Empirical Analysis of the Influence of Family Structure on Milk Consumption：Based on a Survey of 206 Consumer Samples in Beijing

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Abstract：Family is not only one of the important factors affecting consumer behavior but also key consumer decision－making and consumer unit. Different types of family structure，family consumption decision－making，consumption behavior pattern，consumption structure，and consumption level will present different characteristics. To compare the consumption of milk of different families，analyze the influencing factors of the consumption of milk and explore whether the family structure has a significant impact，and analyze the consumption trend of milk through the microcosmic data of family consumption status，three main conclusions are drawn：firstly，households with children tend to consume more milk than households without children，and the more children there are，the greater the milk consumption；secondly，families with older people preferred to drink goat milk more than those without the elderly，and the more the number of older adults，the higher the proportion of goat milk consumption in the total milk consumption in the family，the number of children available through the Regression analysis had a significant positive effect on the increase in milk consumption，while the number of older people and pregnant women harmed household milk consumption.

Keywords：family Structure；milk；consumption；classical linear regression model

1. Introduction

Family is not only one of the important factors affecting consumer behavior but also key consumer decision－making and consumer unit. Different types of family structure，family consumption decision－making，consumption behavior pattern，consumption structure，and consumption level will present different characteristics. In families with infants，adolescents，or the elderly，the consumption of meat，eggs，milk，and other sources of nutrition will vary. After 2000，the consumption of milk in China has gone through the stage of a single variety，ticket－based supply，and consumption expansion since the reform and opening－up.

In this context，investigating the investigation of micro－household milk consumption and analyzing its influencing factors is conducive to the enterprise segmentation of the market on the one hand，according to the characteristics of the different household structure of consumer demand for milk products，adopt different marketing strate-

gies for different consumer groups with different family structure, to better meet consumer demand for dairy products, expand the market scale and increase corporate profits. On the other hand, it is helpful to know the changing trend of the people's demand for milk to better meet the needs of children, pregnant women, and the elderly for nutrient intake and improve the health status of the people.

To compare the consumption of milk of different families, analyze the influencing factors of the consumption of milk and explore whether the family structure has a significant impact, and analyze the consumption trend of milk through the microcosmic data of family consumption status, from January 15, 2019, to January 20, 2019, the researchers conducted a 5-day sample survey in Beijing.

2. Data Sources and Descriptive Statistics

A total of 206 questionnaires was sent to Changping District, Chaoyang District, Fengtai District, Haidian District, and Fangshan District, including 23 from Changping District and 66 from Chaoyang District, one in Fangshan District, 54 in Fengtai District, and 61 in Haidian District. The general situation is shown in Table 1.

Table 1 Descriptive Statistics

	Mean	Min	Max	Std. E	Explanation
Monthly expenditure on milk (yuan)	293.14	0	3200	390.07	Monthly expenditure on milk
Children aged 12 and under (person)	0.45	0	4	0.67	Number of children under 12 years of age with the permanent family residence
Young persons aged 13 to 18 (person)	0.09	0	2	0.31	Number of children aged 13 to 18 years with the permanent family residence
People 60 years of age and above (person)	0.93	0	3	0.92	Number of persons aged 60 and over with the permanent family residence

Whether there are pregnant women in the family (%)

	Mean	Min	Max	Std. E	Explanation
yes	0.015	0	1	0.12	Dummy variable, pregnant woman = 1
no	0.985	0	1	0.88	Control group
Age of respondents (years)	54.27	21	85	15.40	Age of respondents

Sex of respondents (%)

	Mean	Min	Max	Std. E	Explanation
Male	24.76	0	1	0.43	Dummy variable, male = 1
Female	75.24	0	1	0.57	Control group

Respondents' educational background (%)

	Mean	Min	Max	Std. E	Explanation
Below the undergraduate level	58.25	0	1	0.49	Control group
Undergraduate level	29.31	0	1	0.46	Dummy variable, undergraduate level= 1
Master degree and above	12.62	0	1	0.33	Dummy variable, master degree and above= 1
Average monthly income (thousand yuan)	23.3	2	120	19.0	Average monthly household income

Self-rated family health status (%)

	Mean	Min	Max	Std. E	Explanation
Perfectly healthy	11.65	0	1	0.32	Control group
Healthy	61.17	0	1	0.49	Dummy variable, healthy=1
Normal	22.82	0	1	0.42	Dummy variable, normal=1
Worse	3.40	0	1	0.18	Dummy variable, worse=1
Very bad	0.97	0	1	0.10	Dummy variable, very bad=1

Self－rated level of household consumption of agricultural products（％）

Stage of subsistence	3. 40	0	1	0. 18	Control group
Stage of nutrition，diversification	36. 70	0	1	0. 44	Dummy variable，stage of nutrition，diversification ＝ 1
Safety and quality phase	69. 90	0	1	0. 46	Dummy variable，Safety and quality phase＝ 1
Daily consumption as a percentage of total expenditure（％）	46. 45	10	100	20. 59	Consumption of daily living as a percentage of total expenditure

Interest in specialty animal products（％）

Very tall/large	19. 90	0	1	0. 40	Control group
Relatively tall/large	40. 29	0	1	0. 49	Dummy variable，relatively tall/large＝ 1
Normal	28. 16	0	1	0. 45	Dummy variable，normal＝ 1
Lower/smaller	8. 25	0	1	0. 28	Dummy variable，lower/smaller＝ 1
Very low/small	3. 40	0	1	0. 18	Dummy variable，very low/small＝ 1

Data source：Data obtained from Field Survey，unless otherwise specified，are the same below.

As can be seen from Table 1，the average monthly dairy expenditure of the respondents is 293. 14 yuan，among which there are households that do not consume dairy products at all and families that consume 3，200 yuan a month. The consumption number of dairy products vary significantly among different households. The average number of children aged 12 and under，adolescents aged 13 to 18，and older persons aged 60 or above in the homes of respondents is no more than 1. From the average of the three items in the table，it can be seen that the number of families with elderly persons over 60 and children aged 12 and under is much higher than the number of families with young people aged 13 to 18；at the same time，98 percent of the families surveyed do not have pregnant women；The respondents，who range in age from 21 to 85，comprise 24. 76 percent of men and 75. 24 percent of women and are likely to be decision－makers，buyers and cooks of household agricultural products. Still，interviewees often play multiple roles in the family. Half of the respondents have less than a bachelor′s degree，while 29. 31 percent have a bachelor′s degree and 12. 62 percent have a master′s degree or higher. The average monthly income is 23，300 yuan，but there is a big difference among them，with a minimum of 2，000 yuan and a maximum of 120，000 yuan，of these，11. 65％ consider it to be very healthy. In contrast，only 4. 37％ think it to be low，and 22. 82％ consider it to be average，or 69. Ninety percent of the respondents believe that they have reached the stage of consumer safety and quality，36. 70 percent are at the stage of achieving consumer nutrition and diversification，and only 3. 40 percent believe that they are only at the stage of being able to satisfy their basic needs，on average，60. 19％ of the respondents show strong interest in specialty animal products，while 28. 16％ have a moderate attitude of 46. 45％. However，11. 65％ of the respondents show little interest in specialty animal products.

3. Results from Empirical Research

3. 1 Differences in milk consumption among households with a different structure

The structure of families varies according to the number of children，the number of the elderly，and the presence of pregnant women. The survey classifies family structures according to the number of children，the number of the elderly，and the presence of pregnant women in the family. According to the number of children，the family is divided into three groups：no children，one child，and many children；according to the number of elderly persons in the family，the family structure is divided into no elderly persons，one older adult，and many elderly persons；according to the presence or absence of pregnant women，classification of family structure into pregnant women and non－pregnant women（Table 2）.

Table 2 Division of Family Structure

Basis of Division	Categories	Basis of Division	Categories	Basis of Division	Categories
Number of children	No child	Number of old people	No old people	Pregnant women	Yes
	One		One		No
	Children		Old people		——

By comparing the milk consumption of samples from different family structures, it is observed that there are significant differences in the total milk consumption expenditure and the ratio of goat milk expenditure among different families.

3. 1. 1 Differences in milk consumption among households with different numbers of children

In the survey, it is found that families with children are more likely to consume milk. Both parents with higher education and couples with lower education levels are more aware of the importance of dairy products in children's nutritional acquisition when asked "why do you consume so much milk?" The answers generally point to the same reason: that milk helps children replenish nutrients, especially calcium, and helps them thrive. It can be seen that the amount of milk consumption of families with children will generally be more than the no child families, and the more children in the family, the greater the milk consumption. According to the statistical data obtains from the survey, the average annual expenditure on the milk of the families without children is 219. 82 yuan per month, and that of the families with one child is 351. 54 yuan per month, which is significantly higher than that of the families without children, the average monthly consumption of milk for families with more than one child is 512. 48 yuan, which is in line with expectations.

Looking at the proportion of goat milk consumption, we can find that the consumption of goat milk in families with children is lower than that of families without children. In contrast, families with more children hardly consume goat milk. Goat milk consumption in families without chil-

dren averages 6. 74 percent, 3. 37 percent in families with one child, and 0. 24 percent in families with multiple children. The reason for the lower willingness to consume goat milk in families with children is that, on the one hand, because goat milk is raw when it is purchased, it needs to be processed before drinking, which requires parents to spend time, and it is not convenient to buy ready－to－eat dairy products; On the other hand, goat milk has a single taste, simple packaging, and most do not have safety certification. It is difficult for consumers to judge the quality of adequate goat milk. In contrast, ready－to－eat milk or yogurt and other dairy products are rich in taste and diverse in packaging, and after food safety certification and consumers have more trust in the brand, more attractive to consumers.

3. 1. 2 Differences in milk consumption among families with different numbers of old people

The average monthly milk consumption of one elderly family is 230. 61 yuan, significantly less than that of the non－elderly family (313. 48 yuan), and the elderly's preference for goat milk is considerably higher than that of children, the average share of goat milk consumption is 0. 73％ in households without older people, and the average percentage of goat milk consumption is 4. 70％ per month in households with one older adult, which is significantly higher than that of families without older adults, the higher average is 6. 3％ for households with multiple elders, indicating that households with older adults are more likely to consume goat milk than families without older adults, and the number of older adults is higher, the higher the proportion of goat milk consumption

in the total milk consumption is in the family.

Table 3 Summary of Milk Consumption by Families with Different Structure

	Children in Families			Old People in Families			Pregnant Woman in Families	
	No child	One	Children	No old people	One	Old people	No	Yes
Monthly expenditure on milk（yuan）	219.82	351.54	512.48	313.48	230.61	295.08	295.62	125
Goat milk expenditure（％）	6.74	3.37	0.24	0.73	4.70	6.30	3.56	0.00

3.2 Consumption trends of dairy products

The survey through the collection of consumers in the future changes in milk consumption willingness trend to represent the initial trend of consumption of milk products. More than 70 percent of the respondents in the sample say their family's consumption level has exceeded the pursuit of nutrition and is in the pursuit of health and safety. The vast majority of families already have enough consumer power and knowledge to meet their demand for products. Therefore，the majority of respondents who were asked "how do you think your family's consumption of dairy products will change in the future" chose to stay the same，choosing "will increase" over "will decrease". It can be seen that dairy products still have the possibility of expanding the market and increasing the sales volume in the city. Goat milk sales are expected to increase in households with children，so expanding the marketing of goat milk to children will help increase sales.

Table 4 Self－rated Trends in Milk Consumption

	Children in Families			Old People in Families			Pregnant Woman in Families	
	No child	One	Children	No old people	One	Old people	No	Yes

Self－rated expected change in milk consumption（％）

Stay the same	94.92	84.06	81.82	89.36	93.94	88.61	89.66	100.00
Should be increased	3.39	11.59	18.18	6.38	6.06	10.13	7.88	0.00
Should be reduced	1.69	4.35	0.00	4.26	0.00	1.26	2.46	0.00
Percentage change in expected indoor milk consumption（％）	0.81	4.24	5.00	2.82	0.30	1.75	2.37	0.00
Goat milk is expected to account for of all milk consumption（％）	0.00	1.47	0.00	0.87	0.00	0.00	0.50	0.00

3.3 The influence of family pattern on milk consumption

To quantify the effect of the family's model on milk consumption，the regression equation of milk consumption on the family's model is established，and the OLS method is used to estimate the regression results. The family model is represented by three core variables：the number of children in the family，the number of elderlies in the family，and whether or not there are pregnant women in the family. Control variables included age，sex，education，income，self－rated health status，self－rated household consumption stage，and interest in specialty animal products. The model is：

$$Y_i = \alpha_0 + \alpha_1 kid_i + \alpha_2 olds_i + \alpha_3 prg_i + \vec{\beta}_k \vec{W}_{ik} + \mu_i \ (i=1,2,3,\dots)$$

In the model，i stands for individuals，Y

stands for milk consumption（yuan/month），kid stands for the number of children in the variable，olds stands for the number of elderly in the family，prg stands for the number of pregnant women，and $\vec{\beta}$ represents the regression coefficient for the control variable，$\vec{W}$ is the control variable，μ is the error term，and α_0 is the intercept term.

In model 1，only core variables，kid，olds，and prg are added；in Model 2，age，sex，education，and monthly family income are added to model 1，based on Model 2，Model 3 adds the control variables of family evaluation，including self—evaluation of the health level and the stage of family consumption of agricultural products. Model 4 adds the interest evaluation of characteristic animal products on this basis. From the regression results shown in Table 5，when only the core variables are added，the regression coefficient of the number of children is significantly positive at the significant level of 1%. For every increase in the number of children，the average monthly milk consumption of the family increases by 131.8 yuan，the regression coefficients of the number of older adults and pregnant women are not significant. However，the regression coefficients of the number of children are still significant at 1% level from model 1 to model 4，when personal characteristics，family evaluation，and animal product interest evaluation are added successively. It can be seen that the main structural factor affecting household milk consumption is the number of children.

The regression results of Model 4 show that the number of children has a positive effect on the increase of milk consumption. For every additional child in the family，the average monthly milk consumption of the family increases by 77.52 yuan. The results are significant at the 10% level. The number of the elderly and the impact of pregnant women on household milk consumption is negative. Obviously，enterprises should first choose marketing means for children if want to expand the turnover of dairy products. The gender of household food consumption decision—makers has a significant impact on household milk consumption. The milk consumption of male decision—making families is 117 yuan lower than that of female decision—making families，which is significant at a 10% level. The influence of family income on the consumption of milk products is significantly positive at a 5% level. For every 10,000 yuan increase in family income，the average monthly consumption of milk increases by 34.85—yuan education，age，stage of self—rated consumption，health level，and interest of family's consumption decision—makers in specialty animal products have no significant effect on consumption of families' milk.

Table 5 Regression Results of Classical Linear Models：OLS

	Model 1	Model 2	Model 3	Model 4
Children	131.8***(37.70)	79.96*(43.18)	81.40*(43.33)	77.52*(44.34)
Old people	−9.148(29.03)	−11.55(35.71)	−9.590(36.33)	−6.114(36.93)
Pregnant woman	−106.5(224.3)	−123.1(220.8)	−34.80(225.5)	−51.35(228.4)
Age(year)		−0.242(2.260)	−1.078(2.303)	−1.301(2.336)
Sex		−142.2**(62.04)	−128.5(63.29)	−117.0*(65.45)
Undergraduate education		36.40(93.11)	21.53(94.42)	28.00(95.86)
Master degree or above		28.75(89.73)	40.38(92.20)	46.23(93.81)
Average monthly income(k yuan)		4.470***(1.676)	3.567**(1.760)	3.485**(1.810)
Self—rated health			85.40(85.82)	85.58(86.91)
Self—rated normal			87.81(98.18)	91.23(99.04)

Self－rated bad			243.9(167.8)	250.40(171.4)
Self－rated worse			42.05(288.5)	58.57(293.5)
Self－rated stage of nutrition			－106.8(159.7)	－101.1(162.8)
Self－rated stage of safety			37.60(157.5)	49.05(162.8)
Consumption of daily living as a percentage of total expenditure			－0.556(1.444)	－0.506(1.466)
High interest in specialty animal products				－34.13(74.47)
General interest in specialty animal products				－74.21(80.24)
Low interest in specialty animal products				－32.24(119.6)
Interest in specialty animal products is very low				－111.9(159.9)
Intercept	231.5＊＊＊(44.08)	179.3(136.4)	183.0(230.7)	215.9(241.7)
Sample size	206	206	206	206
R^2	0.061	0.119	0.150	0.155
$\overline{R}^2$	0.047	0.084	0.083	0.069

Note：＊，＊＊ and ＊＊＊ represent significant coefficients at the levels of 10％，5％ and 1％, respectively.

4. Conclusions and Policy Recommendations

4.1 Conclusions

Through the questionnaire survey of 206 respondents，we can get the difference of milk consumption in different family structure，as follows：Firstly，families with children tend to consume more milk than families without children，and the more children there are，the greater the milk consumption. Milk products are rich in nutrients，helping promote children to calcium and other elements of the supplement，so more children′s families are more inclined to consume milk to achieve nutrition for children.

Secondly，families with older adults prefer to consume goat milk than those without older people，and the more older people there are，the higher the proportion of goat milk consumption in the total milk consumption. Old People′s demand for milk is generally low，but their preference for goat milk is obviously higher than that of other age groups. The main protein in goat milk is－enzyme protein. The curd formed in the stomach has been shown to be softer and more fragile than milk，functional differences due to differences in the pro-tein structure of milk or a reason for the elderly′s preference for goat milk.

Thirdly，the number of children available through the regression analysis has a significant positive effect on the increase in milk consumption，while the number of older people and pregnant women had a negative effect on household milk consumption.

4.2 Policy Recommendations

Firstly，support the development of the goat milk processes industry and promote the brand building of goat milk. The reason for the lower willingness to consume goat milk among families with children is that，on the one hand，since goat milk is raw when it is purchased，it needs to be processed before drinking，which requires normalization，and it is not convenient to buy ready－to－eat dairy products，this requires the development of goat milk processing industry to fill the gap in the market and promote the standardization of goat milk products. On the other hand，goat milk has a single taste，simple packaging，and most of them are not certified for safety. It is difficult for consumers to judge the quality of goat milk，while ready－to－eat milk or yogurt and other dairy products are more attractive to consumers because of their rich flavor，variety of packaging，food safety certifica-

tion, and consumer trust, in contrast, goat milk is still in the embryonic stage of the development of dairy products, which needs to build goat milk brand, complete quality, and safety certification so that its products in the hearts of consumers to establish credibility.

Secondly, increase the marketing efforts of goat milk, focusing on the consumer groups of children. In the self－assessment of consumption trends for milk products, goat milk sales are expected to increase in families with children, and regression analysis shows that the number of children has a significant positive effect on the increase in milk consumption. Therefore, it is necessary to increase the marketing of milk to children and to promote the consumption of milk by families with children.

Thirdly, we will establish a traceability system for dairy products to reduce the impact of information asymmetry, improve the quality standards system for dairy products, strengthen quality supervision, strengthen market management of dairy products, and vigorously improve the quality of dairy products, to develop green and pollution－free dairy products; to improve the competitiveness of dairy products, adjust the structure of dairy products, vigorously develop new products and add new varieties to meet the diversified consumption needs; to encourage the development of large－scale dairy farms and sheep's dairy farms, promote the large－scale operation, accelerate the scientific and technological progress of milk products, improve the existing defects and deficiencies of milk products.

Lastly, strengthen the propaganda of nutrition knowledge of dairy products and actively do an excellent job in guiding consumption. We should take various forms to promote the development of sales and distribution services of dairy products and provide convenient consumption channels for consumers, speed up the construction and perfection of the e－business marketing system of milk products.

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