

Factors Influencing Dietary Supplement Selection Among Older Adults in Iran: A Discrete Choice Experiment

Faezeh Valaei Sharif¹, Farimah Rahimi², Mohammad Zeraat¹, Yalda Fathi¹, Zahra Sharif¹

¹Faculty of Pharmacy, Alborz University of Medical Sciences, Karaj, Iran; ²Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Correspondence: Zahra Sharif, Faculty of Pharmacy, Alborz University of Medical Sciences, Karaj, Iran, Tel +98-9122209575, Fax +98-2632567175, Email sharifzahra@gmail.com

Introduction: Understanding factors that shape dietary supplement choices among older adults is important for guiding healthcare, industry, and policy. This study aimed to identify key factors influencing supplement choices among older adults using a discrete choice experiment (DCE).

Methods: This study recruited 384 participants aged ≥ 65 years (mean age 73.7, 52% women) from pharmacies in Tehran and Karaj. Attributes were developed through literature review and expert consultation and analyzed using a DCE with multinomial logit model.

Results: Participants had a mean age of 73.67 years; 52% were women. Physician recommendation emerged as the most influential factor, followed by supplement form, monthly cost, ingredient composition, and country of manufacture. Higher costs significantly reduced selection likelihood, vitamin-mineral products were preferred over herbal-only supplements, and foreign-licensed products were favored over domestic ones. Socioeconomic and demographic variables showed no significant effects.

Discussion: These findings highlight the dominant role of healthcare provider influence and cost sensitivity, along with perceptions of formulation quality and origin. Results can support professionals, manufacturers, and policymakers in developing supplement strategies tailored to older adults' needs and expectations.

Keywords: dietary supplements, aged, discrete choice experiment, patient preference

Introduction

Old age represents a critical phase of human life, making attention to older adults' issues essential for healthcare systems worldwide.¹ The global population is experiencing growth in both the total number and percentage of older adults. Projections indicate that by 2030, people aged 60 and older will make up one-sixth of the world's population.² Population forecasts using the medium fertility variant suggest that by 2050, 31% of Iran's population will be 60 years or older. Iran will be ranked as the second globally in aging rate.³ As this older population grows, their challenges and requirements demand greater attention. Undernutrition commonly affects older adults,^{4,5} leading to increased risks of frailty, sarcopenia, falls, dependency in daily activities, hospital stays, reduced quality of life, and death.⁴ Contributing factors include decreased food intake, digestive changes, psychological and mental conditions, multiple medication use, and difficulty obtaining and preparing food.⁶ Nutritional deficiencies among older adults span protein, energy, and micronutrients, including vitamin D, vitamin B12, folate, selenium, calcium, and zinc.⁷⁻⁹ Older adults often turn to dietary supplements to address malnutrition, reduce frailty, support cognitive function, and pursue better health by lowering chronic disease risk and maintaining life quality.^{1,10-13} Supplement use varies across countries and regions based on healthcare access, local health systems, and cultural differences.¹⁴ The Iranian Dietary Supplements Syndicate reported that manufactured supplements reached a value of 409 million dollars in 2022 (exchange rate; 1 USD= 285,000 IRR).¹⁵ Following the Covid-19 outbreak in Iran, households increased their consumption of supplements like vitamin C, vitamin D, zinc, and multivitamins.¹⁶ Success in nutritional



interventions heavily depends on adherence. Research on factors affecting oral nutritional supplement (ONS) adherence points to external influences such as recommendations from healthcare workers and family members, along with product characteristics like taste and mouth-feel.¹⁷ Shared decision making, “the pinnacle of patient-centered care”, requires that clinicians understand and respect patients’ individual preferences, values, and experiences when discussing health interventions.¹⁸ Better understanding of supplement use motivations and improved physician communication can lead to more effective shared decision-making.¹⁹ This approach is particularly important in older populations, where inappropriate or excessive supplement use may pose risks due to comorbidities and polypharmacy. Older adults frequently face both multimorbidity and polypharmacy, conditions associated with increased risks of hospitalization, adverse drug events, and mortality, risks that may be further exacerbated by unmonitored dietary supplement use and potential drug, supplement interactions.^{20,21} In line with this, Li et al²² demonstrated that incorporating shared decision-making when discussing ONSs with elderly patients significantly improved both adherence and quality of life, highlighting the importance of understanding patient preferences in guiding safe and effective supplement use.

Discrete Choice Experiments (DCEs) offer detailed understanding of individual preferences by studying specific attributes and levels within choices, generating comprehensive data that reflects real situations and reveals how different features interact and their relative significance.²³ DCEs, as a method for collecting stated preference (SP) data, help predict how patients might respond to changes in health products or services by identifying which attributes influence their choices. This is especially valuable in systems focused on shared decision-making and value-based care, where understanding trade-offs between outcomes, equity, and cost supports more informed policy and service design.²⁴ This approach helps develop health interventions and policies that match patient values. Since no previous research has examined the preferences of older Iranian supplement users, this study employed DCE to identify which supplement attributes influence older consumers’ choices, providing evidence to measure consumer preferences and key attributes.

Study Objectives and Questions

This research addresses the following questions to guide data collection and analysis, adding to current knowledge about dietary supplement preferences among older adults:

1. Which key attributes of dietary supplements do older adults consider when making purchases?
2. What specific levels of these attributes matter most to older adults when buying supplements?
3. How do different attributes and their levels affect older adults’ decisions to purchase dietary supplements?
4. What role do individual characteristics play in older adults’ supplement purchasing decisions, based on their stated preferences?

Method

DCE was used to examine elderly consumers’ preferences for dietary supplements. DCEs are common in health economics research, using surveys where participants select their preferred option from multiple hypothetical scenarios, each containing different choice sets.^{25–27} Creating a DCE requires selecting various attribute combinations to build realistic options and scenarios. Each option presents a set of attributes that vary across choice sets. DCEs help researchers understand how respondents make choices to maximize their benefits. By studying these choices systematically, researchers can determine how important each attribute is and what trade-offs people will accept.²⁸ Lancsar and Louviere’s²⁵ guideline and the Direct checklist²⁹ was followed for conducting the DCE. The Direct checklist is provided in [Table S1, supplementary material](#).

Selection of Attributes and Levels

The development of attributes and levels occurred in two phases: review and expert consultation.

Phase I: Literature Review and Market Analysis

We first conducted a targeted literature review to identify commonly studied attributes influencing supplement choices among elderly consumers, as well as standard practices in DCE studies within health economics. Databases including

Google Scholar and PubMed were searched using combinations of the keywords: “dietary supplements”, “older adults”, “elderly”, “consumer preferences”, “discrete choice experiment”, and “attribute selection”. Studies published between 2010 and 2023 were considered. Although this was not a systematic review per PRISMA guidelines, the search was designed to capture key themes and commonly used attributes relevant to our objectives.

In parallel, we conducted a market analysis of 50 supplement products commonly available in Iran, focusing on attributes identified in the literature and in local markets, such as country of manufacture, dosage form, packaging type, supplement price, and franchise brand status. These factors were selected based on their visibility to consumers and potential to influence purchasing decisions ([Table S2](#), [Supplementary material](#)).

Phase 2: Expert Consultation and Attribute Refinement

Following guidelines by Lancsar and Louviere²⁵ and Coast et al³⁰ for robust attribute development in DCEs, we refined attributes through expert input to ensure relevance, clarity, and feasibility for elderly populations. An opinion sheet was created summarizing the attributes identified from the literature and market review. This questionnaire was sent via Email to 15 health economics experts specializing in preference elicitation and health-related consumer behavior. Experts were asked to rate the importance of seven predefined attributes on a 5-point Likert scale (1= least important to 5= utmost importance) and to comment on their appropriateness for elderly populations. Of the 15 invited, all of the experts responded (100% response rate). Additionally, an online meeting was held with health economics experts to further discuss and refine the selection of attributes and their levels, ensuring cognitive simplicity and relevance. The feedback was summarized quantitatively through mean scoring; attributes with an average score below 3.0 were excluded. This process also ensured the elimination of redundancy and potential overlap between attributes.

Selection of Attribute Levels

Attribute levels were defined to reflect real-world market variability and were cross-validated through the market analysis to ensure plausibility for elderly consumers. Levels were kept within cognitively manageable ranges to minimize respondent fatigue and ensure comprehensibility, as recommended in preference research among older populations. Final attributes balanced consumer relevance with industry significance.

The finalized list of attributes and their levels is presented in [Table S3](#), [Supplementary Material](#). While DCEs cannot include every potentially relevant factor, care was taken to include attributes most likely to influence choices, avoiding omitted variable bias and unrealistic hypothetical scenarios.²⁵

Experimental Design

A two-alternative, unlabeled, forced-choice design was developed following best practices for DCE studies in health economics.²⁵ The choice design was constructed using JMP 10 software (SAS Institute Inc., Cary, NC). To ensure statistical efficiency and minimize respondent burden, a fractional factorial design optimizing for main effects D-efficiency was employed. This approach allowed the efficient estimation of preference parameters while reducing the cognitive load on elderly participants. The experimental design consisted of 8 choice sets, each presenting participant with two hypothetical supplement profiles varying across the selected attributes and levels. A “no choice” alternative was intentionally excluded in line with previous studies targeting elderly populations, as pilot testing revealed that including such an option led to non-informative answers or respondent disengagement. Forcing participants to choose between two realistic alternatives better reflected typical purchase decisions in the Iranian pharmacy setting and aligned with our study aim of eliciting trade-offs rather than identifying non-participation behavior. The main effects design ensured orthogonality and balance across the scenarios. Attribute levels were coded using effects coding, the default approach in JMP choice modeling. Choices were analyzed using a multinomial logit model with main effects. This model assumes independence of irrelevant alternatives (IIA). Given the unlabeled, two-alternative forced-choice design and the orthogonal and balanced experimental structure, the IIA assumption was considered reasonable in this context; nevertheless, it is acknowledged as a limitation.

Although mixed logit models can account for unobserved preference heterogeneity, the objective of this study was to estimate average population-level preferences. Accordingly, a standard multinomial logit model was selected to ensure model parsimony, interpretability, and comparability with prior DCE studies. [Table 1](#) provides an example choice set.

Pilot Testing and Questionnaire Validation

To enhance comprehensibility and face validity for elderly participants, all choice sets were pre-tested in a pilot study ($n = 30$). Feedback was gathered on comprehension of attributes, levels, and task clarity. Based on this, minor revisions were made to wording and layout to ensure cognitive accessibility for elderly respondents. Because a substantial proportion of participants chose the opt-out (“no choice”) option across multiple choice sets as a simplifying heuristic rather than as a true reflection, the opt-out alternative was excluded from the final design to ensure informative responses and consistent trade-off behavior. The final questionnaire maintained the original attributes and levels but clarified instructions and examples.

The Final Questionnaire Consisted of Two Sections

Section 1: Collected demographic characteristics (age, sex, marital status, education, residence, and monthly expenses). This section also assessed attitudes and perceptions toward dietary supplements ([Table S4, Supplementary Material](#)).

Section 2: Presented the nine two-alternative choice scenarios where participants indicated their preferred supplement in each set.

Data Collection

Sample Size

The sample size was determined using Cochran’s formula for an infinite population, with a p -value of 0.5 (maximum variability), a confidence level of 95%, and precision (d) set at 0.05. This calculation yielded a minimum required sample size of 384 participants. Consistent with guidelines from Pearmain and Kroes³¹ which recommend a minimum of 100 respondents for reliable DCE analysis, our target ensured robust estimation of preference parameters.


Study Setting and Population

Data collection was conducted between April and May 2023, and a total of 384 participants were recruited from community pharmacies in Tehran and Karaj, two major urban centers in Iran. Eligible participants were Individuals aged 65 years or older, as well as their caregivers (if directly involved in supplement purchasing decisions). Participants were required to have basic awareness of dietary supplements and to provide written informed consent. Exclusion criteria included those lacking any knowledge of supplements or those who failed to complete the questionnaire. Informed consent was obtained as participants indicated their agreement at the beginning of the questionnaire prior to participation.

Procedure

A single-stage cluster sampling method was employed. The urban regions of Tehran and Karaj were divided into clusters based on geography (north, south, east, west, center). Two pharmacies per cluster were randomly selected, resulting in 20 pharmacies overall (16 in Tehran, 4 in Karaj). Sample allocation within each city reflected the proportional population size of these urban areas. Questionnaires were administered on-site by trained research staff who explained the survey purpose,

Table 1 Representative Choice Set for Consumer Preference Assessment

	Supplement A	Supplement B
Price	Less than 250,000 IRR	More than 25,000,000 IRR
Production	Domestic Production	Under License
Physician prescribed	No Prescription	By Prescription
Dosage Form	Tablet or Capsule	Liquid Dosage Form
Ingredients	Vitamins, minerals and herbal ingredients	Vitamins and minerals
Check one 	Prefer supplement A <input type="checkbox"/>	Prefer supplement B <input type="checkbox"/>

clarified instructions, and ensured participants understood the DCE tasks. The aim was to reduce potential literacy-related biases among older adults. A total of 384 questionnaires were completed (307 from Tehran, 77 from Karaj). The final sample size slightly exceeded the minimum requirement to account for potential data loss. No weighting or stratification adjustments were applied, as this was an exploratory preference study rather than a population prevalence survey.

Ethical Considerations

This study was approved by the Alborz University of Medical Sciences Ethics Committee (IR.ABZUMS.REC.1400.293) and was conducted in accordance with the Declaration of Helsinki. All participants provided informed consent prior to participation.

Statistical Analysis

The DCE data were analyzed using JMP 10 software, examining 384 completed questionnaires through a Nominal Logistic Model. Demographic characteristics were analyzed using SPSS 16.0 software.

Exchange Rate

All IRR values were converted using an exchange rate of 285,000 IRR = 1 USD.

Results

The DCE Design

Five attributes were selected to create scenarios: price, country of manufacture, ingredient type, prescription by physicians, and dosage form (Table 2). For price, the maximum, minimum, average, and median prices of dietary supplements were considered based on market research. Due to variations in package sizes and liquid forms, the focus was placed on monthly supplement costs. For country of manufacture, two categories were established—domestic production and licensed production—since imported supplements are not available in Iran. Ingredients were divided into three types: vitamins and minerals, vitamins and minerals with herbal substances, and herbal substances alone. The prescription attribute had two levels: requiring a doctor's prescription or not. Market research informed the selection of dosage form levels: tablet or capsule, soft gel, and liquid forms like syrup.

Table 2 Product Attributes and Associated Level Classifications

Selected Attributes	Selected Levels
Price (monthly)	1. ≤1 USD (≤250,000 IRR) 2. 1.8–3.5 USD (500,000–1,000,000 IRR) 3. ≥8.8 USD (≥2500,000 IRR)
Country	1. Domestic 2. Under license
Physician prescribed/Recommended	1. Yes 2. No
Dosage Form	1. Tablet/Caplet 2. Capsule/Liquid-Filled Capsules/Pearls 3. Syrup
Ingredients	1. Multivitamins and Minerals 2. Herbal 3. Multivitamins, Minerals and Herbal

Participants

Of the 384 study participants, 52% were women, showing near-equal gender distribution. Married individuals made up 67% of participants. Regarding education levels, 12% of participants held a Ph.D. or higher, 45% held a Master's degree, 29% held a Diploma or lower, and 14% were illiterate. Most participants were aged 65–75 years, with a mean age of 73.67 years and an average chronic disease history of 7.7 years. All questionnaires included in the final analysis were completed directly by older adult participants. Although caregivers were initially allowed to assist during data collection if needed, no caregiver-completed questionnaires were included in the analytical sample. Tehran residents comprised 79% of participants, while 21% lived in Karaj. Most participants (71%) were unemployed. Monthly household income for most participants ranged from 105.2 USD to 421 USD, averaging 236.8 USD. These findings were compared with 2021 data from the Statistics Center of Iran, which reported urban household annual income at 3989.5 USD (approximately 403.5 USD monthly).³² While these figures appear different, the statistical data reflects a four-person household, making our findings reasonable given participants' age. Table 3 details participant characteristics.

Participants' Attitudes and Perceptions Toward Dietary Supplements

Participants' average attitude of dietary supplements scored 2.5078 on a 1–5 scale. Most showed good to average understanding, with only 1.6% reporting insufficient attitude.

Table 3 Demographic and Socioeconomic Profile of Study Participants

Characteristics	N	(%)
Sex		
Female	204	53
Male	180	47
Marital status		
Married	261	68
Unmarried	123	32
Educational Status		
Illiterate	54	14
Diploma or Lower	111	29
Master	173	45
Ph.D. or Higher	46	12
City of residence		
Tehran	303	79
Karaj	81	21
Monthly Expenses		
≥105.3 USD (≥ 30,000,000 IRR)	115	30
105.3–280.7 USD (30,000,000–80,000,000 IRR)	142	37
280.7–421 USD (80,000,000–120,000,000 IRR)	42	11
>421 USD (>120,000,000 IRR)	85	22
Age		
65-69	109	28%
70-74	96	25%
75-79	97	25%
80-85	82	22%

Logit Model Results

The discrete choice data were analyzed using a multinomial logistic model with main effects only. All estimated coefficients were statistically significant ($p < 0.05$), confirming the relevance of the selected attributes. Detailed logit model coefficient estimates with 95% confidence intervals are provided in [Table S5 \(Supplementary material\)](#).

Relative Importance of Attributes

LogWorth statistics indicated that physician prescription had the greatest influence on choice, followed by dosage form, monthly cost, ingredients, and country of manufacture. [Table 4](#) shows relative importance of attributes among elderly consumers.

Model Significance Tests

Theoretical validity was established as all coefficients aligned with expected economic and behavioral theory signs. Face validity was supported through a pilot study involving 30 participants. No interaction terms were included as inter-attribute correlations were consistently below 0.5. An orthogonal design with main effects was therefore deemed appropriate.³³

Attribute Effect on the Estimated Logistic Model

The marginal effects analysis confirmed that lower prices, physician prescription, and vitamins/minerals ingredients increased the likelihood of supplement choice. The magnitude of the marginal utility associated with physician prescription was larger than that of most other attributes, indicating that prescription sensitivity played a dominant role in respondents' decision-making. In addition, the minus marginal utility associated with higher cost was comparable to that of key non-price attributes, suggesting that price sensitivity influenced choices. Liquid forms and herbal-only supplements were less preferred. [Table 5](#) represents the detailed effects of each attribute based on the logistic model analysis.

Table 4 Relative Importance of Attributes Among Elderly Consumers

Attitude	LogWorth	P-value
Prescription	299.192	< 0.001
Dosage Form	24.938	< 0.001
Monthly Costs	19.923	< 0.001
Ingredient	13.296	< 0.001
Country of Manufacturer	12.545	< 0.001

Notes: Relative importance indicates the extent to which each attribute influences choices in the DCE. LogWorth equals $-\log_{10}(p\text{-value})$ and represents statistical significance, with higher values indicating stronger evidence of an effect (eg, LogWorth = 2 corresponds to $p = 0.01$).

Table 5 Marginal Effects of Attributes on Choice Probability

Attributes	Marginal Probability	Marginal Utility
Monthly Fee [1 USD and Less]	0.5080	0.0000
Monthly Fee [1.8–3.5 USD]	0.3692	−0.3191
Monthly Fee [8.8 USD and More]	0.1228	−1.4198
Production [Under License]	0.6388	0.28506
Production [Domestic]	0.3612	−0.28506
Ingredients [Containing Herbal Ingredients]	0.1602	−0.57606

(Continued)

Table 5 (Continued).

Attributes	Marginal Probability	Marginal Utility
Ingredients [Containing Vitamins and Minerals]	0.5983	0.74174
Ingredients [Containing Vitamins, Minerals and Herbal Ingredients]	0.2415	-0.16567
Prescription [Without Doctor's Prescription]	0.1116	-1.0373
Prescription [With Doctor's Prescription]	0.8884	1.0373
Dosage Form [Tablet or Capsule]	0.4729	0.48173
Dosage Form [Tablet or Soft Gel]	0.3930	0.29675
Dosage Form [Liquid EG Syrup]	0.1341	-0.77848

Notes: Marginal effects indicate the change in choice probability associated with a one-unit change in an attribute (or relative to the reference level). Marginal utility shows the direction and magnitude of preference in the choice model, while marginal probabilities express these effects as percentage-point changes in predicted choice.

Impact of Socioeconomic Factors on Supplement Preference

We incorporated demographic and socioeconomic variables into the estimated logit model to examine their impact on preferences. Analysis of new models including these variables showed no significant effects on supplement choice decisions, as indicated by the chi-square statistics and associated probability values shown in [Table 6](#).

Table 6 Impact of Sociodemographic Factors on Elderly Consumers' Supplement Preferences

Demographic and Socioeconomic Variables	L-R Chi-Square Statistic	Degrees of Freedom (DF)	Probability>Chisq
Sex	6.433	8	0.5989
Age	4.276	8	0.8314
Marital Status	3.033	8	0.9323
Education Status	17.428	32	0.9830
City of Residence	5.601	8	0.6918
Area of Residence	47.613	88	0.9999
Occupational Status	6.786	8	0.5599
Monthly Expenses	29.364	40	0.8922
History of Supplement Use	12.225	32	0.9994
Type of Used Supplements	11.172	16	0.7987
Attitude attitudes toward dietary supplements			
Q1	24.448	24	0.4362
Q2	14.781	24	0.9270
Q3	19.185	24	0.7421
Q4	20.763	24	0.6527
Q5	20.997	32	0.9317

Discussion

Healthcare decisions are often made by professionals and regulators without direct input from patients. Yet, understanding patients' preferences and willingness to pay is essential for patient-centered care. Quantifying these preferences is key to aligning healthcare decisions with public priorities.³⁴ This research marked the first application of DCE methodology to evaluate factors influencing supplement choices among older adults and revealed key factors that shape older adults' supplement choices. The findings showed that physician's recommendations carry the most weight in decision-making, followed by the supplement's form, monthly cost, ingredients, and country of manufacture. In Iran, patient trust in physicians is generally high, and Iranian patients report strong preferences for receiving clinical information and participating in medical decision-making, which may partly explain why physician recommendation emerged as a dominant driver of supplement preferences in our study.^{35,36} Most people seek prescriptions for vitamins, relying on healthcare providers' advice and following medical recommendations in different part of the world.^{37–39} Whereas, only about 23% of US supplement use stemmed from healthcare provider recommendations.^{40,41} Our analysis showed that price sensitivity played a major role; as costs rise, selection probability decreases, with a marked drop in choices when monthly costs exceed 8.8 USD. This contrasts with Livingston et al's 2020 study of young adults,⁴² where cost ranked second to ingredients in importance and with a Chinese DCE study of gastric cancer patients found cost to be least important, possibly due to lower income levels or prioritizing post-surgery recovery.⁴³ These differences may reflect varying economic contexts, cultural perceptions of supplement value, or the clinical urgency of use. Older adults in our study may be more cost-conscious due to fixed incomes or prioritizing essential medications in the presence of polypharmacy. In contrast, young adults may prioritize lifestyle-related features (eg, ingredients), and cancer patients recovering from surgery may temporarily deprioritize cost in favor of recovery-focused needs. Previous data showed that consumers value clinical evidence of safety and effectiveness, often willing to pay more for proven products.⁴⁴ Manufacturing origin served as a quality indicator,⁴⁵ and our results show older adults prefer supplements produced under foreign license. A Nigerian study similarly found consumers favored foreign over domestic pharmacy products, citing perceived quality and effectiveness.⁴⁶ This suggests Iranian manufacturers should strengthen their branding, while regulatory bodies should note how licensed production connects with quality perception among Iranian consumers. Despite expectations, participants preferred vitamin and mineral supplements over herbal ones. This aligns with US studies showing 40% prevalence for vitamin/mineral use versus 14% for herbal supplements, with higher usage among older adults, particularly women.⁴⁷ Common supplements among US adults over 60 include multivitamins/minerals, vitamin D, omega-3 fatty acids, and B vitamins.^{40,48,49} Lower marginal utility of herbal supplements as a component of complementary and alternative medicine (CAM) in Iran may be related to patients typically resorting to traditional medicine at later stages of illness and primarily using CAM therapies for non-serious conditions such as colds and transient gastrointestinal disorders.^{50,51} Our study found no significant correlation between socioeconomic factors (education, gender, residence, region, employment, and supplement use history) and supplement preferences. It is likely that trusted physician recommendations and perceived health needs outweigh socioeconomic considerations among older adults when forming preferences. Supplement use patterns during the COVID-19 pandemic shifted towards preventive and health maintenance motivations. Healthcare professionals were often the main source of recommendation during this period. This may suggest that pandemic-associated behaviors might have influenced relative attribute importance in our study.^{52,53} As this study assessed stated preferences using a DCE rather than actual purchasing behavior, socioeconomic constraints may be less pronounced than in real-world settings.⁵⁴ However, Broader population studies have documented socioeconomic gradients in supplement use and health behaviors, such as higher use among individuals with higher-income and education.^{55–57} These associations may vary depending on the supplement type and population studied. While supplement use generally increases with age,^{48,49,58} the average number of supplements taken remains consistent across age groups.⁴⁹ Some research indicated multiple supplement use increased among those 60 and older.⁴⁰ Previous studies have shown higher supplement use among women^{40,48,49,58} and those with higher education and income levels.^{40,49,58} Livingstone et al⁴² and Masumoto et al¹⁴ found educated women more likely to choose supplements. Our findings of no significant correlation suggest that such influences might differ in our study context, highlighting the need for further research.

Conceptually, dietary supplement choice among older adults can be viewed as a trade-off between perceived health benefits, trust in information sources, product characteristics, and financial considerations. In this framework, physician recommendation may act as a signal of safety and effectiveness, product formulation and country of origin shape perceptions of quality, while price reflects affordability. The DCE allowed these attributes to be evaluated simultaneously within a stated decision-making context.

Limitations of the Study

This research had several limitations. The study relied on self-reported data, which means participants may have chosen answers they thought were correct or socially acceptable rather than providing truthful responses. Participants' awareness of being observed may influence their decision-making which makes it more controlled than in real-world scenarios. The attributes and levels included in the discrete choice experiment were informed by literature review, market analysis, expert input, and measured stated preferences based on hypothetical scenarios which may not fully reflect all factors considered important by older adults themselves.²³ Future studies should incorporate qualitative methods to identify user-generated attributes, and should consider preference elicitation in rural and underserved areas to better capture heterogeneity in supplement decision-making. Excluding an opt-out alternative may inflate stated willingness to choose compared with real-world behavior, and this should be considered when interpreting results. Consequently, findings reflect relative preferences and trade-offs among supplement attributes rather than absolute market participation. Memory bias was also a potential issue, as respondents had to recall specific information while completing the questionnaire. The study's time and location constraints should also be considered, as conducting the research under different circumstances might produce different results. Additionally, focusing solely on individuals currently purchasing supplements represents a further limitation, as it may not reflect the preferences of the broader elderly population. Potential interactions or correlations between attributes were not explored in the present analysis, which may limit understanding of more complex decision-making patterns.

Conclusion

This study examined the preferences of elderly individuals regarding nutritional supplements using a discrete choice experiment method. The findings showed that physician's prescription was the primary factor influencing supplement choice among older adults followed by supplement form, cost, ingredients, and country of manufacture. Notably, socioeconomic and demographic factors did not significantly impact preferences. Price sensitivity was evident, as higher costs significantly reduced the likelihood of supplement selection. Additionally, older adults preferred supplements produced under foreign licenses, reinforcing the need for domestic manufacturers to strengthen brand trust and quality perception. Vitamin and mineral supplements were favored over herbal supplements, highlighting a potential area for further research. These insights provide valuable guidance for supplement manufacturers and policymakers in addressing consumer preferences in this market.

Data Sharing Statement

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

Ethics Approval

The Alborz University of Medical Sciences ethics committee approved this research (IR.ABZUMS.REC.1400.293).

Informed Consent

Informed consent was obtained from all individual participants included in the study.

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

The authors did not receive support from any organization for the submitted work.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Abolfathi M, Pasdar Y, Kheiri M, Irandoost S, Darabi F. The effect of consuming multivitamin/mineral supplements on elderly quality of life: based on randomized control trial. *J Educ Health Promot.* 2021;10(1):63. doi:10.4103/jehp.jehp_129_20
2. World Health Organisation. Ageing and health, fact sheet. 2024. Available from: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health#:~:text=>. Accessed February 10, 2026.
3. Mehri N, Messkoub M, Kunkel S. Trends, determinants and the implications of population aging in Iran. *Ageing Int.* 2020;45(4):327–343. doi:10.1007/s12126-020-09364-z
4. Roberts HC, Lim SER, Cox NJ, Ibrahim K. The challenge of managing undernutrition in older people with frailty. *Nutrients.* 2019;11(4):808. doi:10.3390/nu11040808
5. World Health Organisation. Supplemental nutrition with dietary advice for older people affected by undernutrition. 2023. Available from: <https://www.who.int/tools/elena/interventions/nutrition-older-people>. Accessed February 10, 2026.
6. Gahche JJ, Bailey RL, Potischman N, Dwyer JT. Dietary supplement use was very high among older adults in the United States in 2011 – 2014. *J Nutrition.* 2017;(C):1–9. doi:10.3945/jn.117.255984
7. Gana W, De Luca A, Debaq C, et al. Analysis of the impact of selected vitamins deficiencies on the risk of disability in older people. *Nutrients.* 2021;13:1–24.
8. Borg S, Verlaan S, Hemsworth J, et al. Systematic review and meta-analysis micronutrient intakes and potential inadequacies of community-dwelling older adults: a systematic review. *Br J Nutr.* 2015;25(8):1195–1206. doi:10.1017/S0007114515000203
9. Vural Z, Avery A, Kalogiros DI, Coneyworth LJ, Welham SJM. Trace mineral intake and deficiencies in older adults living in the community and institutions: a systematic review. *Nutrients.* 2020;12(4):1072. doi:10.3390/nu12041072
10. Jayawardena R, Wickramawardhane P. Impact of an oral nutritional supplement on nutritional status in older adults with malnutrition: a randomized controlled trial. *World Nutr J.* 2024;8(i1):147–161. doi:10.25220/WNJ.V08.i1.0015
11. Yan LC, Yu F, Wang XY, et al. The effect of dietary supplements on frailty in older persons: a meta-analysis and systematic review of randomized controlled trials. *Food Sci Technol.* 2022;42:e65222. doi:10.1590/fst.65222
12. Fekete M, Lehoczki A, Tarantini S, et al. Improving cognitive function with nutritional supplements in aging: a comprehensive narrative review of clinical studies investigating the effects of vitamins, minerals, antioxidants, and other dietary supplements. *Nutrients.* 2023;15(24):5116.
13. Kaur D, Rasane P, Singh J, et al. Nutritional interventions for elderly and considerations for the development of geriatric foods. *Curr Aging Sci.* 2019;12(1):15–27. doi:10.2174/1874609812666190521110548
14. Masumoto S, Sato M, Maeno T, Ichinohe Y, Maeno T. Factors associated with the use of dietary supplements and over-the-counter medications in Japanese elderly patients. *BMC Fam Pract.* 2018;19(1). doi:10.1186/s12875-017-0699-9
15. Iran syndicate of dietary supplements. 2024. Available from: <http://www.idsms.org/section15/page7.aspx>. Accessed February 10, 2026.
16. Nikooyeh B, Ghodsi D, Amini M, et al. Dietary changes during the COVID-19 lockdown in Iranian households: are we witnessing a secular trend? A narrative review. *Front Public Health.* 2024;12:1485423.
17. Lester S, Kleijn M, Cornacchia L, Hewson L, Taylor MA, Fisk I. Factors affecting adherence, intake, and perceived palatability of oral nutritional supplements: a literature review. *J Nutr Health Aging.* 2022;26(7):663–674.
18. Barry MJ, Edgman-Levitan S. Shared decision making—the pinnacle of patient-centered care. *N Engl J Med.* 2012;366(9):780–781.
19. Frenkel M, Morse MB, Narayanan S, Scholar G. Addressing patients request to add dietary supplements in cancer care — a suggested approach. *Nutrients.* 2023;15(24):5029. doi:10.20944/preprints202311.1426.v1
20. Wastesson JW, Morin L, Tan ECK, Johnell K. An update on the clinical consequences of polypharmacy in older adults: a narrative review. *Expert Opin Drug Saf.* 2018;17(12):1185–1196. doi:10.1080/14740338.2018.1546841
21. Qato DM, Wilder J, Schumm LP, Gillet V, Alexander GC. Changes in prescription and over-the-counter medication and dietary supplement use among older adults in the United States, 2005 vs 2011. *JAMA Intern Med.* 2016;176(4):473–482. doi:10.1001/jamainternmed.2015.8581
22. Guan hong L, Dongxiu L, Zhaolin C. Impact of shared decision-making on compliance with oral nutritional supplements and quality of life among elderly patients with cirrhosis. *Am J Nurs Sci.* 2020;9(3):97–101. doi:10.11648/j.ajns.20200903.12
23. Rusmevichientong P, Jaynes J, Chandler L. Understanding influencing attributes of adolescent snack choices: evidence from a discrete choice experiment. *Food Qual Prefer.* 2021;92(December 2020):104171. doi:10.1016/j.foodqual.2020.104171
24. Van den Broek-Altenburg E, Atherly A. Using discrete choice experiments to measure preferences for hard to observe choice attributes to inform health policy decisions. *Health Econ Rev.* 2020;10(1):18. doi:10.1186/s13561-020-00276-x
25. Lancsar E, Louviere J. Conducting discrete choice experiments to inform healthcare decision making: a user’s guide. *Pharmacoeconomics.* 2008;26:661–677.
26. 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
27. Ryan M, Gerard K. Using discrete choice experiments to value health care programmes: current practice and future research reflections. *Appl Health Econ Health Policy.* 2003;2(1):55–64.

28. Alamri AS, Georgiou S, Stylianou S. Discrete choice experiments: an overview on constructing D-optimal and near-optimal choice sets. *Heliyon*. 2023;9(7):e18256. doi:10.1016/j.heliyon.2023.e18256
29. Ride J, Goranitis I, Meng Y, LaBond C, Lancsar E. A reporting checklist for discrete choice experiments in health: the DIRECT checklist. *Pharmacoeconomics*. 2024;42(10):1161–1175. doi:10.1007/s40273-024-01431-6
30. Coast J, Al-Janabi H, Sutton EJ, et al. Using qualitative methods for attribute development for discrete choice experiments: issues and recommendations. *Health Econ*. 2012;21(6):730–741. doi:10.1002/hec.1739
31. Pearmain D, Kroes EP. Stated preference techniques: a guide to practice. 1990.
32. Statistical centre of Iran, income and consumption. 2025. Available from: <https://amar.org.ir/en/Statistics-by-Topic>. Accessed February 10, 2026.
33. Chen F, Du M, Blumberg JB, et al. Association among dietary supplement use, nutrient intake, and mortality among US adults: a cohort study. *Ann Intern Med*. 2019;170(9):604–613. doi:10.7326/M18-2478
34. Mühlbacher A, Johnson FR. Choice experiments to quantify preferences for health and healthcare: state of the practice. *Appl Health Econ Health Policy*. 2016;14(3):253–266.
35. Chegini Z, Kakemam E, Behforoz A, Lotfollah-Zadeh F, Jafari-Koshki T, Khodayari Zarnag R. Impact of patient communication preferences on the patient trust in physicians: a cross-sectional study in Iranian outpatient's clinics. *J Patient Exp*. 2022;9:23743735211069810.
36. Asghari F, Mirzazadeh A, Fotouhi A. Patients' preferences for receiving clinical information and participating in decision-making in Iran. *J Med Ethics*. 2008;34(5):348–352. doi:10.1136/jme.2007.021873
37. Algaed HA, AlJaber MI, Alwehaibi AI, et al. General public knowledge and use of dietary supplements in Riyadh, Saudi Arabia. *J Fam Med Prim care*. 2019;8(10):3147–3154. doi:10.4103/jfmpe.jfmpe_511_19
38. Alfawaz HA, Krishnaswamy S, Al-Faifi L, et al. Awareness and attitude toward use of dietary supplements and the perceived outcomes among Saudi adult male members of fitness centers in Saudi Arabia. *Int J Sport Nutr Exerc Metab*. 2018;28(5):509–514. doi:10.1123/ijsnem.2017-0246
39. Sekhri K, Kaur K. Public knowledge, use and attitude toward multivitamin supplementation: a cross-sectional study among general public. *Int J Appl Basic Med Res*. 2014;4(2):77–80. doi:10.4103/2229-516X.136780
40. Liu L, Tao H, Xu J, Liu L, Nahata MC. Quantity, duration, adherence, and reasons for dietary supplement use among adults: results from NHANES 2011–2018. *Nutrients*. 2024;16(12):1830. doi:10.3390/nu16121830
41. Bailey RL, Gahche JJ, Miller PE, Thomas PR, Dwyer JT. Why US adults use dietary supplements. *JAMA Intern Med*. 2013;173(5):355–361. doi:10.1001/jamainternmed.2013.2299
42. Livingstone KM, Lamb KE, Abbott G, Worsley T, McNaughton SA. Ranking of meal preferences and interactions with demographic characteristics: a discrete choice experiment in young adults. *Int J Behav Nutr Phys Act*. 2020;17(1):1–12. doi:10.1186/s12966-020-01059-7
43. Wang Q, Chen Y, Peng Y, et al. Preferences of oral nutritional supplement therapy among postoperative patients with gastric cancer: attributes development for a discrete choice experiment. *PLoS One*. 2022;17(9):e0275209. doi:10.1371/journal.pone.0275209
44. Teoh SL, Ngorsuraches S, Lai NM, Chaikyapunapruk N. Consumer preferences and willingness to pay for nutraceuticals: a discrete choice experiment. *Value Heal Reg Issues*. 2021;24:167–172. doi:10.1016/j.vhri.2020.09.003
45. Shah SA, Jan FA, Khan N. The influence of quality, price, availability and country of origin effect on healthcare consultants prescription decision making. *J Soc Obstet Gynaecol Pakistan*. 2016;6(3):106–114.
46. Mohammed E, Ezike AC, Ahmed IB, Aizobu MA, Molade O, Aderinola FM. Purchasing attitudes of consumers towards domestic and foreign products sold in community pharmacies: a case study of the Federal Capital Territory, Nigeria. *Trop J Pharm Res*. 2023;22(7):1511–1518. doi:10.4314/tjpr.v22i7.22
47. Kaufman DW, Kelly JP, Rosenberg L, Anderson TE, Mitchell AA. Recent patterns of medication use in the ambulatory adult population of the United States: the Slone survey. *JAMA*. 2002;287(3):337–344. doi:10.1001/jama.287.3.337
48. Mishra S, Stierman B, Gahche JJ, Potischman A. Dietary supplement use among adults: United States, 2017–2018. *CDC*. Available from: <https://www.cdc.gov/nchs/products/databriefs/db399.htm>. Accessed February 10, 2026.
49. Gahche JJ, Bailey RL, Potischman N, Dwyer JT. Dietary supplement use was very high among older adults in the United States in 2011–2014. *J Nutr*. 2017;147(10):1968–1976. doi:10.3945/jn.117.255984
50. Abolhassani H, Naseri M, Mahmoudzadeh S. A survey of complementary and alternative medicine in Iran. *Chin J Integr Med*. 2012;18(6):409–416. doi:10.1007/s11655-012-1124-9
51. Moeini R, Mozaffarpur SA, Mojahedi M, et al. The prevalence of complementary and alternative medicine use in the general population of Babol, North of Iran, 2018. *BMC Complement Med Ther*. 2021;21(1):1–12. doi:10.1186/s12906-021-03281-7
52. Ayer C, Celep AGS. Assessment of dietary habits and use of nutritional supplements in COVID-19: a cross-sectional study. *PharmaNutrition*. 2022;22:100309. doi:10.1016/j.phanu.2022.100309
53. Ghodsi D, Nikooyeh B, Amini M, et al. Dietary supplement use among Iranian households during COVID-19 epidemic lockdown: less access in those who may need more national food and nutrition surveillance. *Int J Prev Med*. 2023;14(1):99. doi:10.4103/ijpvm.ijpvm_207_22
54. Zhang Y, Ho TQA, Terris-Prestholt F, et al. Prediction accuracy of discrete choice experiments in health-related research: a systematic review and meta-analysis. *EClinicalMedicine*. 2025;79:102965. doi:10.1016/j.eclinm.2024.102965
55. Nichols E, O'Hara NN, Degani Y, et al. Patient preferences for nutritional supplementation to improve fracture healing: a discrete choice experiment. *BMJ Open*. 2018;8(4):e019685. doi:10.1136/bmjopen-2017-019685
56. McCormack D, Mai X, Chen Y. Determinants of vitamin D supplement use in Canadians. *Public Health Nutr*. 2017;20(10):1768–1774. doi:10.1017/S1368980015001950
57. Foote JA, Murphy SP, Wilkens LR, Hankin JH, Henderson BE, Kolonel LN. Factors associated with dietary supplement use among healthy adults of five ethnicities: the multiethnic cohort study. *Am J Epidemiol*. 2003;157(10):888–897. doi:10.1093/aje/kwg072
58. Tan ECK, Eshetie TC, Gray SL, Marcum ZA. Dietary supplement use in middle-aged and older adults. *J Nutr Heal aging*. 2022;26(2):133–138. doi:10.1007/s12603-022-1732-9

Patient Preference and Adherence

Dovepress
Taylor & Francis Group

Publish your work in this journal

Patient Preference and Adherence is an international, peer-reviewed, open access journal that focusing on the growing importance of patient preference and adherence throughout the therapeutic continuum. Patient satisfaction, acceptability, quality of life, compliance, persistence and their role in developing new therapeutic modalities and compounds to optimize clinical outcomes for existing disease states are major areas of interest for the journal. This journal has been accepted for indexing on PubMed Central. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/patient-preference-and-adherence-journal>