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Consumers' Preference and Willingness to Pay for Imported Milk in the Seven Administrative Districts of Shanghai, China†

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Abstract

The research objectives were as follows: 1) to assess consumer awareness regarding imported milk in the 7 administrative districts of Shanghai; 2) to investigate consumer preferences and willingness to pay for specific attributes of imported milk in the 7 administrative districts of Shanghai; and 3) to identify distinct consumer segments based on their preferences for imported milk attributes in the 7 administrative districts of Shanghai. The study utilized a choice experiment method to analyze consumer preferences for imported milk attributes in Shanghai. Five attributes were considered: fat content, flavor, nutritional enhancement, country of origin, and price. A questionnaire was designed, and data were collected from 310 respondents in Shanghai's 7 districts. Two models, Random Parameter Logit (RPL) and Latent Class Modeling (LCM), were employed to estimate utility values for milk attributes. Statistics software was used for data analysis to identify differences in consumer perceptions. The research findings revealed that: 1) Consumer awareness of imported milk in Shanghai's administrative districts was marked by distinct demographic profiles and consumption patterns. Most respondents were female, aged 25 - 34, with significant education levels and comfortable incomes. While milk consumption was prevalent, there was a preference for domestically produced milk, with limited uptake of imported dairy products and fortified foods. Different consumer segments exhibited varying levels of awareness and importance regarding nutritional claims, with "Nutrient-fortified" consumers showing the highest awareness; 2) Consumer preferences for imported milk in Shanghai revealed a preference for lower-priced, lower-fat, and original-flavored options, along with a strong preference for fortified milk enriched with vitamins and minerals. Country of origin influenced preferences, with German and New Zealand milk preferred over French milk. Consumers in Shanghai were willing to pay more for specific attributes of imported milk, such as lower-fat options and original flavors, while prioritizing nutrition and quality; and 3) Distinct consumer segments were identified in Shanghai based on preferences for imported milk attributes. The "Nutritional Fortification Preference" type prioritized health benefits and was willing to pay premiums for fortified varieties. The "No Difference" type showed minimal preference for specific attributes, emphasizing overall health claims. The "Taste Preference" type favored original-flavored milk, prioritizing taste and flavor. Lastly, the "Price-Sensitive" type prioritized affordability and exhibited lower willingness to pay premiums.

Keywords: Nutrition claims, Country of origin, Choice experiment, Imported milk, Willingness to pay

Introduction

Since China's accession to the World Trade Organization (WTO), the Chinese market has been increasingly liberalized, and the average tariff on imported milk has dropped from 25 to 15 % (Ianchovichina & Martin, 2001; Zhao et al., 2021). At the same time, technological advances have led to the rapid development of the Internet, which has been increasingly integrated into all aspects of people's lives, and online shopping has become one of the emerging shopping methods, increasingly favored by Chinese consumers. With the increasing scale of mobile users and the rapid development of mobile payment, shopping websites are gradually shifting to mobile platforms, and cell phone shopping is

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gradually replacing computer shopping. Mobile shopping not only breaks through the time constraints, but also breaks through the limitations of the location, allowing people to realize anytime, anywhere shopping, which greatly improves the efficiency of traditional shopping. At the same time, online shopping also improves the transaction efficiency of many intermediaries, eliminating many trading links, greatly reducing the circulation costs (Chen et al., 2022). At present, most of China's imported milk is sold with the help of e-commerce shopping platforms, which further reduces the cost of circulation, and also further reduces the price of imported milk, allowing it to fall from US$1,800/ton in 2010 to US$1,259/ton in 2020, a drop of 30.06 %. Meanwhile, affected by food safety incidents such as melamine in 2008, Chinese consumers began to favor imported dairy (Li et al., 2021).

Mintel milk consumption trend report shows that Chinese consumers' attitudes towards local milk sources are significantly polarized, with 44 % believing that local milk sources are reliable, while 36 % do not. More consumers favor imported dairy products (43 %) than domestic ones (34 %) (Steenson & Buttriss, 2020). China's milk imports are growing at an explosive rate due to a combination of decreasing prices and increasing consumer preference. Packaged milk imports grew from more than 7,000 tons in 2008 to 634,100 tons in 2016, an increase of 89.19 times; the growth rate of packaged milk imports only began to slow down from 2016 to 2018, and domestic consumer demand grew strongly in 2019, and the production rate of packaged milk in the domestic market was unable to meet the growth rate of consumer demand, so there was a large increase in the volume of imports In 2020, consumer demand continued to grow, coupled with the tight domestic market and loose international market after the epidemic, imports of packaged milk again showed large growth. 2016 onwards, the growth rate of imports of packaged milk only began to slow down. Imported milk, high-end milk and room-temperature yogurt have become the 3 major categories dominating China's liquid milk market, with the combined sales of the 3 accounting for as much as 70.1 % (Yu, 2024).

China imported 1,039,800 tons of packaged milk in 2020 and 890,600 tons in 2019, of which 485,500 tons, or 54.5 %, came from the European Union (of which Germany accounted for 29 % and France accounted for 6.8 %), 283,900 tons, or 31.9 %, came from New Zealand, 103,200 tons, or 11.6 %, came from Australia, and the remaining source countries The remaining source countries include South Korea, Russia and so on. In Suning, Tmall, Jingdong and other large-scale e-commerce shopping platform to collect specifications for the price of 200/250 mL imported milk found that 45.11 % of the price of imported milk is less than 5 yuan, this kind of milk is usually ordinary milk, that is, did not add any other camp components of the milk; the price of imported milk in the price of 5 - 8 yuan accounted for 32.13 % of the proportion of this kind of milk is mostly functional and nutritional enhancement of milk, for example: Calcium content or protein content level is higher than ordinary milk; the price of imported milk above 8 yuan accounted for 22.76 %, most of this kind of milk is organic milk or milk designed specifically for children with added calcium, iron, zinc and vitamin D. China's Suning, Jingdong, Tmall and other e-commerce platforms have more than 400 brands of imported milk online, the number is much higher than that of domestic milk, and the number of brands is much higher than that of domestic milk.

The number is much higher than that of domestic milk, but the brand concentration is much lower than that of domestic milk. By collecting, processing, integrating, calculating and analyzing the real-time monitoring of major e-commerce platforms, STARCHART DATA obtained that 5 of the top 10 brands in China's liquid milk sales were imported milk brands, occupying a total of 18.3 % of the market share. Among these 5 brands, 2 are German brands (Deya and Oldenburg), 2 are New Zealand brands (Anjia and Nu Skin), and 1 is an Australian brand (Deloitte). The rapid development of China's economy and the improvement of the overall quality of consumers' demand for imported milk is also increasing, which makes the market prospect of imported milk in China broader (Wang et al., 2021), however, the demand and preference of different consumer groups in China for the health and nutritional attributes of imported milk are still unclear. In view of this, this paper aims to investigate the following issues:

1) Chinese consumers' preferences and willingness to pay for imported milk with different attributes such as fat content, nutritional fortification, taste, and country of origin, and to regulate the imported milk market and improve the quality of imported milk according to consumers' preferences;

2) Whether there are significant differences in the preferences of different types of consumers for imported milk with different ingredients and effects;

3) Whether there are differences in the knowledge and use of nutritional information, nutritional labeling and health claims among different types of consumers and whether there are significant characteristics of each type of consumer. The purpose is to understand Chinese consumers' preferences for imported milk with different attributes, which will help producers to accurately grasp the market characteristics of consumers' purchases of imported milk, so that they can better satisfy the differentiated needs of Chinese consumers, and at the same time, it will help the government to continually guide the market for imported milk and promote the benign development of the imported milk market.

This paper mainly investigates consumers' preference and willingness to pay for imported milk containing attributes of taste, fat content, country of origin, and nutritional fortification information. Taking consumers in 7 administrative districts of Shanghai as the object of the survey, the degree of consumer preference and willingness to pay for imported milk at each level of attributes are obtained through empirical investigation, mathematical statistics, model estimation, etc. Based on this, according to the consumers' different preferences at each attribute on the basis of this, according to the different preferences of consumers for each attribute level, the potential category model is used to classify them into different groups, and obtain the cognitive situation, attitude and use of health claims and nutritional labels of consumers in each group.

The study of consumer preference and purchasing behavior can not only provide a basis for the government to introduce relevant food policies to further regulate and optimize the imported milk market, but also provide some guidance for enterprises to develop production and sales strategies. The study of consumer preference and willingness to pay for imported milk is mainly for the government and relevant enterprises to provide a certain theoretical and empirical basis for decision-making, in order to make their decisions more scientific, the focus of the study is shown below:

1) Analyze the individual and descriptive characteristics of the samples through an empirical survey, and then to understand the current consumer awareness of various nutritional fortification attributes as well as the attitudes and use of nutritional labels and health claims in the 7 administrative districts of Shanghai.

2) Study consumers' preference and willingness to pay for imported milk attributes such as nutritional fortification information, country of origin information, flavor and fat content, so as to provide strong empirical data support for the government to guide the imported milk market and improve the quality of imported milk. At the same time, it can also provide a basis for further comparative analysis of the price and quality of domestic and imported milk, thus promoting the development of the domestic dairy industry.

3) According to the different preferences of consumers for imported milk with different attributes, consumers can be divided into several different categories of groups, which can provide a basis for decision-making for enterprises to produce differentiated products.

Methodology

Research methods

Literature research

At the early stage of the research, through reading a large number of domestic and foreign literature, we summarized the research results related to consumers' preference for dairy taste, nutritional enhancement and other attributes, and at the same time, combined with the real market situation in China, we put forward imported milk as the object of research in this paper, and we synthesized and sorted out the previous literature related to the topic of the research, and finally determined the research idea of this paper, and established a theoretical model related to this paper on the basis of the research idea. Theoretical model related to this paper.

Empirical research

In the form of questionnaire survey, this paper selects 7 administrative districts in Shanghai as the research location, and the imported milk consumers as the survey object. Imported milk consumers as the survey object, so as to get the basic information of imported milk consumers, as well as their knowledge and attitude towards nutritionally fortified food, nutrients and other related data, and use statistical software to count and analyze the data.

Selection of experiments

In this paper, the questionnaire was designed based on the Choice-Based Conjoint Analysis (CBC) model on the basis of the choice experiment.

Random parameter model (RPL), latent category model (LCM)

In this paper, we refer to a large number of domestic and international literature. On the basis of a large number of domestic and international literature, this paper analyzes the surveyed data with the help of Random Parameter Model (RPL) and Latent Category Model (LCM) to derive Chinese consumers' preferences and willingness to pay for each attribute of imported milk.

Research process

Research process are shown in **Figure 1**.

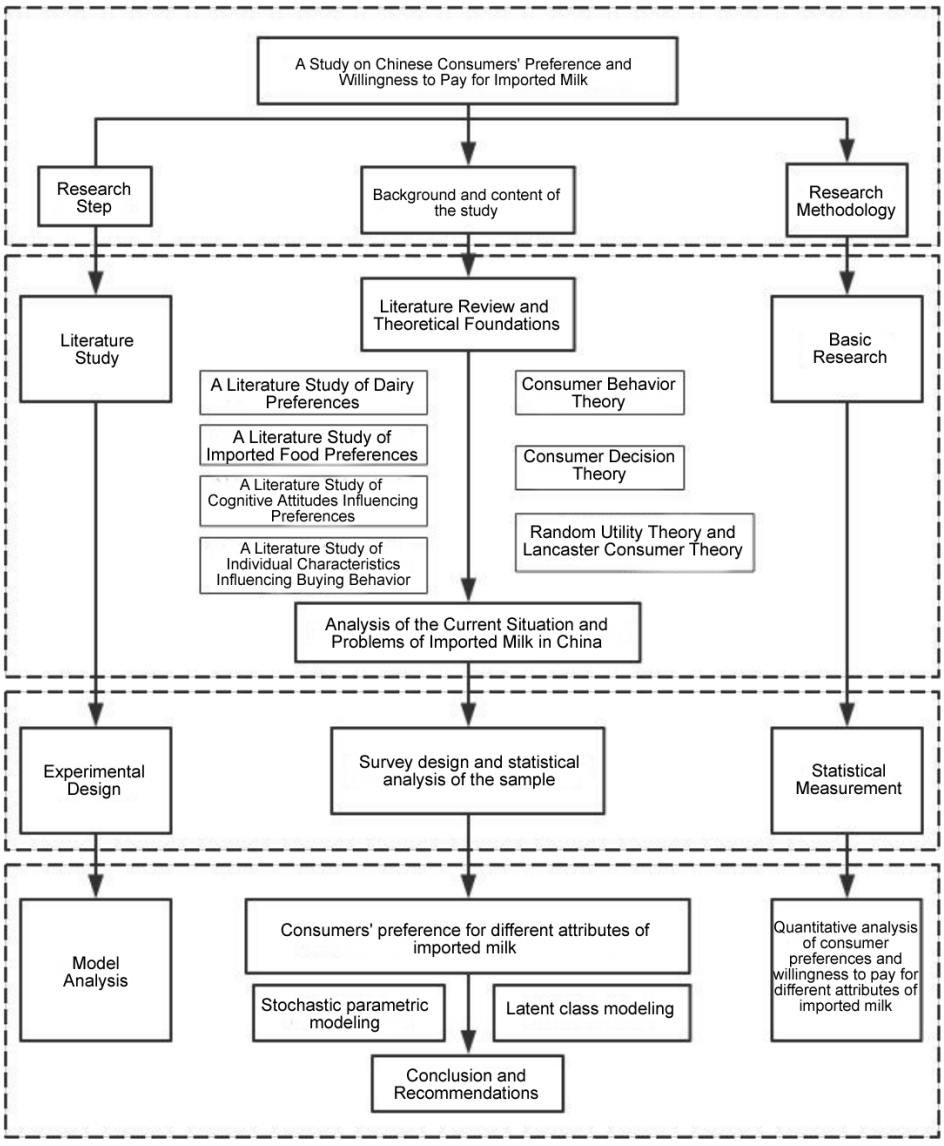

Figure 1 Research process.
Source: Adapted from Walker & Ben-Akiva (2002)

This paper is based on the theme of consumers' preferences and willingness to pay for imported milk containing attributes such as flavor, fat content, nutritional fortification, country of origin, etc.

Meanwhile, it integrates the current situation of imported milk in China and relevant research results from scholars to form the research framework of this paper. Additionally, a questionnaire survey is conducted using the method of choice experiments to collect empirical data, while estimation based on the random parameter model and latent class model yields the corresponding results. Relevant policy recommendations are put forward.

Theoretical perspective

The theoretical perspectives discussed in this paper provide a rich framework for understanding consumer behavior and decision-making processes, particularly in the context of preferences for imported milk. Consumer Demand Theory underscores the significance of both consumer motivation and purchasing power in driving demand, a lens through which Maslow's Hierarchical Needs Theory is applied in this research. Meanwhile, Consumer Cognition Theory sheds light on the process by which consumers acquire knowledge about products, emphasizing the need for explanations to familiarize consumers with the attributes of imported milk. This elucidates the importance of patient communication during the research process, facilitating informed consumer decisions. Moreover, Consumer Purchase Decision Theory delineates the systematic process consumers undergo, from demand determination to post-purchase evaluation, echoing the utilization of the Howard-Sheth model in this study. Finally, integrating Random Utility Theory and Lancaster Consumer Theory offers insights into how consumers derive utility from product attributes and make choices accordingly, guiding the empirical analysis of preferences and willingness to pay for various milk attributes. In essence, these theoretical frameworks provide a robust foundation for comprehending and analyzing consumer behavior, essential for informing policy recommendations in the realm of imported milk consumption.

In the research context described, Consumer Cognition Theory would be particularly relevant for examining how consumers acquire knowledge about imported milk and how this knowledge influences their preferences and decision-making processes. By elucidating the cognitive mechanisms underlying consumer perception, this theory can inform effective communication strategies aimed at educating consumers about the attributes and benefits of imported milk, ultimately shaping their purchasing behavior.

Choice experiment designs

Choice Experiment is a very important non-market value assessment method, the basic theory of which is to enable respondents to make their own preference choices for a certain product in a certain hypothetical environment. Choice experiments are based on the random utility theory and the Lancaster model of consumer choice (Adamowicz et al., 1998). Random utility theory states that if consumers are given a choice between 2 products with different attributes, they will choose to buy the product that maximizes their utility (Loureiro & Umberger, 2007; McFadden, 1974), thus transforming the choice problem into a utility comparison problem. Choice experimental designs should include explicit definitions and hierarchies of product attributes (Hanley et al., 1998).

Imported milk attributes and hierarchy setting

In this paper, based on the literature review and imported milk sold in the Chinese market, the attributes of milk are set into 5 in the choice experiment: Fat content, flavor, nutritional function enhancement, country of origin and price.

1) Fat content attribute and its level setting. With the improvement of people's living standards, the number of obese people is increasing, and lowering the intake of sugar and fat has become a priority precaution in the dietary guidelines of many countries (Baghurst, 2007). The health risks of consuming foods high in sugar and fat are frequently reported in mass media and public health campaigns (Miklavec et al., 2015). As a result, consumers are increasingly concerned with information about the fat, calorie and sugar content of food products, especially among women or those with obese body types (Johansen et al., 2011). When examining consumers' attributes of fat content in dairy products such as milk, Tuorila (1987) set it as skim, 1.9 %, and 3.9 % fat content, Chapman & Lawless (2005) set it as skim versus 2 % fat content, and Harwood & Drake (2018) set it as skim, 1 % fat content, and 2 % fat content, full fat, and Haddad et

al. (2007) and Getter et al. (2014) set it as skim, low fat, and full fat. Considering the attribute hierarchy restrictions and the reality of milk sold in the Chinese market, this paper sets the fat content attribute of imported milk to 2 levels: Full fat and skimmed.

2) Flavor attributes and their level setting. Numerous studies have found that the flavor of dairy products has a significant impact on consumer purchase preferences (Haddad et al., 2007; Getter et al., 2014; Cerjak & Tomic, 2015). At present, the vast majority of imported milk sold in the Chinese market is original milk, and the proportion of imported milk with strawberry, banana, and chocolate flavors is very small; for example, in the case of Jingdong Mall, the proportion of imported milk with original, strawberry, banana, and chocolate flavorists 76.53, 8.42, 4.08 and 3.32 %, respectively. In order to further explore consumers' preference for imported milk flavors, this paper sets the flavor attributes of imported milk into 3 levels, i.e., strawberry, banana and original flavors.

3) Nutritional enhancement attributes and their level setting. Calcium is an important cause of rickets, zinc is an indispensable element in the process of bone development, and iron is the main raw material for the synthesis of hemoglobin. The body's ability to absorb calcium is closely related to the amount of vitamin D in the body. Simultaneous supplementation of calcium, iron, zinc and vitamin D can effectively enhance immunity and improve the body's metabolism, helping to prevent rickets, while maintaining the normal concentration of hemoglobin (Shaw et al., 2022). Vitamin A deficiency may not only lead to visual impairment, loss of appetite, but also reduce the body's resistance, and severe deficiency can lead to blindness, anemia and growth retardation in children (Dong et al., 2014). Currently, imported milk sold in the Chinese market is usually fortified with only one type of vitamin (e.g., vitamin A, vitamin D, etc.) or one type of element needed by the human body (e.g., calcium, iron, etc.), and some milks are fortified with calcium, iron, zinc, and vitamin D. Since vitamin A and vitamin D work together to promote the development of the bones and enhance the immune ability of the body, in this paper, the attributes of nutrient fortification are set into 3 levels: Vitamins A and D, Calcium, Iron, Zinc, Vitamin D, and No additives.

4) Country of origin attributes and their hierarchical settings. In the Chinese market, milk imported from the EU and New Zealand accounted for the largest proportion, and the 2 together accounted for 85.7 % in 2018, and most of the milk imported from the EU came from Germany and France. Therefore, this paper selects New Zealand, Germany and France as import source country attributes.

5) Price attribute and its level setting. Due to the differences in importing countries, brands, and the presence or absence of added extra attributes, the prices of imported milk sold on the market vary greatly. By investigating the price of imported milk with specifications of 200/250 mL in Jingdong Mall, it is found that the price of ordinary imported milk without additives is generally around RMB 4.5, the price of imported milk with 1 - 2 nutritional fortification attributes is generally between RMB 5 - 7, and the price of organic imported milk and imported milk for children and pregnant women is more expensive, generally between RMB 7 - 9. Based on the existing literature and the reality of China's market, this paper sets the price attributes of imported milk (1×200 mL) into 4 levels, which are RMB 4.5, 5.8, 7.1 and 8.4, respectively.

Table 1 The attributes and levels of milk.

Attributes	Levels
Fat content	Skimmed
	Whole
Flavor	Original
	Strawberry
	Banana
Nutritional enhancement	None

Attributes	Levels
	Vitamin A, Vitamin D
	Calcium, Iron, Zinc, Vitamin D
Country of origin	New Zealand
	Germany
	France
Price	4.5 Yuan (RMB)
	5.8 Yuan (RMB)
	7.1 Yuan (RMB)
	8.4 Yuan (RMB)

Questionnaire design

The questionnaire for this experiment includes a total of 4 parts as follows: 1) individual consumer characteristics; 2) consumer attitudes towards healthy eating; 3) consumer knowledge and use of information on nutritional fortification attributes; and 4) choice experiment. Usually, a full factorial design is the best way to choose the task design in a choice experiment. However, based on the attributes and their hierarchical settings shown in the table above (**Table 1**) a total of 2(Fat content) ×3(Flavor)×3(Nutritional enhancement) ×3(Country of origin) ×4(Price) = 216 virtual imported milk profiles can be generated. Since each choice card contains 2 imported milk profiles and a "do not buy" option, each surveyed consumer needs to compare 216×215 = 46440 imported milk profiles. In general, if the number of tabs exceeds 15, respondents will become fatigued during the identification process. Therefore, this paper adopts the method of partial factor analysis design, based on the principle of randomized design, to randomly combine each attribute of imported milk with its corresponding level, in order to ensure a balanced distribution of attribute levels while reducing respondents' fatigue.

Finally, 12 different versions of the questionnaire were designed by the design software, each version including 11 choice cards, at which the questionnaire was designed with the highest efficiency, the D efficiency value of all attributes exceeded 91.71 %, the frequency of attributes was basically balanced between the levels of the attributes, and the deviation between the actual standard deviation and the ideal standard deviation was less than 1 %. The final design of the sample choice cards is shown in **Table 2**.

Table 2 Example of task card selection.

Group 1 Milk	Strawberry	Original	**Neither**
	None	Vitamin A,Vitamin D	
	Skimmed	Whole	
	New Zealand	Germany	
	8.4 Yuan (RMB)	4.5 Yuan (RMB)	
	I'll take this one	**I'll take this one**	

Data collection

Location selection and staff recruitment

This paper selects Shanghai as the investigation location. Shanghai is China's economic and financial center. Evaluated in terms of the concentration of commercial resources, the convenience of logistics and transportation, the activity of urbanites, and the diversity of lifestyles, Shanghai is far ahead

of other cities in China, and is a "super first-tier city". The survey of consumers' preference and willingness to pay for imported milk in Shanghai is a good representation. The experiment was conducted in 7 administrative districts of Shanghai (Huangpu, Xuhui, Jiading, Yangpu, Hongkou, Fengxian and Songjiang), in which a large integrated plaza with catering and entertainment facilities was selected for face-to-face surveys by trained investigators who randomly intercepted consumers for face-to-face interviews. In the specific survey, respondents were invited to participate in the choice experiment and answer the questionnaire only if they were responsible for half or more of the household's food purchases.

According to the 7th National Population Census Bulletin of Shanghai 2021, the selected Shanghai is 7 administrative districts (Huangpu District, Xuhui District, Jiading District, Yangpu District, Hongkou District, Fengxian and Songjiang Districts) with a total population of 865,997.

The investigator selected 49 participants in each district and divided them into 2 groups for the experiment, each consisting of 23 - 26 participants, for a total of 343 participants recruited. The same group of participants completed the same version of the questionnaire. There were 12 versions of the questionnaire with a total of 14 groups of participants, and the remaining 2 groups of participants randomly chose 2 versions of the questionnaire to answer. Ultimately, it was ensured that 264 (2×11×12) groups of imported milk profiles resulting from the 12 versions of the questionnaire were included in the experiment. The survey was conducted on September 21, 2023 and completed on September 27th. A total of 310 valid questionnaires were collected.

Steps

Step 1: After making sure that all participants had arrived, the experimenter gave each participant an ID number and participants were seated according to their ID numbers. No participants were allowed to discuss with each other during the experiment.

Step 2: The experimenter explained the purpose of the experiment, the experimental procedure, and the details of the questionnaire to the participants, and informed them that there were no differences in the attributes of the imported milk in the experiment, except for the attributes of fat content, flavor, nutritional claims, country of origin, and price, and that there were no differences in the attributes of the brands.

Step 3: At the official start of the experiment, participants were told to pay attention to the information on the imported milk packages in the choice card of the questionnaire and to select the appropriate option in the choice card.

In addition, at the end of the experiment, participants were asked to complete other parts of the questionnaire, including individual characteristics, attitudes towards healthy eating, and knowledge and use of information on nutritional fortification attributes.

Model construction and variable assignment

Model construction and variable assignment

According to Lancaster's Consumer Demand Theory and Random Utility Theory, different attributes of imported milk determine consumers' preference for imported milk. According to their maximum budget, consumers will choose milk with different combinations of attributes to maximize their utility.

Assuming that U_{nit} denotes the utility that consumer n obtains in the t th case by choosing the ith milk from the subset m of the choice space C from a subset m of the choice space C in scenario t. The consumer's utility U_{nit} consists of the deterministic component$V_{nit}$and a stochastic component ε_{nit}:

$$U_{nit} = V_{nit} + \varepsilon_{nit}$$

Only if $U_{nit} > U_{njt}$,that is, V_{nit}-$V_{njt} > \varepsilon_{njt} - \varepsilon_{nit}$ for any j≠i, All of these hold true before consumer n chooses the ith milk. The probability that a consumer chooses milk of type i is:

$$P_{nit} = \text{prob}(V_{nit} - V_{njt} > \varepsilon_{njt} - \varepsilon_{nit}; \forall j \neq i)$$

In this article V_{nit}denotes a linear function of 5 attributes: price, flavor, fat content, country of origin, and whether or not the milk is fortified:

$$V_{nit} = \beta'_n X_{nit}$$

where β'_n denotes the vector of utility scores for consumer n and X_{nit} denotes the vector of attributes for the ith milk.

Unlike the traditional logit model, which usually assumes that consumers are homogeneous, the stochastic parametric (RPL) model relaxes the requirement by allowing consumers' preferences for product attributes to be heterogeneous, i.e., different consumers' preferences can be different. Therefore, this paper analyzes the RPL model according to the RPL model, and further assumes that ε_{nit}obeys an extreme I-type distribution, then the probability that a consumer chooses the ith milk in scenario t can be expressed as:

$$V_{nit}=\int \frac{\exp(V_{nit})}{\sum_j \exp(V_{njt})} f(\beta_n) d\beta'_n$$

where f(β) is the probability density function of parameter β and the distribution of the random parameter is specified by its probability density function. If the parameter is fixed at β_c (non-random), the distribution collapses, f(β_c) $\rightarrow\infty$ or f(β) = 0.

However, if each consumer's choice preference is not unique, but there are significant differences between different groups of a particular number of consumers, then Latent Class Modelling (LCM) can better fulfill the requirements. In Latent Class Modeling, consumers belong to different classes, and each class of consumers has different utility parameters. That is to say, the preferences of all consumers in each category are homogeneous, but the preferences of consumers in different categories are heterogeneous. This model reflects the "block" distribution of consumer preferences, and it is able to explore the heterogeneity more deeply.

In the LCM (latent class modelling) model, the utility obtained by consumer n by choosing option i in scenario t is:

$$u_{nit|s}=\beta_s X_{nit}+\varepsilon_{nit|s}$$

$\beta_s$is the parameter vector of category s associated with the explanatory variables, and $\varepsilon_{nit|s}$ denotes the error term obeying the I-distribution.

Thus, the likelihood of a consumer choosing option i, given s categories, is expressed as follows:

$$P_{ni}=\sum_{s=1}^{S} P_{ns} \prod_{t=1}^{T} P_{nit|s}$$

P_{ns} represents the likelihood that consumer n is in category s and denotes the probability that the consumer chooses option i in the tth scenario given s categories.

In the case of incomplete a priori information about the number of categories or the probability of choosing, the parameter values of each attribute are estimated by the maximum likelihood function, and the number of categories is jointly determined by the utility coefficients. The latent class model was estimated by using SPSS Statistics software.

In the empirical model, the utility function includes the attributes of milk, i.e., the explanatory variables, and also chooseno represent the dis-options. Therefore, the utility function is represented as follows:

$u_{nit|s} =$ chooseno $+\beta_{s1}PRICE_{nit} + \beta_{s2}SKIM_{nit} + \beta_{s3}STRAWBER_{nit} + \beta_{s4}BANANA_{nit} + \beta_{s5}VAD_{nit} + \beta_{s6}FCZD_{nit} + \beta_{s7}NZ_{nit} + \beta_{s8}GERMANY_{nit}$

In this case, effect codes are used for milk attributes and levels, price is a continuous variable, and "chooseno" is a dummy code that, when it is 1, represents the choice of the "no purchase" option, and when it is 0, it is the opposite.

Through the RPL model and LCM model, the utility score and price coefficient of each attribute level of imported milk can be obtained, so that the average willingness to pay for each attribute level can be further estimated, and the specific calculation formula is as follows:

$$WTP_k = -2(\frac{\beta_k}{\beta_p})$$

where WTP_kdenotes consumers' willingness to pay for the kth attribute, β_k denotes the marginal utility of the kth attribute level, and β_p denotes the marginal utility of the price attribute.

Variable assignment

Except for the price attribute, each attribute of imported milk is assigned with an effect code, and the specific variable assignments are shown in **Table 3** below.

Table 3 Variable assignment.

Main effect variable	Variable assignment
Skimmed	SKIM = 1; WHOLE = 0
Whole	SKIM = 0; WHOLE = 1
Strawberry	STRAW = 1; BANANA = 2
Banana	STRAW = 0; BANANA = 1
Original	STRAW = −1; BANANA = −1
Vitamin A, Vitamin D	VAD = 1; FCZD = 0
Calcium, Iron, Zinc, Vitamin D	VAD = 0; FCZD = 1
None	VAD = −1; FCZD = −1
New Zealand	NZ = 1; GER = 0
Germany	NZ = 0; GER = 1
France	NZ = −1; GER = −1
Price	PRICE1 = 4.5
	PRICE2 = 5.8
	PRICE3 = 7.1
	PRICE4 = 8.4

Data analysis

Based on the results of data collection, simulations were conducted using SPSS Statistics software to estimate the utility values of consumers for each attribute and level of imported milk. In the process of estimating the utility values, the price attribute and the CHOOSE NO option in the questionnaire were defined as fixed values, and it was assumed that the consumer's fractional utility for each attribute and level

was randomly normally distributed. The RPL model is estimated by using statistics software to obtain the scored utility of other attributes. Finally, various data results are obtained to analyses the differences in perceptions, attitudes and habits of consumers of different preference types.

Results and discussion

Consumer characteristics and consumption habits

Of the 310 respondents, 56.1 % were female and 43.9 % were male, which is consistent with the fact that women are the main food buyers in most households.

Table 4 Individual statistical characteristics and consumption habits of respondents.

Statistical characteristics	Categorical indicators	Sample size	Percentage
Gender	Male	136	43.90 %
	Female	174	56.10 %
AGE	18 - 24	65	21.00 %
	25 - 34	170	54.80 %
	35 - 44	52	16.80 %
	≥ 45	23	7.40 %
Education	Primary and below	10	3.20 %
	Junior high school	35	11.30 %
	High school or higher vocational	68	21.90 %
	College	84	27.10 %
	Undergraduate	96	31.00 %
	Graduate student and above	17	5.50 %
Income	Less than 50,000 yuan	44	14.20 %
	51,000 - 100,000 yuan	98	31.60 %
	100,001 -150,000 yuan	76	24.50 %
	150,001 - 200,000 yuan	46	14.80 %
	200,001 - 300,000 yuan	23	7.40 %
	More than 300,000 yuan	23	7.40 %
Have children under 5 years old	Yes	134	43.20 %
	No	176	56.80 %
Number of times milk is consumed per week	No	13	4.20 %
	Rarely (1 - 2 times)	93	30.00 %
	Occasionally (3 - 4 times)	104	33.50 %
	Often (5 - 6 times)	60	19.40 %
	Drink every day	40	12.90 %
Percentage of food purchased that is fortified	0 - 10 %	174	56.10 %
	10 - 30 %	66	21.30 %
	30 - 50 %	40	12.90 %
	50 - 100 %	30	9.70 %
Have you ever heard of fortified food	Heard of and purchased	84	27.10 %
	Heard of it but didn't buy it	99	31.90 %
	Haven't heard of it	127	41.00 %

This is consistent with the fact that women are the main purchasers of food in most households. The proportion of consumers aged "18 - 24", "35 - 44" and "over 45" was 21.0, 16.8 and 7.4 %, "High school or senior vocational school" and "graduate school and above" accounted for 21.9 and 5.5 % of the respondents, respectively. The majority of respondents had annual household incomes of more than 100,000

yuan, with the majority of them having annual household incomes between 101,000 and 15,000 yuan. The majority of the respondents had an annual household income of more than 100,000 yuan, with 24.5 % of the respondents having an annual household income of between 101,000 and 150,000 yuan, 151,000 and 200,000 yuan, 201,000 and 300,000 yuan or more respectively. Of these, 24.5, 14.8, 7.4 and 7.4 %, respectively had an annual household income of 101,000 to 150,000 yuan, 151,000 to 200,000 yuan, 201,000 to 300,000 yuan, and more than 300,000 yuan. "Households with children aged 5 and under accounted for 43.2 % of respondents.

The majority of respondents consume milk on a weekly basis. The majority of respondents consume milk on a weekly basis, "rarely (1 - 2 times)", "occasionally (3 - 4 times)", "often (5 - 6 times)" and "rarely (1 - 2 times)". The percentage of respondents who consume milk "rarely (1 - 2 times)", "occasionally (3 - 4 times)", "often (5 - 6 times)" and "every day" is 30, 33.5, 19.4 and 12.9 %, respectively. Respondents among the dairy products consumed by the respondents, the proportion of imported dairy products in the "0 - 10 %" range is the largest, at 56.1 %; in addition, the proportion of nutritionally fortified foods in the food purchased by the respondents is 56.1 %. In addition, the proportion of nutrient-fortified food products in food purchases ranged from "10 - 30 %", "30 - 50 %", and "more than 50 %", accounting for 21.3 % of respondents respectively. The proportions of respondents who purchased "10 - 30 %", "30 - 50 %", and "more than 50 %" of food products were 21.3, 12.9 and 9.7 %, respectively.

In conducting the questionnaire survey, this study first explained to consumers what nutritionally fortified foods are, i.e., foods that are fortified according to the needs of different groups of people in order to maintain the original quality of the food. This means that according to the needs of different groups of people, a certain amount of food nutrients is added to the food in order to maintain the original nutrient content of the food, or in order to supplement the nutrients that are lacking in the food. According to the needs of different populations, in order to maintain the original nutrient content of food, or to supplement the nutrients lacking in food, a certain amount of food fortification, such as vitamins, minerals, trace elements, etc., is added to food in order to enhance its nutritional value (Hassan & Mustapha, 2010; Gulseven & Wohlgenant, 2014). Consumers were subsequently surveyed on their knowledge of nutritionally fortified foods and as shown in **Table 4**. 41 % of the respondents had never heard of nutritionally fortified foods, 31.9 % of the respondents had heard of but never purchased nutritionally fortified foods, and only 27.1 % of the respondents had heard of and purchased nutritionally fortified foods.

Differences in perceptions, attitudes and habits of consumers with different preference types

Consumers are most concerned about the taste of imported milk, followed by attributes such as nutritional fortification, fat content, and country of origin; the premiums they are willing to pay for the attributes of imported milk such as skimmed, added Vitamin A and D, added Calcium, Iron, Zinc, and Vitamin D, made in Germany, and made in New Zealand, are RMB 3.02, RMB 1.87, RMB 3.81, RMB 2.83, and RMB 0.28, respectively. Consumers were categorized into 4 different categories through the latent class model (LCM), namely, "nutrient-fortified preference", "undifferentiated", "taste preference" and "price-sensitive". "Price-sensitive" consumers. The survey on consumers' knowledge of nutrients, attitudes towards nutrition claims, as well as attention to and frequency of use of health claims and nutrition labels revealed that consumers were generally more concerned about the overall health claims of food products than the individual nutrition claims. In addition, consumers' attention to both nutrition labeling and health claims was higher than their frequency of use, and the gap between consumers' attention to nutrition labeling and frequency of use was lower than the gap between their attention to health claims and frequency of use. Among the 4 types of consumers, the "Nutritional Enrichment Preference" consumers scored the highest in terms of their knowledge of nutrients, the importance they attached to each nutritional claim, and the concern and frequency of using nutritional labels and health claims, followed by the "Price Sensitive" consumers, the "Taste Sensitive" consumers, and the "Taste Sensitive" consumers. Consumers with "nutritional fortification preference" scored the highest, followed by "price-sensitive" consumers, "taste preference" consumers scored lower, and "no difference" consumers scored the lowest. Therefore, government departments and enterprises should publicize and educate the knowledge of food nutrition and health according to the perception and attitude of different types of consumers.

Differences in perceptions of nutrient fortification attributes

Regarding the variable of consumers' knowledge of nutrients such as carbohydrates, understanding is taken as 1, while not understanding is taken as 0. The results of the survey are shown in **Figure 2**. Overall, among the 310 consumers, 77.7, 78.4 and 78.7 % of them knew about the nutrients such as carbohydrates, dietary fiber, and cholesterol, etc.; in terms of the types, among the " Nutritional fortification preference type", "no difference type", "taste preference type" and "price-sensitive type", 80.3 % of consumers, respectively, 75.0, 64.4 and 80.6 % were aware of carbohydrates, 81.5, 60.0, 73.4 and 79.1 % of consumers were aware of dietary fiber, and 83.1, 80.0, 60.0 and 77.6 % of respondents were aware of cholesterol, respectively.

Therefore, "fortification-preferring" consumers had the highest awareness of nutrients, "price-sensitive" consumers were slightly less aware of nutrients than "fortification-preferring" consumers, and "fortification-preferring" consumers were less aware of nutrients than "fortification-preferring" consumers. "Consumers of the "No Difference" category had lower awareness of fortified foods and nutrients, and consumers of the "Taste Preference" category had lower awareness of nutrients such as carbohydrates and cholesterol.

	Overall	Nutritional Fortification Preference Type	No difference Type	Taste preference Type	Price Sensitive Type
Carbohydrates	77.70%	80.30%	75%	64.40%	80.60%
Dietary Fiber	78.40%	81.50%	60%	73.40%	79.10%
Cholesterol	78.70%	83.10%	80%	60%	77.60%

Figure 2 Various consumers' understanding of nutritional fortification properties.

Differences in attitudes towards nutrition claims

In the study of whether consumers attach importance to each nutrient, a 5-point Likert scale was used to rate "not important", "not very important", "generally important "The results of the survey are shown in **Table 5**. Overall, the 310 consumers attached the highest importance to the overall health claims with 4.01 points. Overall, the 310 consumers attached the highest importance to overall health claims, with a score of 4.01, and nutrient claims such as cholesterol, vitamins, and fats, with scores of 3 or more; by type, "nutritional fortification preference", "no difference", "taste preference", "price preference", and "price" were scored 1 - 5, respectively. In terms of type, consumers with "nutritional fortification preference", "no difference type", "taste preference type" and "price sensitivity type" attach great importance to overall health claims, with scores of 4.08, 4.10, 3.85 and 3.91, respectively, and the lowest scores for other nutrients such as vitamins are 3.07, 2.50, 2.93 and 2.91, respectively.

Therefore, there is a significant difference in the degree of importance attached to each nutritional claim among the 4 types of consumers. "Nutritional fortification-preferring" consumers attach the highest degree of importance to each nutritional fortification claim, followed by "price-sensitive" consumers, "taste-preferring" consumers, "price-sensitive" consumers, "price-sensitive" consumers, and "taste-preferring" consumers. Taste Preference" consumers and "No Difference" consumers.

Table 5 Consumers' attitudes towards healthy eating.

	Overall	Group 1	Group 2	Group 3	Group 4	Sig.[c]
Importance of energy statements[b]	3	3.07	2.85	2.93	2.91	0.000
Importance of fat statements[b]	3.18	3.23	2.9	3.07	3.18	0.000
Importance of sugar statements[b]	3.12	3.2	2.7	3.19	3.33	0.000
Importance of vitamin statements[b]	3.4	3.46	2.9	3.31	3.46	0.000
Importance of fiber statements[b]	3.26	3.31	2.75	3.22	3.33	0.000
Importance of sodium/salt statements[b]	3.29	3.38	2.5	3.27	3.31	0.000
Importance of the cholesterol statements[b]	3.61	3.67	3.1	3.58	3.61	0.000
Importance of the statements "omega-3 fatty acids help keep the heart healthy"[b]	3.5	3.54	2.85	3.47	3.6	0.000
Importance of the Statements "zinc, iron, etc. help aid in normal brain cognition"[b]	3.78	3.83	3.2	3.8	3.79	0.000
Importance of general health Statements[b]	4.01	4.08	4.1	3.85	3.91	0.000

Note: [b] Variables on consumer attitudes, interests, and habits of using nutritional information were measured on a 5-point Likert scale (e.g., " unimportant" , " not very important " , " not important" , " not too important" , " average" ," more important " , " very important " are scored as 1 - 5, respectively). [c] Significant differences between the 4 categories of consumers in terms of their perception, attitude, and habit were detected through ANOVA analysis. Sig. value less than 0.05 means that the difference between groups is significant.

Consumers with "no difference" only valued "cholesterol claims", "zinc, iron, etc. help brain normal cognition", "zinc, iron, etc. help brain normal cognition", and "no difference". the "no difference" consumers only place more than 3 points on "cholesterol claims", "zinc, iron, etc. help normalize brain cognition", and "overall health claims". It is worth noting that these consumers place a higher importance on "overall health claims" at 4.10 than "fortification preference" consumers. This is similar to the findings of Wardle et al. (2004), Gulseven &Wohlgenant (2014), Huffman & Jensen (2004). The reason for this may be that there are more male, younger consumers in the "no difference" group, and these consumers are less health-conscious and do not pay much attention to nutrient claims, so overall health claims become the most important factor in their choice of food. Therefore, the overall health claims become their main reference when choosing food products, and they naturally attach a higher degree of importance to them.

Differences in the use of health statements

The same 5-point Likert scale was used to examine consumers' attention to and use of health statements. Consumers' attention to health claims was rated as "not concerned", "not too concerned", "average", "quite concerned", "very concerned", "very concerned", "not concerned", "not concerned", "not concerned", "not concerned", and "not concerned". The scores of "not concerned", "not too concerned", "average", "quite concerned", and "very concerned" were assigned as 1 - 5 points, respectively, For the frequency of consumers' use of health claims, "will not", "seldom", "generally", "often", and "very often" were assigned a score of 1 - 5, respectively. The results of the survey are shown in **Figure 3**.

Overall, the 310 consumers showed a high level of concern about health claims and the frequency of using them, with scores of 3.32 and 3.05, respectively. In terms of type, "nutritional fortification preference", "no difference", "flavor preference", "price sensitivity", and so on. Consumers of "nutritional strengthening preference type", "no difference type", "taste preference type" and "price sensitive type" scored 3.45, 2.90, 3.11 and 3.22, respectively for their concern for health claims, and 3.21, 2.30, 2.87 and 2.97, respectively for their frequency of use of health claims. Therefore, "nutritional fortification preference" consumers have the highest concern and frequency of using health claims, followed by "price sensitivity" consumers, "no difference" and "taste preference" consumers, and "no difference" and "no difference" consumers.

"Taste preferred" consumers scored lower, especially the "no difference" consumers, who scored less than 3 points. It is worth noting that both overall consumers and consumers in each category paid more attention to health claims than the frequency of use, which indicates that consumers subconsciously believe that they should pay attention to health claims, but many of them ignore them when purchasing food. Although all types of consumers' attention to health claims was higher than their frequency of use of health claims, "no difference" consumers' attention to health claims was much higher than their frequency of use of health claims, with a difference of 0.6 points, which may be due to the fact that "no difference" consumers were more concerned about health claims than their frequency of use when purchasing food products. this may be due to the fact that "no difference" consumers ignore the use of health claims because of their indifference when purchasing food.

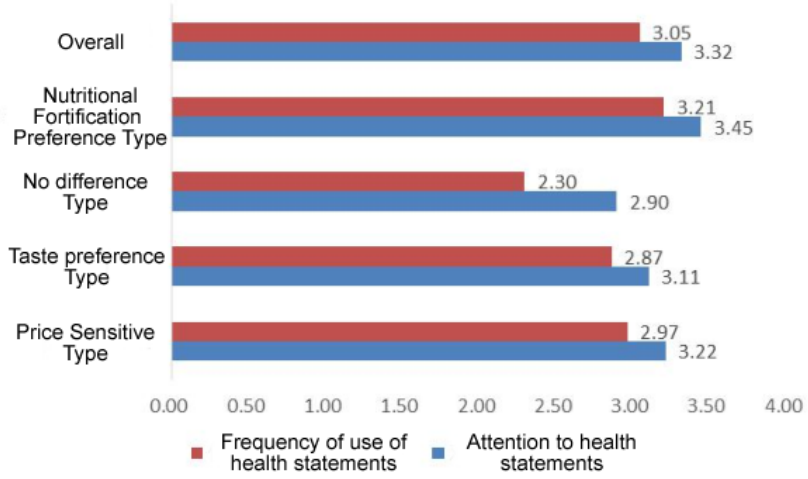

Figure 3 Consumers' attention to health statements and frequency of use.

Upon categorizing consumers based on their preferences, the study identified variations in the levels of concern and frequency of use of health claims. Consumers categorized as "nutritional fortification preference" exhibited the highest levels of concern and frequency of use of health claims, followed by "price sensitive" consumers. Conversely, "taste preference" consumers scored lower, particularly those classified as "No Difference", indicating a lesser emphasis on health claims in their purchasing decisions. A notable observation from the study is that consumers, regardless of their preference category, generally showed a higher level of attention to health claims compared to their actual frequency of use (Kozup et al., 2003). This suggests that while consumers consciously recognize the importance of health claims, they may not consistently apply them in their purchasing behaviors. However, it's intriguing to note that "no difference" consumers displayed a significantly higher level of attention to health claims compared to their frequency of use. this discrepancy may stem from a heightened awareness of health-related information during the decision-making process, despite ultimately prioritizing other factors over health claims when making food purchases. These findings underscore the complex interplay between consumer preferences and the utilization of health claims in food purchasing decisions. While health claims are considered important by consumers, their actual application in decision-making may vary based on individual preferences and priorities. As such, food manufacturers and policymakers should consider these nuances in consumer behavior when designing and promoting products with health-related attributes (Hieke et al., 2015).

Differences in the use of nutrition labels

Like the study of consumers' concern and use of health claims, the study of consumers' concern and use of nutritional labels was conducted on a 5-point Likert scale rating. The results of the survey are shown in **Figure 4**.

Overall, the 310 consumers' concern for nutrition labeling and the frequency of its use were comparable to that of health claims, with scores of 3.26 and 3.07, respectively. In terms of type, "nutritional fortification preference", "no difference", "flavor preference", "price sensitivity", and so on. consumers of "nutrition labeling preference", "no difference", "taste preference", and "price sensitive" scored 3.38, 2.80, 3.07, and 3.18, respectively for their attention to nutrition labeling, and 3.17, 2.60, 2.82, and 3.10 for their frequency of nutrition labeling, respectively. Therefore, consumers with "nutritional fortification preference" have the highest concern and frequency of using nutrition labels, followed by consumers with "price sensitivity", and consumers with "taste preference" have the highest concern and frequency of using nutrition labels, while consumers with "taste preference" have the highest concern and frequency of using nutrition labels. Consumers of the "flavor preference" type have the lowest scores for both concern and frequency of use, and consumers of the "no difference" type have the lowest scores, with none of them exceeding 2.80 points. Although consumers' attention to nutrition labeling scores were also slightly higher than their frequency of use of nutrition labeling scores, consumers' attention to nutrition labeling and frequency of use of nutrition labeling was lower than that of health claims.

However, compared to health claims, the difference between consumers' attention to nutrition labels and their frequency of use is smaller, suggesting that consumers pay attention to nutrition labels while applying them to their daily purchasing behaviors. Although consumers' attention to nutrition labeling slightly exceeded their frequency of use, the disparity was narrower compared to health claims, indicating a substantial degree of attention given to nutrition labels in their everyday purchasing decisions. This suggests that while consumers may not consistently utilize nutritional labels, they nonetheless acknowledge their importance and consider them in their shopping choices (Ikonen et al., 2020). Thus, despite the marginally lower engagement with nutrition labels compared to health claims, their significance in influencing consumer behavior remains notable.

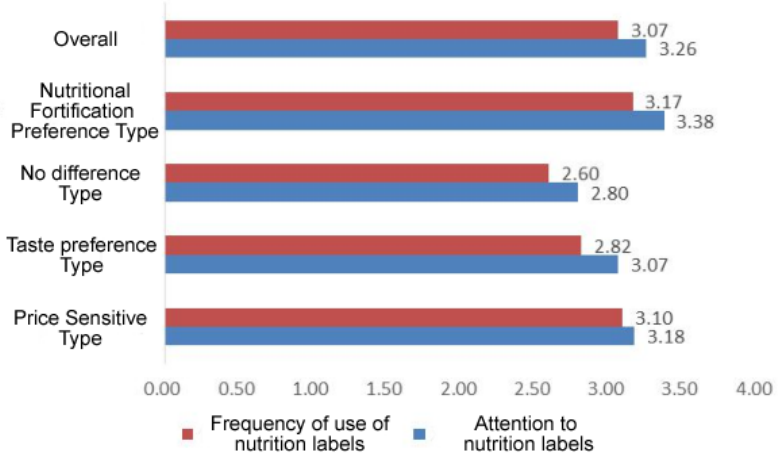

Figure 4 Consumers' attention to nutrition labels and frequency of use.

The findings of the study reveal that consumers exhibit a comparable level of concern for both nutritional labels and health claims, as indicated by the scores of 3.26 and 3.07, respectively on the 5-point Likert scale. This suggests that consumers perceive both types of information as important factors influencing their purchasing decisions. The study further delves into the relationship between consumer preferences and their attention to and use of nutritional labels. Consumers categorized under the "nutritional fortification preference" group demonstrated the highest levels of concern and frequency of use of nutritional labels, followed by those classified as "price sensitive". This implies that consumers who prioritize the nutritional content of products are more likely to pay attention to and utilize nutritional labels when making purchasing decisions (Kozup et al., 2003). Conversely, consumers with a preference for taste showed lower levels of concern and frequency of use of nutritional labels, indicating that taste may be a more dominant factor influencing their choices. Furthermore, the study highlights a noteworthy observation

regarding the difference between consumers' attention to nutritional labels and their actual frequency of use. While consumers overall showed a slightly higher level of attention to nutritional labels compared to their frequency of use, the gap between the 2 was narrower compared to health claims. This suggests that although consumers may not consistently apply nutritional labels in their purchasing behaviors, they still recognize their importance and consider them in their decision-making process.

These findings align with previous research by Roberto et al. (2021), which also noted a similar pattern of consumer behavior regarding nutritional labels. Despite a slightly lower level of engagement compared to health claims, nutritional labels still hold significance in influencing consumer behavior. This underscores the importance of providing clear and informative nutritional labeling to assist consumers in making informed choices, particularly for those who prioritize the nutritional content of products.

This study's findings shed light on the nuanced relationship between consumer preferences and their attention to and use of nutritional labels. By understanding these dynamics, policymakers and food manufacturers can tailor their strategies to better meet consumer needs and preferences, ultimately promoting healthier food choices in the market.

Conclusions

This paper analyzes the current situation and problems of the imported milk market, and adopts the choice experiment method to survey 310 consumers who often buy food for their families in Shanghai, to study their preferences and willingness to pay for imported milk with different attributes, to explore the individual characteristics, perceptions, attitudes and purchasing habits of consumers who have significant differences in their preferences for the attributes of imported milk, and to come up with the following conclusions:

1) The imported milk market is full of chaos. At present, the imported milk market shows a significant increase in the amount of imports, the price is gradually reduced, the import source is concentrated, etc.; through an in-depth analysis of the imported milk market found that the brand is chaotic, the quality is uneven, the lack of specialized supervision, consumer preference is too blindly follow the main problems of China's imported milk market.

2) There are significant differences in consumer preferences for each attribute of imported milk. Among the attributes of fat content, taste, nutritional enhancement and country of origin of imported milk, the taste attribute has the greatest influence on consumers, followed by the nutritional enhancement attribute, fat content attribute and country of origin attribute. Among the flavor attributes, consumers preferred original-flavored imported milk the most and were willing to pay $5.96 and $8.90 more to avoid strawberry-flavored and banana-flavored imported milk, respectively. In the fat content attribute, consumers are willing to pay $3.02 more for imported milk with skimmed attribute. Among the attributes of nutritional fortification, consumers are willing to pay $1.87 and $3.81 more for imported milk with added vitamins A and D and added calcium, iron, zinc, and vitamin D, respectively. In the attribute of country of origin, consumers are willing to pay $0.28 and $2.83 more for New Zealand-made and German-made milk, respectively compared to French-made imported milk.

3) The preference characteristics of different categories of consumers are significant. According to the different preferences of consumers for each attribute of imported milk, consumers can be categorized into "nutritional enrichment preference", "no difference", "flavor preference" and "price sensitive", accounting for 57.3, 6.6, 14.6 and 21.5 %, respectively. Among the 4 categories of consumers, "nutritional fortification preference" consumers have the highest willingness to pay for the addition of vitamins A and D and the addition of calcium, iron, zinc, vitamin D and other nutritional fortification attributes, respectively 14.43 and 25.64 yuan; they are willing to pay a premium for imported skimmed milk and German milk attributes of 18.29 and 16.89 yuan, respectively; they are willing to pay for imported milk with the attributes of skimming and German milk, respectively 16.89 and 16.89 yuan, respectively. 16.89 yuan; in order to avoid strawberry and banana flavored imported milk, this group of consumers is willing to pay 27.50 and 29.69 yuan, respectively. "No difference type" consumers are willing to pay no more than $2.20 for each attribute, and the influence of imported milk attributes on this type of consumers is minimal. Consumers of the "flavor preference" group strongly prefer strawberry flavor and are willing to pay an

additional $13.07 for strawberry-flavored imported milk; they are willing to pay an additional $11.87 for added Vitamins A and D, and $9.50 for New Zealand-made attributes. “Price-sensitive” consumers are the most sensitive to price, so even if they prefer skimmed milk and milk with added calcium, iron, zinc and vitamin D, they are only willing to pay 1.51 yuan and 2.46 yuan more for them; in order to get original milk, these consumers are willing to pay 7.86 yuan and 9.90 yuan more to avoid imported strawberry-flavored and banana-flavored milk. In order to obtain original flavored milk, such consumers are willing to pay $7.86 and $9.90 more to avoid strawberry and banana flavored imported milk.

4) There are differences in the awareness and importance of different statements by different categories of consumers. In terms of awareness of nutrients such as dietary fiber, “Nutrient-fortified” consumers are the highest, “no difference” consumers are the lowest, and “flavor-preferring” consumers are only higher than “no difference” consumers. “Consumers with a preference for taste were only higher than those with a preference for no difference, while consumers with a preference for price were slightly less likely than those with a preference for fortification to be aware of nutrients. Regarding attitudes towards nutrition claims, consumers attached the highest importance to “overall health claims”. Among them, “Nutritional fortification preference” consumers attached the highest importance to each nutritional claim, with the mean value exceeding 3.07 points; “no difference” consumers attached the lowest importance to each nutrient among the 4 types of consumers, but this type of consumers attached the highest importance to “overall health claims”. “Consumers in the “price sensitive” category placed the highest importance on all types of nutritional claims, with all claims except “energy claims” scoring above 3.10 points. Consumers of the “price-sensitive” group attached higher importance to all types of nutritional claims, except for the “energy claim”, which scored more than 3.18 points. Consumers of the “flavor-preferring” group attached lower importance to all types of claims, but the lowest score was more than 2.90 points. In terms of attention to and use of nutrition labels and health claims, all 4 types of consumers pay more attention to them than the frequency of using them, and the scores of the 4 types of consumers in terms of attention to and frequency of using them, from highest to lowest, are: “nutritional fortification-preferring” consumers, “price-sensitive” consumers, “flavor-preferring” consumers, “Taste-preferring” consumers, and “Taste-preferring” consumers. Consumers of “nutritional fortification preference”, “price sensitivity”, “taste preference” and “no difference”.

Recommendations

Practical recommendations

1) The government should play a leading role in strengthening the supervision of the whole process of imported milk, including entry and consumption. Through the analysis of the market of imported milk, it can be seen that at present, the supervision of China’s imported milk is in the state of multi-departmental division, there is no unified safety supervision department, which is also an important reason for the imported milk often appeared in the labeling, composition, shelf life and other unqualified problems. China can learn from the experience of the European Union and other developed countries, from the central level to set up a unified imported milk regulatory department, mainly responsible for coordinating the supervision of imported milk at all levels of regulatory departments. Under this model, the safety supervision of imported milk is undertaken by different regulatory departments, and under the coordination of the competent authorities to realize the whole process of supervision of imported milk import, consumption and other circulation links, so as to avoid regulatory gaps due to cross-functional. At the same time, the government and can be based on consumer preferences for the country of origin and other attributes of the targeted imported milk, thus improving the imported milk market brand clutter, uneven quality problems.

2) The government and the media should provide consumers with correct information about product attributes, so that they can make scientific purchasing decisions. First of all, the government and the media should strengthen the publicity and education work on the attributes of milk, especially on the attributes of nutritional enhancement. The results of this paper show that more than 40 % of consumers have never heard of nutritionally fortified food, so the government and media should play a media role, through public service announcements, expert lectures and other ways to explain the attributes of milk, so that consumers fully understand the meaning of the attributes, and then in the process of purchasing have a reference basis.

Secondly, the government and the media can widely publicize the nutritional intake standards of milk and cultivate consumers' awareness of selective consumption. Due to differences in individual characteristics, there are some differences in the intake of nutrients by consumers, therefore, while publicizing, different types of milk can be recommended according to different consumer groups. For example, the advantages of low-fat high-calcium milk can be conveyed to the elderly when publicizing the nutritional knowledge of milk, thus guiding consumers' preference.

3) Encourage relevant enterprises to provide consumers with differentiated imported milk with various levels of attributes. At present, Chinese consumers have higher and higher demands for milk quality, and the heterogeneity of consumer preferences puts higher demands on producers, so related companies should adjust their market strategies according to consumer demand and produce products with different attributes. For example, according to the results of this paper, for consumers with "nutritional fortification preference", Chinese milk importing enterprises, foreign-invested enterprises, or domestic producers can import or produce milk with nutritional fortification attributes (e.g., added vitamins A and D), and increase the price of the product according to the production cost to meet the nutritional requirements of consumers. The following are some examples of how to meet the nutritional requirements of consumers.

4) Guiding producers to use distinctive labels on food packaging to highlight the nutritional and health labels of food products in order to meet consumer demand. According to the findings of this paper, there is a gap between consumers' attention to nutrition labeling and health claims and the frequency of their use, which indicates that consumers ignore nutrition labeling and health claims when purchasing food products, even though they are concerned about nutrition labeling and health claims. Relevant producers can learn from the nutritional scoring system adopted in France, using green, light green, yellow, orange and red to represent the 5 levels of ABCDE, respectively, to label the level of each nutrient, eye-catching colors can attract consumers' attention, but also easy for consumers to identify the nutritional level of the food products, so that they can quickly and accurately find the products they need, and can better meet the needs of consumers.

Theory contribution

The research on consumer preferences for imported milk attributes in Shanghai makes significant theoretical contributions to the understanding of consumer behavior and marketing research. Firstly, by identifying distinct consumer segments based on preferences for taste, price sensitivity, and nutritional fortification, the study enhances our understanding of consumer segmentation within the dairy product market. This delineation of heterogeneous preferences allows for tailored marketing strategies and product development initiatives to better meet the needs of diverse consumer groups. Secondly, the adoption of attribute-based choice modeling techniques provides insights into the relative importance of different attributes influencing consumer decision-making regarding imported milk. By quantifying consumer preferences and willingness to pay for various attributes, the research advances choice modeling methodologies, facilitating more precise market analysis and product positioning strategies. Additionally, the study sheds light on the increasing significance of health and nutrition considerations in consumer purchasing decisions within the dairy product category.

Consumers' preferences for fortified milk and their willingness to pay premiums for nutritional enhancements underscore the importance of health-related attributes in shaping consumer choices. The findings offer valuable insights for developing effective Market Positioning Strategies for imported milk products. Understanding consumer preferences and segmenting the market based on attributes enables companies to tailor their product offerings and marketing messages to effectively meet the needs of target consumer segments.

This research underscores the importance of consumer education and communication in shaping perceptions and preferences for imported milk. By emphasizing the nutritional benefits and quality standards associated with imported milk, companies can effectively communicate product attributes and enhance consumer understanding and appreciation. The study's theoretical contributions have implications for both academia and industry, informing future research directions and guiding marketing strategies in the dairy product market.

Future research recommendations

Firstly, Longitudinal studies could offer valuable insights into the evolution of consumer preferences and behaviors over time. By tracking changes in consumption patterns and market dynamics, longitudinal research can provide a deeper understanding of trends and shifts in consumer demand for imported milk. Secondly, investigating the Impact of Marketing Strategies on consumer perceptions and purchasing decisions regarding imported milk could yield valuable insights for marketers. By analyzing the effectiveness of various marketing tactics, such as advertising, promotions, and branding, researchers can identify strategies that resonate most with consumers, informing more targeted and impactful marketing campaigns.

Thirdly, sustainability considerations in the production and sourcing of imported milk represent an increasingly important area of inquiry. Exploring consumer attitudes towards sustainability and ethical practices in dairy production can shed light on emerging trends and preferences, guiding efforts to promote environmentally and socially responsible consumption. Lastly, examining the role of digital and e-commerce channels in shaping consumer choices and purchasing behavior for imported milk is crucial in today's digital age. By investigating the impact of online platforms, digital marketing strategies, and e-commerce trends on consumer decision-making, researchers can provide valuable insights for companies looking to optimize their online presence and reach consumers effectively.

These future research directions have the potential to deepen our understanding of consumer preferences for imported milk and inform strategic decision-making for dairy producers, marketers, and policymakers alike. By addressing these key areas of inquiry, researchers can contribute to the development of more informed and effective strategies to meet the evolving needs and preferences of consumers in the dairy market.

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