary healthcare institutions representing a critical initiative for advancing TCM inheritance and development. The dissemination of appropriate TCM techniques at the primary level enhances healthcare delivery capacity and patient satisfaction while reducing medical expenses and alleviating the economic burden of disease.

However, during active promotion efforts, most regions have focused on information dissemination and base construction while neglecting the cultivation and motivation of primary health technicians—the key implementation agents. On one hand, the number of health technicians mastering appropriate TCM techniques at primary-level units remains insufficient, with relative scarcity of human resources. On the other hand, influenced by factors such as work environment, performance systems, technical income, and operation time, primary health technicians demonstrate limited enthusiasm for participating in TCM technique training and clinical application.

Given these challenges, this study adopts a discrete choice experiment (DCE) approach from the perspective of primary health technicians to investigate their behavioral patterns and preferences regarding appropriate TCM technique usage, aiming to provide theoretical foundations for establishing incentive and promotion mechanisms.

Methods

1.1 Study Participants

Between July and August 2021, we employed multistage random cluster sampling to select one county-level city each from eastern and western China (Laizhou City in Shandong Province and Qingzhen City in Guizhou Province). From these target counties, we randomly selected 17 township health centers and six community health service institutions. All health technicians on duty during the survey day were included from smaller institutions, while 50% were randomly sampled from larger institutions. Inclusion criteria comprised on-duty medical personnel including TCM practitioners, Western medicine practitioners, public health physicians, and nurses holding practicing certificates. Exclusion criteria included certified physicians who had never participated in clinical practice.

A total of 23 primary healthcare institutions were sampled, with 319 health technicians enrolled for questionnaire administration. All 319 questionnaires were returned, of which 295 passed consistency checks, yielding a valid response rate of 92.5%. This study was approved by the Ethics Committee of West China Hospital, Sichuan University (Approval No.: 2023-398).

1.2 Research Methods

1.2.1 Attribute and Level Setting Attributes and levels constitute fundamental elements in DCE. Attributes refer to product or service characteristics, while levels represent their degrees—together forming the basis for choice scenarios. We systematically reviewed literature on key factors influencing health technicians' use of appropriate TCM techniques and identified seven determinants from three dimensions (technique attributes, users, and institutions): (1) medical insurance coverage, (2) operation duration per session, (3) expected efficacy, (4) assistance with professional title promotion, (5) impact on workload, (6) impact on patient expenditures, and (7) impact on income. Following consultation with TCM technique experts, health policy makers, health economists, DCE specialists, and primary care physicians, we finalized seven attributes and their corresponding levels (Table 1).

1.2.2 Questionnaire Design The discrete choice experiment questionnaire incorporated seven attributes: two with two levels and five with three levels. A full factorial design would have generated 972 (2^2\$×3^{5}\$) possible combinations. To ensure feasibility, we employed an efficient orthogonal design to create 18 choice sets, which were evenly distributed across three questionnaire versions. Each version contained six choice sets plus one consistency test question (designed with clearly dominant options to assess respondents' rational engagement) and an opt-out option for each choice set. The questionnaire also collected basic demographic information and assessed respondents' self-rated enthusiasm for learning appropriate techniques on a 1-10 scale, with higher scores indicating greater enthusiasm.

1.2.3 Survey Administration Each respondent completed only one questionnaire version. To ensure approximately equal distribution across the three versions, participants sequentially rotated through versions 1, 2, and 3. Questionnaires failing the consistency test were excluded from analysis.

1.3 Statistical Analysis

We used SAS 9.2 for efficient orthogonal design and EpiData 3.1 for double data entry to ensure quality. Categorical data were presented as frequencies and percentages, while non-normally distributed continuous data were expressed as median (interquartile range) [M (QR)]. Stata 16.0 analyzed preference data, employing conditional Logit models for overall preference analysis and latent class

models for preference classification. Willingness-to-pay (WTP) monetized utility changes from attribute-level variations, with P<0.05 considered statistically significant.

1.3.1 Conditional Logit Model Based on utility maximization theory, primary health technicians select the TCM technique yielding maximum satisfaction—i.e., the highest utility. The model is specified as:

$$U_{ij} = \beta_0 + \beta_{1X_{1ij}} + \beta_{2X_{2ij}} + \cdots + \beta_{mX_{mij}} + \varepsilon_{ij}$$

where U represents utility, observed attributes include medical insurance coverage (X_1), operation duration (X_2), etc., each with corresponding weights (β_1, β_2, …, β_7) revealing preference directions and magnitudes.

1.3.2 Latent Class Model The latent class model assumes heterogeneous preferences across different primary health technician groups following a discrete distribution. It classifies respondents based on model fit indices, selecting the number of categories that minimizes the Bayesian Information Criterion (BIC). Results demonstrate preference differences and demographic variations across classes.

1.3.3 Willingness-to-Pay (WTP) WTP measures the monetary value of attribute levels, calculated as the ratio of non-economic attribute coefficients (β) to the income attribute coefficient. With respondents' average monthly salary of ¥4,231.4, income was scaled in units of 1% monthly wage (¥42.3/month). The formula indicates that obtaining attribute level x yields utility equivalent to a monthly income increase of WTP yuan:

$$\mathrm{WTP}_x = \frac{\beta_x}{\beta_{\mathrm{income}}} \times 42.3$$

Results

2.1 Sample Characteristics

Among 295 valid respondents, 65.76% were female with a median age of 35 (IQR=13) years. Over half (52.88%) held bachelor's degrees or higher, and 49.83% had junior professional titles. TCM practitioners accounted for 18.64% of the sample. Approximately 64.75% reported monthly incomes ≤¥5,000, 77.97% worked in township health centers, and 63.39% were formal employees. The median enthusiasm score for learning appropriate techniques was 9 (IQR=3) (Table 3).

2.2 Conditional Logit Model Analysis

The model incorporated seven key attributes, with respondents' choices as the dependent variable and attribute values as independent variables. Preliminary analysis using dummy coding for operation duration and income impact revealed good linear relationships, so these were treated as continuous variables in the main model, while other attributes used dummy coding.

Results showed all seven attributes significantly influenced preferences ($P<0.05$): medical insurance coverage, operation duration, income impact, workload impact, promotion assistance, technical efficacy, and patient expenditure impact. Preferred TCM techniques were characterized by: insurance coverage (β=0.7946), promotion assistance (β=0.4142), unchanged patient expenditure (β=0.4001) or reduced expenditure (β=0.4001), improved efficacy (β=0.3778), no workload increase (β=0.1465), and 10% income increase (β=0.0324). Techniques within insurance coverage had 2.214 times higher probability of being used; each additional minute of operation duration reduced usage probability to 0.990 of the previous level; each 1% income increase raised usage probability to 1.033 times the baseline; promotion-assisting techniques showed 1.513 times higher usage probability; improved-efficacy techniques had 1.459 times higher usage probability; techniques reducing or maintaining patient expenditure showed 1.492 times higher usage probability (Table 4).

2.3 Willingness-to-Pay by Attribute Level

Using an insurance-covered TCM technique yielded utility equivalent to a monthly income increase of ¥1,036. Compared to a 20-minute technique, a 5-minute technique provided utility equivalent to ¥205/month. Relative to techniques increasing workload by 10%, those with no workload impact provided utility equivalent to ¥191/month. Promotion-assisting techniques offered utility equivalent to ¥540/month. Improved-efficacy techniques provided utility equivalent to ¥493/month. Techniques reducing or maintaining patient expenditure offered utility equivalent to ¥522/month (Table 5).

2.4 Latent Class Model Analysis

The latent class model categorized respondents based on their preference patterns. While three categories yielded the minimum BIC value (Table 6), insufficient sample sizes in some categories caused parameter estimation issues. We therefore selected a two-category model as the final solution.

The primary distinction between categories lay in the opt-out option (whether respondents would actually apply their preferred technique in clinical practice: 1=yes, 0=no). Category 1 (16.2% of respondents) showed an opt-out coefficient of -3.660 ($P<0.001$), designated as the "Wait-and-See Group." Category 2 (83.8%) showed an opt-out coefficient of 2.189 ($P<0.001$), designated as the "Supportive Group." The Wait-and-See Group exhibited stronger preference for techniques with proven efficacy (β=1.275, WTP=¥1,123.60/month) even

when efficacy was unchanged from previous treatments, whereas the Supportive Group showed no significant preference for unchanged-efficacy techniques (β=0.054, WTP=¥69.22/month). Regarding workload, the Wait-and-See Group only experienced significant utility gains when workload decreased (β=0.517, WTP=¥455.61/month), while the Supportive Group was more sensitive to workload changes, deriving significant utility from both unchanged (β=0.142, WTP=¥182.02/month) and reduced workload (β=0.123, WTP=¥157.66/month).

To explore sources of preference heterogeneity, we examined demographic characteristics showing significant differences in stepwise regression, including education level (coded: secondary school and below=1, junior college=2, bachelor's=3, graduate=4), monthly income, and learning enthusiasm. The Wait-and-See Group demonstrated significantly lower learning enthusiasm (β=-0.258, P<0.001) compared to the Supportive Group (Table 7).

Discussion

3.1 Medical Insurance as a Critical Factor

Medical insurance coverage (β=0.7946, P<0.001) emerged as the most important factor influencing TCM technique adoption, with a WTP of ¥1,036/month. Primary health workers' preferences are shaped by their service population, as patients prefer treatments covered by insurance. Literature indicates that including appropriate TCM techniques in insurance coverage with clear fee standards can reflect health workers' labor value and influence their motivation. However, current promotion efforts lack adequate insurance coverage, with many techniques remaining outside reimbursement schemes. To address this, health authorities should solicit broad stakeholder input to establish evaluation criteria for insurance inclusion, actively screen and assess appropriate techniques, and incorporate widely-used modalities into insurance coverage to encourage clinical adoption.

3.2 Income Incentives

Income significantly influences adoption (β=0.0324, P<0.001). Due to their characteristics, some TCM techniques require longer operation times and treatment courses, imposing greater labor burdens than conventional procedures. We recommend that health administrative departments establish special promotion funds for appropriate TCM techniques to compensate operators' labor and incentivize technique selection. Reward mechanisms should be based on standardized assessments of technique scope and operation protocols, considering difficulty, risk, and labor burden to genuinely reflect the value of TCM techniques.

3.3 Combined Incentive Strategies

Professional title promotion, patient costs, technical efficacy, operation duration, and workload all affect adoption. Compared to techniques with no promotion benefit, those facilitating early promotion had a WTP of ¥541/month. Techniques maintaining or reducing patient expenditure showed WTP of ¥522/month relative to those increasing costs. Improved-efficacy techniques demonstrated WTP of ¥493/month compared to uncertain-efficacy alternatives. Although operation duration and workload showed lower WTP values, they still influence job satisfaction and performance.

The relative importance of these attributes suggests that combined incentives can be effective. For instance, using an insurance-covered technique (WTP=¥1,036/month) that increases patient expenditure yields similar utility to a technique linked to promotion (WTP=¥541/month) that reduces patient costs (WTP=¥522/month). Some hospitals have explored point-based promotion systems that comprehensively evaluate clinical, teaching, and research performance. Linking TCM technique usage to promotion through bonus points could effectively stimulate adoption. Strategic combination of multiple incentives can optimize promotion efforts.

3.4 Heterogeneous Preferences Across Worker Groups

The latent class analysis revealed preference heterogeneity, identifying two distinct groups. The Wait-and-See Group (16.2%) exhibits skepticism toward TCM techniques, only willing to adopt those that clearly reduce workload and demonstrate proven efficacy. To promote adoption among this group, techniques should be simple, easy to learn, operationally straightforward, workload-reducing, and clearly effective to improve attitudes and facilitate usage.

The Supportive Group (83.8%) believes in TCM technique efficacy and remains willing to use them even without workload reduction, showing sensitivity to both unchanged and reduced workload conditions. These findings underscore the need for differentiated incentive strategies tailored to distinct worker categories.

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