

Article

Analysis of Consumers' Willingness to Pay for Honey in China

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Abstract: Although China is the largest honey producer in the world, domestic consumption is relatively low. Therefore, this study aims to conduct a detailed investigation of honey consumption in the Chinese mainland and identify the main factors determining it. The survey data are from 960 respondents in Jiangxi Province in eastern China. The results showed that respondents mostly prefer an intense flavor (46.46%) and that the color is less important (35.94%). Regarding the types of honey, most respondents prefer runny honey (50.83%) rather than set honey (22.81%). The most common way of buying honey is by a direct sale from beekeepers (44.90%). Most of the respondents have confidence in the quality of domestic honey (87.40%), and the majority consume honey because it is a healthy and nutritious food (74.48%). The results of Fisher's discriminant analysis indicated that the most important attributes are taste and consistency (of the intrinsic attributes) and price (of the extrinsic attributes), which are the most common reasons for purchasing. These findings provide a better understanding of honey consumption in the Chinese mainland, and they can provide guidance for developing marketing strategies and increasing the level of consumer satisfaction.

Keywords: honey; consumer willingness; consumption behavior; consumer utility



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1. Introduction

Honeybees play very important roles in natural ecosystems by providing global pollination services for food crops and wild plants. There has been a long history of beekeeping in China. The character “honey” appears on oracle bones dating from around 3000 years ago in China. Honeybee fossils were discovered in Shandong Province in 1983, indicating that honeybees inhabited China more than 20 million years ago. In 2020, there were about 300,000 beekeepers with 9,215,725 colonies in China [1].

Honey is one of the traditional natural products in China, and it is the primary source of income for many beekeepers. However, the average honey consumption in China was 0.23 kg per capita in 2018, less than in Japan (0.37 kg), France (0.70 kg), the United States (0.79 kg), the United Kingdom and Northern Ireland (0.84 kg), and Germany (1.00 kg), [2] (data for 2018, FAO).

Honey consumption has been investigated in many papers. In the last 20 years, honey consumption behaviors have been studied in different countries [3–13]. Previous studies showed that the origin of honey is an important factor that influences consumption [10] and that the intrinsic attributes of traditional food are driving factors [14], suggested by the quality attributes of Protected Designation of Origin (PDO) [11,14]. The influence of the different extrinsic attributes of products has also been analyzed, such as price, store name, brand name, country of origin [15], and regional climate [16]. The brand–land connection for products on the Internet has been evaluated [17]. Consumers pay more and more attention to the quality of agricultural food products because their awareness of food safety is improving [18,19]. More and more research focuses on organic honey and organic food consumption [13,20–22]. However, poor knowledge of consumer preferences impedes marketing, so it is very important to understand honey consumption. This paper presents

our investigation and analysis of honey consumption in China. Our aim of this research was to analyze consumers' willingness to pay for honey in China.

2. Materials and Methods

We created a questionnaire with questions related to consumer preferences and attitudes toward honey consumption. We conducted an anonymous survey by issuing questionnaires on-site using the same questionnaire. Respondents were required to fill in the form from the perspective of seeking truth from facts. Data was collected from respondents who completed the on-site questionnaire from 2021 to 2022 in Jiangxi Province in eastern China. In total, 1000 questionnaires were collected, including from undergraduate students, graduate students, staff, retirees, farmers, etc., of which 40 were discarded because of incomplete answers. The final number of questionnaires was 960. The reliability analysis of the questionnaire showed that Cronbach's alpha was 0.765, which was greater than 0.7, indicating that the reliability of the questionnaire was good.

The statistical methods applied in the research were descriptive statistics, t-test, ANOVA, and Fisher's discriminant. Empirical analysis used Stata statistics software. To explore the influencing factors of consumption of honey and honey purchase frequency, this paper constructs the following model:

$$buy_i = \alpha_0 + \alpha_1 gen_i + \alpha_2 age_i + \alpha_3 edu_i + \alpha_4 income_i + \alpha_5 awar_i + \alpha_6 con_i + \sigma \quad (1)$$

buy_i indicates whether the i th consumer buys honey and how often they buy it. Gen_i , age_i , edu_i , $income_i$, $awar_i$, and con_i indicate the gender, age, education level, monthly income, honey cognition, and confidence in domestic honey, respectively; α_0 is the constant term; α_1 , α_2 , α_3 , α_4 , α_5 , and α_6 are the estimated coefficients; and σ is the perturbation term.

3. Results

3.1. Descriptive Analysis of the Sample

We counted 960 valid questionnaires. As Table 1 shows, the proportion of respondents aged from 21 to 60 years was 84.69%. Most participants (79.27%) had a polytechnic/university degree or higher (Ph.D. and M.Sc.). The monthly income of most participants (65.00%) was in the range of RMB 2001–8000 (USD 315–1259). According to the *China Statistical Yearbook* (<http://www.stats.gov.cn/tjsj/ndsj/2021/indexch.htm>, accessed on 2 June 2022), the average monthly salary in 2020 was RMB 6463 (RMB 4811–8115). Most respondents with a monthly income of less than RMB 2000 were students.

Table 1. Descriptive analysis of the sample.

Variable Definition	Share (%)	N
Gender		
Female	56.04	538
Male	43.96	422
Age		
≤20 years	8.23	79
21–40 years	45.63	438
41–60 years	39.06	375
>60 years	7.08	68
Education		
Primary school	10.31	99
Secondary school	10.42	100
Polytechnic and university	40.10	385
Ph.D. and M.Sc.	39.17	376

Table 1. *Cont.*

Variable Definition	Share (%)	N
Average monthly income ^a		
≤RMB 2000 (USD 314.62)	20.83	200
RMB 2001–5000 (USD 314.78–786.55)	30.94	297
RMB 5001–8000 (USD 786.70–1258.48)	34.06	327
≥RMB 8000 (USD 1258.48)	14.17	136

^a Exchange rate USD 100 = RMB 635.69 on 8 February 2022. Source: <https://www.safe.gov.cn/>, accessed on 8 February 2022.

3.2. Analysis of Consumers' Preference for Honey

As can be seen from Table 2, 34.48% of respondents purchase honey once a year, while 27.50% of respondents purchase honey less than once a year; 46.46% respondents prefer an intense flavor, and 35.94% of consumers think that color is not important. With regard to the types of honey, 50.83% of respondents prefer runny honey rather than set honey (22.81%). Finally, 44.90% of respondents purchase honey directly from beekeepers.

Table 2. Descriptive analysis of consumers' preferences for honey.

How Often Do You Purchase Honey?	Share (%)	N
Once a month	4.27	41
Once every 2–6 months	17.40	167
Once every 7–12 months	16.35	157
Once a year	34.48	331
Less than once a year	27.50	264
Never buy	4.27	41
Which honey would you rather choose depending on flavor?		
Mild flavor	32.50	312
Intense flavor	46.46	446
Taste is not important to me when I'm choosing honey	21.04	202
Which honey would you rather choose depending on color?		
Brighter honey	29.58	284
Darker honey	34.48	331
Color is not important to me when I'm choosing honey	35.94	345
What type of honey do you prefer?		
Runny honey	50.83	488
Set honey	22.81	219
Type is not important to me when I'm choosing honey	26.35	253
Which is the most common location of your honey purchase?		
Directly from the beekeeper	44.90	431
In specialized honey stores	13.54	130
In supermarkets	26.35	253
Via the Internet	9.90	95
At markets	5.31	51

To compare the difference between females and males regarding the determinants of honey purchase and consumers' preferences for honey, an independent sample t-test was performed. There were no significant differences at the 5% level between genders regarding preferences related to flavor ($p = 0.0769$), color ($p = 0.0743$), type ($p = 0.0729$), and location of honey purchase ($p = 0.1038$).

The results of Table 3 indicate that the effects of age and the level of education on the two dependent variables were significant. These results also indicate that the effect of monthly income on the dependent variable, which honey would you rather choose depending on color, is significant; in the other cases, no statistically significant differences are observed.

Table 3. ANOVA test analysis of consumers' preferences for honey.

Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Age					
Which honey would you rather choose depending on flavor?	38,855.58	3	12,951.86	8.65	0.007 **
Which honey would you rather choose depending on color?	37,644.67	3	12,548.22	50.62	0.0001 ***
Level of education					
Which honey would you rather choose depending on flavor?	26,334.00	3	8778.00	5.16	0.028 **
Which honey would you rather choose depending on color?	26,334.00	3	8778.00	39.76	0.0001 ***
Monthly income					
Which honey would you rather choose depending on flavor?	7744.67	3	2581.56	2.26	0.16
Which honey would you rather choose depending on color?	7744.67	3	2581.56	25.21	0.0002 ***

Note: *** and ** indicate statistically significant at 1% and 5%, respectively.

3.3. Analysis of Consumers' Attributes

As can be seen from Table 4, the highest-ranked attributes toward honey characteristics were taste, consistency, and price, followed by color, type of honey, and scent. Respondents evaluated that the eye-catching labels and eye-catching packaging attributes were unimportant.

Table 4. Descriptive analysis of consumers' attributes toward the relative importance of honey characteristics.

Characteristic	Relative Frequency (%)	
	Important	Unimportant
Price	78.13	21.87
Taste	83.02	16.98
Scent	71.46	28.54
Color	73.75	26.25
Consistency	80.42	19.58
Eye-catching label	69.58	30.42
Eye-catching packaging	60.52	39.48
Type of honey	73.02	26.98

To further explore the decisions of consumers to buy honey in regard to the honey attributes, Fisher's discriminant analysis was conducted using eight variables related to various attributes of importance. The results revealed that the first component involves the attributes of honey price, taste, and consistency, which were highly rated on the consumers' importance scale (Table 5). The second component consists of four variables (scent, color, eye-catching label, and type of honey). The third component consists of one variable (eye-catching packaging), which is an extrinsic attribute of the honey and is not important for respondents when they buy honey.

Table 5. Fisher's test analysis of consumers' attributes toward the relative importance of honey characteristics.

Characteristic	Z Value	Fisher's Discriminant Results
Price	0.69	1
Taste	1.45	1
Scent	−0.36	2
Color	0.002	2
Consistency	1.04	1
Eye-catching label	−0.65	2
Eye-catching packaging	−2.06	3
Type of honey	−0.11	2

As can be seen from Table 6, most of the respondents have confidence in the quality of domestic honey (87.40%) and prefer domestic honey (94.79%), but they are also worried about fake honey on the market (76.15%). In total, 74.48% respondents purchase and consume honey because it is a healthy and nutritious food.

Table 6. Consumer attitudes toward honey purchase and consumption.

Consumers' Attitudes toward Honey Purchase	Share (%)	N
What are the factors that affect your purchase of honey?		
I know nothing about honey knowledge	12.92	124
I think that on the market there is too much fake honey	76.15	731
I don't need honey	10.94	105
From where do you prefer to buy honey?		
I like to buy domestic honey	94.79	910
I like to buy honey produced abroad	5.21	50
Do you have confidence in the quality of domestic honey?		
Yes	87.40	839
No	12.60	121
Consumers' attitudes toward honey consumption		
Honey is a general food	23.02	221
Honey is a healthy and nutritious food	74.48	715
Honey is a medicine	2.50	24

3.4. Empirical Analysis of Honey Consumption

In order to analyze the factors affecting honey consumption, this paper sets two dependent variables (whether to buy honey and frequency of honey purchase) and six independent variables (gender, age, education level, monthly income level, honey awareness, and confidence in the quality of domestic honey), as shown in Table 7.

Table 7. Variable settings and description of statistical analysis.

Variable Type	Variable Definition	Variable Assignment	Samples	Average	SD	Min.	Max.
Dependent	Whether to buy honey	1 = Yes; 0 = No	960	0.725	0.447	0	1
	Frequency of honey purchase	1 = Once a month; 2 = Once every 2–6 months; 3 = Once every 7–12 months; 4 = Once a year or less than once a year	960	3.118	0.969	1	4
Independent	Gender	1 = Male; 0 = Female	960	0.440	0.497	0	1
	Age	1 = ≤20 years; 2 = 21–40 years; 3 = 41–60 years; 4 = >60 years	960	2.45	0.745	1	4
	Education of respondent	1 = Primary school; 2 = Secondary school; 3 = Polytechnic and university; 4 = Ph.D. and M.Sc.	960	3.081	0.95	1	4
	Income level of respondent	1 = ≤RMB 2000; 2 = RMB 2001–5000; 3 = RMB 5001–8000; 4 = ≥RMB 8000	960	2.416	0.972	1	4
	Honey awareness	1 = General food; 2 = Healthy and nutritious food; 3 = Medicine	960	1.795	0.462	1	3
	Confidence in the quality of domestic honey	1 = Yes; 0 = No	960	0.874	0.332	0	1

The results of our empirical analysis, as shown in Table 8, revealed that the influence of gender on consumers' purchase of honey is negatively significant at the statistical level of 1%; this indicates that men are significantly less likely to buy honey than women, as the probability of men buying honey is 8.62% lower than that of women. The effect of age on consumers' purchase of honey passed the 1% significance level test, and the regression coefficient was positive, indicating that the older the consumer is, the higher the probability of their buying honey. Consumers are 8.88% more likely to buy honey for each increase in age level; this is because honey is a traditional health food, and older consumers pay more attention to health, so they are more likely to buy honey. Compared with consumers with a monthly income of RMB 2000 or lower, consumers with a monthly income of RMB 2001–5000, RMB 5001–8000, and RMB 8000 have a significantly positive impact on honey purchase behavior, and the marginal effect coefficient continues to increase with the growth of income level. This implies that the higher the income level is, the greater the probability of buying honey is, which is in line with the law of demand in economics; this means the higher the income level is, the stronger the demand for superior goods is. Honey awareness has a significant impact on consumers' purchase of honey; taking honey as a general food as a reference, consumers who believe that honey is a healthy and nutritious food are 6.39% more likely to buy honey than consumers who regard honey as a general food. The influence of domestic honey quality confidence on consumers' honey purchase behavior was positive at the statistical level of 1%, and the marginal effect was 0.155; this indicates that consumers who were confident in the quality of domestic honey were 15.50% more likely to purchase honey than consumers who lacked confidence in the quality of domestic honey, because confidence in the quality of domestic honey could effectively stimulate consumers' desire to buy.

Table 8. Empirical analysis of whether to buy honey.

Variable	Coeff.	SE	dy/dx	SE
Gender	−0.280 ***	0.0911	−0.0862 ***	0.0278
Age	0.288 ***	0.0728	0.0888 ***	0.0220
Secondary school (in contrast with primary school)	0.00620	0.201	0.00191	0.0619
Polytechnic and university (in contrast with primary school)	0.0988	0.165	0.0305	0.0510
Ph.D. and M.Sc. (in contrast with primary school)	0.00722	0.176	0.00223	0.0541
RMB 2001–5000 (in contrast with ≤RMB 2000)	0.399 ***	0.127	0.123 ***	0.0386
RMB 5001–8000 (in contrast with ≤RMB 2000)	0.517 ***	0.140	0.159 ***	0.0424
≥RMB 8000 (in contrast with ≤RMB 2000)	0.618 ***	0.176	0.191 ***	0.0532
Healthy and nutritious food (in contrast with general food)	0.207 **	0.105	0.0639 **	0.0323
Medicine (in contrast with general food)	0.363	0.302	0.112	0.0929
Confidence in the quality of domestic honey	0.504 ***	0.132	0.155 ***	0.0399
Constant	−0.975 ***	0.282		
Pseudo R2		0.073		

Note: dy/dx represents the marginal effect, which is the degree to which the dependent variable changes by one unit that causes the dependent variable. *** and ** indicate statistically significant at 1% and 5%, respectively.

The sequential Probit model was used to further analyze the factors affecting the frequency of consumers' honey purchase, and the results are shown in Table 9. Compared to consumers with a primary school education and below, consumers with a secondary school education or with bachelor's, master's and doctoral degrees had a significantly positive impact on the frequency of honey purchase, among which the influence of a bachelor's degree is significant at the statistical level of 10%, and the influence of master's and doctoral degrees is significant at the statistical level of 1%; this means that the higher the education level is, the greater the frequency of consumers buying honey is. Compared with consumers with a monthly income of RMB 2000 and below, a monthly income of more than RMB 8000 had a negative impact on the frequency of consumers buying honey, which is significant at the statistical level of 5%; this indicates that consumers with a monthly income of more than RMB 8000 purchase honey at a significantly reduced frequency, possibly because consumers with a higher income monthly income (more than RMB 8000)

pay more attention to high-quality products and also may buy some other high-grade health care products instead of honey.

Table 9. Empirical analysis of the frequency of honey purchase.

Variable	Coeff.	SE
Gender	−0.006	0.088
Age	−0.0753	0.0660
Secondary school (in contrast with primary school)	0.113	0.187
Polytechnic and university (in contrast with primary school)	0.311 *	0.162
Ph.D. and M.Sc. (in contrast with primary school)	0.455 ***	0.172
RMB 2001–5000 (in contrast with ≤RMB 2000)	−0.239	0.146
RMB 5001–8000 (in contrast with ≤RMB 2000)	−0.171	0.157
≥RMB 8000 (in contrast with ≤RMB 2000)	−0.382 **	0.174
Healthy and nutritious food (in contrast with general food)	−0.177	0.110
Medicine (in contrast with general food)	−0.368	0.284
Confidence in the quality of domestic honey	−0.0159	0.149
cut1	−1.840 ***	0.293
cut2	−0.780 ***	0.283
cut3	−0.175	0.281
Pseudo R2	0.016	

Note: cut1, cut2, and cut3 are the estimates of the tangent points, that is, the range of the values of the dependent variable that need to be estimated for calculation. Since “Honey Purchase Frequency” has 4 values, cut has 3 values. ***, ** and * indicate statistically significant at 1%, 5%, and 10%, respectively.

In order to further analyze the impact of honey purchase channels on consumption, we selected two channels, specialty stores and online purchasing facilities, for empirical analysis. As shown in Table 10, the influence of age on consumers’ choice of specialty stores is positive at the statistical level of 5%; this indicates that the older the consumer is, the higher the likelihood of choosing a specialty store to buy honey is. Compared with consumers with a primary school education level and below, consumers with a secondary school education or with bachelor’s, master’s, and doctoral degrees are more likely to choose specialty stores to buy honey. Taking honey as a general food, the influence of the perception that it is a medicine on consumers’ decisions is positive at the statistical level of 1%, which means consumers who believe that honey is a medicine have a higher probability of purchasing honey through specialty stores.

Table 10. Empirical analysis of honey purchasing channels.

Variable	In Specialized Honey Stores		Via the Internet	
	Coeff.	SE	Coeff.	SE
Gender	−0.0424	0.106	0.146	0.122
Age	0.190 **	0.0858	−0.286 ***	0.109
Secondary school (in contrast with primary school)	0.480 *	0.264	−0.172	0.474
Polytechnic and university (in contrast with primary school)	0.672 ***	0.225	0.666 **	0.308
Ph.D. and M.Sc. (in contrast with primary school)	0.551 **	0.231	1.007 ***	0.308
RMB 2001–5000 (in contrast with ≤RMB 2000)	−0.0188	0.169	−0.637 ***	0.170
RMB 5001–8000 (in contrast with ≤RMB 2000)	0.179	0.173	−0.440 **	0.194
≥RMB 8000 (in contrast with ≤RMB 2000)	0.101	0.206	−1.130 ***	0.308
Healthy and nutritious food (in contrast with general food)	0.116	0.127	−0.0548	0.139
Medicine (in contrast with general food)	0.976 ***	0.293	−0.383	0.522
Confidence in the quality of domestic honey	−0.0425	0.154	−0.214	0.179
Absolute term	−2.272 ***	0.356	−0.786 *	0.450
Pseudo R2	0.0432		0.1366	

Note: ***, ** and * indicate statistically significant at 1%, 5%, and 10%, respectively.

The influence of age on consumers’ choice of online honey purchase is negatively significant at the 1% statistical level, that is, the older the consumer is, the lower the likelihood of buying honey online is. Consumers with bachelor’s, master’s, and doctoral

degrees are more likely to choose to buy honey online, because consumers with higher education levels are more skilled at using the Internet. The impact of income level on consumers' purchase of honey through the Internet is negative and significant; this indicates that the higher the income is, the lower the probability of buying honey through the Internet is. This may be because consumers with higher incomes believe in offline physical consumption or are more willing to experience consumption offline, appreciating the enjoyment brought about by the consumption process.

4. Discussion

This study examined the drivers of honey consumption in the Chinese mainland. The survey showed that 79.27% respondents had higher education, similar to other studies in Romania and in Croatia [8,11]. In previous studies, consumers in different countries and regions have had different preferences for honey; Irish, German, Austrian, and Swiss consumers prefer honey with a dark color [5,23], while Croatian ones prefer honey with a light color [11]. In this study, most consumers think honey color is unimportant, but they prefer runny honey rather than set honey. Our results are mainly consistent with the previous research in terms of "determinants of consumer buying behaviour" [11,24] and "consumer attitudes towards honey" [11]. The results show that 74.48% of respondents in China view honey as a healthy and nutritious food. It is obviously necessary to educate the purchasing population regarding the food value of honey and correct the wrong idea of considering honey as a medicine and tonic. With the improving standard of living and the large population (1.4 billion) in China, there is a large potential consumer market for honey if appropriately exploited.

We can summarize the following conclusions from the above results: (1) honey is a favorite product of Chinese consumers and has a market prospect; (2) it is necessary to strengthen the popularization of honey consumption knowledge and broaden honey purchase channels; (3) women, the elderly, and high-income people are the groups with honey consumption potential.

5. Conclusions

Summarizing the results of our study on honey consumption in Jiangxi Province, honey is purchased relatively rarely, as more than 61.98% of respondents purchase honey once a year or less than once a year. The respondents mostly prefer runny honey and domestic honey, and they consume honey because of its health and medicinal values. In total, 44.90% of respondents purchase honey directly from beekeepers. From the above results, we suggest popularizing honey consumption knowledge and broadening honey consumption channels.

The empirical findings suggest some implications practical to beekeepers and honey sales enterprises, for guiding the transformation of the traditional sales mode to a modern one. In particular, when considering different honey consumption groups, honey sellers should develop different strategies.

This study's limitations include that some factors that may influence honey consumption are not considered, such as consumer's motivation, cultural practices, consumer familiarity, experience with honey, etc. Future research should account for these factors as much as possible through multi-criteria decision-making models and methods. Moreover, behavior modeling and cloud computing can provide new research methods for studying honey consumption [24–28].

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