

# Examining Factors Influencing the Consumption of Meal Replacements Using Ordered Logit Analysis: Insights from Shaanxi Province

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**Abstract.** With the acceleration of the pace of life and the enhancement of health consciousness, meal replacement products, which are both nutritious and convenient, have received widespread attention in recent years and have great room for development. This study aims to comprehensively explore the main reasons for consumers to buy meal replacement products, the author through a large number of literature reading finally summarized twelve potential influencing factors, and selected Shaanxi Province residents as the object of the study to carry out a questionnaire survey, a total of 206 valid questionnaires were returned, through descriptive statistical analysis and ordered logistic regression and other methods to analyze the main motives for meal replacement consumption, the results show that the convenience of time saving, weight loss effects, and other factors have a positive impact on the consumption of meal replacement. The results of the study show that convenience, timesaving, weight loss effect and other factors have a significant positive impact on meal replacement consumption, and businessmen can further optimize meal replacement products according to consumers' needs and preferences to expand the meal replacement market.

**Keywords:** Meal replacement, regression model, questionnaire.

## 1. Introduction

### 1.1. Background of the Study

From traditional dietary supplements in the early twentieth century to the meal replacement shakes that now dominate the mainstream, The development and evolution of the meal replacement market stems from the changing dietary habits and lifestyles of society. From the aspect of dietary habits, nowadays consumers are more concerned about the health of food, so they will consider the nutritional value of food more strictly. Scholar Qi Yan's research in 2021 shows that meal replacement products are rapidly expanding the market by attracting consumers with their nutritious and satiety-rich features [1]. While analyzing from the perspective of lifestyle, due to the accelerated pace of life, more and more people tend to buy convenient instant food, scholars Rivera, and Ximena C pointed out in the article that convenience has now become the main reason for consumers to choose meal replacement products [2]. Combining these two advantages, it is concluded that the market prospect of meal replacement consumption is bright, so the analysis of the influencing factors of meal replacement consumption is of great significance. This paper firstly focuses on the development history of the meal replacement market and explores the consumption behavior of meal replacement, then clarifies the research purpose and research questions of this paper, lays the foundation for the literature review, research design and other contents, and finally combines with the data support to comprehensively reveal the key factors affecting the expenditure of meal replacement. Through the in-depth analysis of this paper, a clear and complete research framework is constructed for the readers to deepen the understanding of the consumption behavior of the meal replacement market and the causes behind it and enrich the theoretical content of the meal replacement field.

### 1.2. Significance of the Study

In the past research on meal replacement, attention has been focused on the fields of medicine and food science, focusing on the analysis of medical applications and nutritional value, and the research

on the meal replacement market, which cuts through from the perspective of economics, has been relatively limited. Therefore, this paper aims to fill the gaps in existing research by analyzing the economic decision-making behind meal replacement consumption with Shaanxi Province residents as the research object and providing a new perspective on marketing and product design in the meal replacement industry.

The uniqueness of this study is to delineate the scope of the research object to the main group of meal replacement consumers, the office workers, to analyze their consumption behavior in the meal replacement market, and to reveal the consumption characteristics and factors affecting the expenditures of this group. Through in-depth analysis of the Meal Replacement market, we will discover the factors that potentially affect the consumption of Meal Replacement by office workers and help the Meal Replacement industry to develop in a sustainable manner.

### 1.3. Plan of the Study

This paper presents an analysis of the meal replacement consumption market, primarily employing a questionnaire survey approach to gather data from 210 randomly selected residents of Shaanxi Province. Utilizing statistical analysis software such as SPSS, the study delves deeply into the survey results to elucidate the determinants affecting meal replacement product use. Subsequently, the study draws on these analytical insights to propose strategic recommendations for market development. The paper is organized into five key sections:

The introductory segment outlines the study's context, its importance, the scope of the research, and the methodology employed.

The second part of the literature review. Through extensive reading of the existing literature and analyzing the reference value and shortcomings of the literature, the Setting the stage for conducting the questionnaire design.

The third part of the meal replacement consumption behavior analysis. The questionnaires were distributed randomly, and 206 valid questionnaires were returned. The questionnaire content mainly consists of three parts: respondents' personal information, respondents' meal replacement consumption behavior, and potential influencing factors (internal and external characteristics of meal replacement products).

The fourth part of the meal replacement consumption behavior influence factors analysis. Use SPSS and other software to test the reliability of the questionnaire data, multiple logistic regression and so on.

The fifth part of the research conclusions and recommendations. Based on the study of meal replacement consumption behavior, it points out the problems existing in the current meal replacement consumption market and provides corresponding improvement measures.

### 1.4. Research Methodology

In this paper, literature research method, questionnaire survey method, econometric analysis method and other methods were used to synthesize and analyze the factors affecting the consumption behavior of meal replacement.

First of all, on the platforms of Knowledge.com and Wipro, we reviewed the relevant literature on meal replacement consumption and meal replacement market to gain a comprehensive insight into the field of meal replacement consumption and grasp the existing research results, and then combined with the current situation of meal replacement consumption and the purpose of the study, we selected Shaanxi Province residents as the target of the survey to carry out a questionnaire survey, and we collected a total of 206 valid questionnaires. The questionnaire's content mainly consists of three parts: respondents' personal information, respondents' meal replacement consumption behavior, and potential influencing factors. Before further analysis, the collected data were tested for reliability to ensure that the data were true and effective, and then the influencing factors of meal replacement consumption behavior were analyzed by methods such as multivariate logistic regression, which paved the way for the development suggestions put forward later.

## 2. Literature Review

With the change of social dietary concepts and lifestyles, the emerging popular industry of meal replacement has attracted widespread attention, so the study of the meal replacement industry is of significant practical significance.

### 2.1. Research on the Meal Replacement Market

Scholars Zhang Xiaotong and Wu Peng, comprehensively summarized the development background of the meal replacement industry, deeply analyzed the research and development direction of the meal replacement products, and made suggestions for improvement of the existing problems, which provide reference for the development of the meal replacement industry [3]. Scholars Liu Na and Ding Rong conducted data collection by sampling in 2021 and conducted principal component analysis and correlation analysis on the data to reveal the current development status of the meal replacement industry [4]. Scholar Zhang Tianrun reveals that the current prevalence of the concept of fat loss and weight reduction has led to the further development of the meal replacement industry [5]. Scholars Zhang Xiangqun and Liu Haiyue proposed in 2019 that people gradually realize the importance of low-sugar and low-calorie healthy diet, and the demand for meal replacement products increases, which makes the prospects of the meal replacement industry bright and has a broad space for development [6]. Scholars Hartmann and Christina analyzed and found that one of the reasons for consumers to choose meal replacement is that they believe it can play a role in weight reduction and can replace exercise [7]. Scholar Chen Qibing explains the origin, classification and development history of meal replacement products, and analyzes the development prospect of meal replacement food [8].

At present, there is a wealth of research on the development of meal replacement in academia, but due to the difficulty of collecting data on meal replacement consumption and the wide variety of data sources, most of the literature has the problem of lack of precision in the scope of the study, which may lead to the results of the study by the influence of regional differences, resulting in certain bias.

### 2.2. Research on Consumer Preferences

Scholars Shen Xuan and Fu Hongkui analyzed the prospects of quinoa in the meal replacement industry in 2022, side by side with the fact that consumers may consider its nutritional value when choosing meal replacement products [9]. Scholars Ji and Yunho found that innovation, ease of consumption, ease of purchase, price, and place of origin are the factors that consumers pay more attention to [10]. Nattinee concluded from the perspective of consumer preference that while product quality is important, the design of the product packaging also influences consumer behavior to a certain extent [11]. Scholars Choi and Timothy in 2022 analyzed that Vietnamese households pay more attention to convenience and product variety when choosing meal replacements [12]. Scholars Bae et al. compared the consumption preferences of Chinese and Korean college students and concluded that Chinese college students pay more attention to hygiene, freshness and taste, while Korean college students care more about taste, price and hygiene [13]. Scholar Mee conducted a survey on the meal replacement market in 2022 and found that different nutritional labels influence consumer behavior [14].

By summarizing and analyzing the current research status, it can be found that certain progress has been made in the analysis of the market for meal replacement products, but there are still problems such as insufficiently comprehensive analysis of influencing factors that need to be solved. By reading the existing literature on the current situation of the meal replacement market and consumer preference, these two parts of the analysis will be integrated. Firstly, this paper will comprehensively understand the development background and development trend of the meal replacement market, and secondly, from the perspective of consumers, it will summarize the potential influencing factors of meal replacement consumption that have a high rate of mentioning and explore the development prospect of the meal replacement market in depth.

### 3. Data Sources

#### 3.1. Questionnaire Design

This questionnaire survey takes Shaanxi Province as an example to study the meal replacement consumption market. The questionnaire was designed by summarizing the findings of existing literature. Given that the meal replacement market occupies a relatively small share of the overall consumer market and not all respondents have financial investment in meal replacement products, the first two questions, "Whether consumers have spent money on meal replacement products this month" and "Whether they will continue to have the intention to consume meal replacement products in the future", are placed in the first two questions to effectively exclude participants who do not meet the research objectives. Therefore, putting "whether consumers have spent money on meal replacement products in the current month" and "whether they still want to consume meal replacement products in the future" in the first two questions can effectively exclude participants who do not meet the research objectives.

This questionnaire covers the following three sections: respondents' basic personal information, including respondents' gender, age, and location; respondents' meal replacement consumption behavior, including frequency of consumption, meal replacement expenditure, etc.; and the influencing factors of meal replacement consumption behavior, including internal product factors and external product factors.

#### 3.2. Survey and Return of Questionnaires

To ensure the effectiveness of the questionnaire, the author conducted a pre-survey before formally carrying out the survey. Amendments were made to the problems that appeared in the pre-survey, and the formal questionnaire was finally designed. The questionnaire survey was conducted online and offline simultaneously, and the online survey used the Questionnaire Star applet to recover the questionnaire through WeChat and other platforms. And the paper questionnaire was distributed offline to randomly survey Shaanxi residents. A total of 210 questionnaires were distributed and 208 were returned, excluding 2 invalid questionnaires, the number of valid questionnaires was 206, with an effective rate of 99.04%.

#### 3.3. Preliminary Examination of Questionnaire Data

As shown in the table 1, this study used SPSS statistical software to test the Cronbach's alpha value (Cronbach's alpha) of 0.928 (*alpha* value  $\geq 0.7$  means that the questionnaire is more reliable, and the higher the value means that the questionnaire data is more reliable), and the reliability of this questionnaire is at a very high level.

**Table 1.** Reliability

Cronbach's Alpha	item count (of a consignment etc)
.928	9

As shown in the table 2, the validity test was carried out, and the KMO value was 0.945, so the data of this questionnaire has good representativeness. In conclusion, the data of this questionnaire is reliable and can be used for further analysis.

**Table 2.** KMO and Bartlett's test

Kaiser-Meyer-Olkin metric for sampling adequacy.	.945
approximate chi-square (math.)	1129.724
Bartlett's test of sphericity	df
	36
	Sig.
	.000

## 4. Data Analysis

### 4.1. Descriptive Statistical Analysis

From the table 3, we can see that 56.3% of the respondents are male, 43.7% are female, 25.7% are under 18 years old, 41.7% are between 18 and 35 years old, 20.9% are between 36 and 55 years old, and 11.7% are over 55 years old. 30.1%, 29.6% in second-tier cities, 25.7% in third-tier cities, and 14.6% in fourth-tier cities and below; the number of people with sufficient mealtime accounted for 34.1%, and the number of people with tight mealtime accounted for 65.9%, which indicates that most of the interviewees did not have sufficient meal time. From the perspective of consumers' perception of meal replacement products, 65.3% of them think that meal replacement products are healthy, which means that meal replacement products are trusted by most of the people; the number of people who spent more than 500 RMB on meal replacement products in this month only accounted for 15.5%, and most of the interviewees focused on spending in the range of 100-500 RMB. In summary, the meal replacement market still has great potential for development.

**Table 3.** Descriptive statistical analysis

variable name	options	sample size	percentage
gender	male	116	56.3%
	women	90	43.7%
(a person's) age	Less than 18 years	53	25.7%
	18-35 years	86	41.7%
	36-55 years	43	20.9%
	55+	24	11.7%
location	first-line city	62	30.1%
	second-tier city	61	29.6%
	third-tier city	53	25.7%
	Fourth-tier cities and below	30	14.6%
This month in Meal Replacement Spending on products	Less than \$100	29	14.1%
	\$100-300	92	44.7%
	301-500	53	25.7%
	500 or more	32	15.5%
Consider meal replacement products healthiness	be	136	65.3%
	clogged	70	33.7%
Adequacy of mealtimes	be	71	34.1%
	clogged	135	65.9%

### 4.2. Multiple Logistic Regression Analysis

#### 4.2.1 Model Assumptions

Drawing upon the current status of domestic and international research, this study identifies 12 variables as potential influencers that evaluate consumer behavior towards meal replacements. It then formulates relevant research hypotheses based on these selected factors.

H1: Female consumers are more willing to buy.

H2: Age has negative effect on consumer purchase intention.

H3: The level of development of the region where it is located has positive effect on consumers' willingness to buy.

H4: Subjective satisfaction level of internal product factors can significantly affect consumer purchase intention.

H4a: Consumer satisfaction with price positively contributes to purchase frequency.

H4b: Consumer satisfaction with taste positively influences purchase intention.

H4c: Weight loss efficacy positively contributes to purchase frequency.

H4d: Consumer satisfaction with nutritional value is positively related to purchase intention.

H4e: Consumer satisfaction with packaging exquisiteness positively contributes to purchase frequency.

H4f: Consumer satisfaction with portability of product positively contributes to purchase frequency.

H5: Subjective satisfaction level of product external factors can significantly affect consumers' purchase intention.

H5a: Satisfaction with after-sales service significantly and positively affects consumers' purchase intention.

H5b: Purchase convenience satisfaction significantly and positively affects consumer purchase intention.

H5c: Satisfaction with product diversity significantly and positively affects consumer purchase intention.

**Table 4.** Variable

Variant typology	variable name and code	Variant assign a value to something	Envisage affect
personal characteristic	Sex (X1) Age (X2) Location (X3)	Male=1, Female=2 <18 years=1, 18-35 years=2, 36-55 years=3, >55 years=4 Tier 1 cities=1, Tier 2 cities=2, Tier 3=3, Tier 4 and below=4	forward negative negative
internal factor level of satisfaction subjective perception	Price (X4) Taste (x5) Weight loss effect (X6) Nutritional value (X7) Portability (X8) Package appearance (X9)	Very dissatisfied=1, Dissatisfied =2, Fair=3, Satisfied=4, Very satisfied=5	forward forward forward forward forward forward
external factors level of satisfaction subjective perception	After-sales services (X11) Ease of purchase (X10) Product diversity (X12)	Very dissatisfied=1, Dissatisfied=2, Fair=3, Satisfied=4, Very satisfied=5	forward forward forward

**4.2.2 Model Regression Results**

**Table 5.** Regression results

	reckon	significance
Your gender	.500	.021
Your age	-.186	.009
location	-.089	.028
prices	.496	.005
texture (of food)	.219	.011
Weight loss	.411	.046
nutritional value	.208	.253
Portability	.070	.030
Packaging Design	.268	.002
after-sales service	.103	.015
Ease of Purchase	.255	.041
Product diversity	.166	.019

(1) Gender (X1): The regression coefficient of X1 is 0.500, which is positive and significant, indicating that women consume meal replacement more frequently than men. First, women are more aware of weight loss, and the high satiety of meal replacement can meet this demand; second, meal

replacement products are more advertised on platforms where female users are more active, attracting female consumers in table 4.

(2) Age (X2): The regression coefficient of X2 is -0.186, which is significant at 1% level, indicating that age has a large negative influence on the willingness to consume meal replacement. The older the age, the more reluctant to accept new things, the lower the acceptance of such youthful products as meal replacement, which leads to the lower purchase frequency in table 5.

(3) The development level of the region (X3). The regression coefficient of X3 is -0.109 and is significant at the 5% level, indicating that the more developed the region is, the higher the frequency of meal replacement purchase. The fast-paced life in developed areas will squeeze the mealtime, and the meal replacement is more convenient and can save time.

(4) Subjective perception of internal factor satisfaction: the regression coefficients of price (X4), taste (X5), weight loss efficacy (X6), portability (X8), and package appearance (X9) are 0.496, 0.219, 0.411, 0.070, and 0.268, respectively, which are positive and significant, suggesting that the lower the price, the higher the purchasing frequency; the better the taste, the higher the purchasing frequency; The stronger the weight loss effect, the higher the purchase frequency; the higher the nutritional value, the higher the purchase frequency; the more portable the product, the higher the purchase frequency; the more beautiful the package appearance, the higher the purchase frequency. And the regression coefficient value of nutritional value (X7) is 0.208, but it does not demonstrate significance, indicating that subjective satisfaction with nutritional value does not have a significant impact on consumer meal replacement purchase behavior.

(5) Subjective Perception of Satisfaction with External Factors: The regression coefficients of after-sales service (X11), purchasing convenience (X10) and product diversity (X12) are 0.103, 0.255 and 0.166, respectively, which are positive and significant, indicating that the better the after-sales service is, the higher the purchasing frequency is; the more convenient it is to purchase, the higher the purchasing frequency is; and the more diversified the products are, the higher the purchasing frequency is.

#### 4.2.3 Model Robustness Test

(1) Parallelism test: The results of the test are shown in table 6,  $P=0.353 > 0.05$ , accepting the original hypothesis, indicating that the model passes the parallelism test and is robust enough to be used for further analysis.

**Table 6.** Parallelism test

mould	-2 Log likelihood	chi-square (math.)	significance
null hypothesis (math.)	493.872		
generalization	480.644	13.228	.353

(2) Model likelihood ratio test: The model likelihood ratio test is a statistical method used to compare whether there is a difference between two models. According to the table 7, the chi-square value is,  $P=0.004 < 0.005$ , which rejects the original hypothesis and indicates that this model construction is meaningful.

**Table 7.** Likelihood ratio test

mould	-2 Log likelihood	chi-square (math.)	significance
intercept only	525.272		
final model	479.946 <sup>b</sup>	45.325 <sup>c</sup>	.004

## 5. Conclusion

Through the previous research and analysis, it can be known that the main group of meal replacement consumers are young women in developed areas, analyzing the needs and preferences of this core consumer group, and finding that their main motivation for choosing meal replacement lies

in the convenience and time-saving and fat loss and weight loss needs, which provides an effective support for the innovation direction and marketing strategy of meal replacement products.

### 5.1. Catering to Consumer Demand for Weight Reduction

With the enhancement of social awareness of weight loss, meal replacement products are gradually popular, and the weight loss effect is one of the main reasons to attract many consumers, businesses should seize the "weight loss" of this publicity point to focus on publicity to expand the market. Currently on the market there is a relatively single problem of meal replacement products, businesses should enhance the level of research and development of meal replacement products and continue to introduce new products to stimulate consumer desire to buy, and at the same time to ensure that the product meets the low-calorie, satiety characteristics, catering to the needs of consumers to lose weight.

### 5.2. Catering to Consumer's Pursuit of Convenience

Considering the positive impact of portability and packaging design on purchase frequency, meal replacement products should be packaged in attractive, lightweight and easy-to-carry packages, which can be achieved through the production of powdered meal replacement products. To meet the purchasing convenience, businesses should combine online and offline sales forms, so that people in remote areas can purchase through online platforms and increase the number of products sold in pharmacies or supermarkets, to ensure that consumers can conveniently and quickly purchase meal replacement products. The more developed regions have a higher demand for meal replacement products, so we can appropriately increase the amount of products placed in developed regions.

### 5.3. Increase Customer Loyalty

Price has a strong influence on the frequency of purchase, merchants can adopt a thin profit and high sales policy, through a moderate reduction in price to stimulate the purchase volume, to enhance customer loyalty, and bring the purpose of long-term profits. In addition to direct price reductions, can also be realized through promotional activities, such as issuing coupons, buy one get one free and other more innovative forms. Merchants should improve the after-sales service of meal replacement products and strictly abide by the relevant food safety regulations to protect consumers' rights and interests, enhance consumers' trust in meal replacement products and increase the repurchase rate.

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