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Research on the Influencing Factors of Women's Willingness to Choose the Form of "Internet + Maternal and Child Health Care" for Pregnancy Health Care in Childbearing Age

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Abstract. Background: "Internet+Maternal and Child Health" platforms have been put into place, with women in childbearing age as the main audience. These platforms effectively protect mothers and children's health and improve physicians' performance. Nevertheless, the "Internet + maternal and child health" platforms have faded in the post-epidemic era, failing to meet the real needs of women who are pregnant. Methods: This paper takes the 1,608 data collected through the questionnaire survey as the research samples, and takes the basic information, medical background, health behaviour during pregnancy, needs during pregnancy and worries as the independent variables, and the willingness of women as the dependent variable, and explores the influence of different categories of independent variables on the dependent variables through Kendall's tau correlation analysis, generalized linear model, and random forest regression model. Results: The platform is more likely to be used by higher income groups than lower income groups, and single and unmarried groups are more likely to use the platform than married and divorced groups. At the same time, the concerns and needs of women of the right age during pregnancy and childbearing are critical to the approval of the "Internet + Maternal and Child Health" platform. Conclusion: Women of the relevant age group should have their wants and concerns addressed via the "Internet+Maternal and Child Health" platform. Additionally, a comprehensive range of nanny services should be offered to enable women to obtain advice on healthy living during pregnancy.

Keywords: Women of Childbearing Age; Internet + Maternal and Child Health; Using Willingness.

1. Introduction

China's seventh population census revealed that the country has over 688 million female citizens and 253 million people between the ages of 0 and 14—almost two-thirds of the total population. China's health policy places a high priority on the development and well-being of its enormous population of women and children[1-2].The 2019 China Maternal and Child Health Development Report highlights the importance of actively utilizing big data platforms and Internet technologies, promoting "Internet+Maternal and Child Health" services, and enhancing the capacity for information gathering, analysis, and application[3]."Work Plan for Promoting Maternal and Child Health Culture Construction (2021-2025)" was released by the Health Commission in 2021. The plan emphasized the significance of creating "Internet + Maternal and Child Health" and suggested that the organization "strive to innovate the whole-process service model of fertility and provide women and children with full-cycle comprehensive health services." Women and children on the cloud have progressively evolved as a result of policy recognition of the Internet + medical paradigm and its application to the field of obstetrics and gynecology[4-5].

Currently, domestic medical institutions are actively utilizing the "Internet +" model in conjunction with conventional medical technology to offer systematic health services and management, including high-risk maternal management, pregnancy health education, and pregnancy risk screening[6]. But the field of "Internet + maternal and child health" is still in its infancy, and the pertinent platforms don't fully understand the needs of women who are ready to have children[7-9].Thus, the purpose of

this paper is to investigate school-age women's willingness to select the type of "Internet + maternal and child health" pregnancy care and the factors that influence it, as well as to offer practical recommendations for overcoming the platform's development roadblock from the viewpoint of the target audience.

2. Literature Review

'Internet + maternal and child health ' is a product of the integration of the Internet and the field of maternal and child health. It uses the Internet as a carrier and information technology to provide convenient and efficient medical services and management functions for women and children and staff of maternal and child health service institutions. It also includes providing women and children with full-life cycle health management maternal and child characteristic business services, and fulfilling the public health functions of maternal and child health care institutions [10].

Most foreign scholars ' studies have shown that the use of the Internet and information technology can bring positive effects to the whole process health care of pregnant women and newborns, help to promote the physical and mental health of pregnant women, improve maternal and infant prognosis and delivery outcomes. Diana 's study found that electronic health management can strengthen the weight management of pregnant women during pregnancy and postpartum, and reduce the risk factors of maternal and infant myocardial metabolism [11]. Wang H and other studies have shown that the channels for young pregnant women to obtain maternal and child health knowledge and information during pregnancy have become more networked and digitized, and the Internet has become one of the most popular sources of health information [12]. Leila Ahmadian found that because pregnant women have less time to communicate and consult with doctors, more than two-thirds of pregnant women use the Internet to understand information such as physiological and psychological changes during pregnancy, pregnancy complications, characteristics of high-risk pregnant women, labor pains and their relief methods [13].

Chinese scholars ' attention to ' Internet + maternal and child health ' mostly focuses on the impact of ' Internet + maternal and child health ' on pregnant women 's healthy life during pregnancy and delivery outcomes. Xu Jun et al.explored the application effect of the " Internet + medical " service model in the out-of-hospital management of high-risk pregnant women[14]. Ma Liangkun et al.sorted out the current situation of mobile medical care for maternal management in China, and suggested that health management APPs could be used under the new coronavirus epidemic to help pregnant women achieve basic healthy life and self-management, so as to improve the current situation of maternal health management [15]. Some scholars have discussed the construction mode of " Internet + maternal and child health " in the new era based on the typical practices of " cloud maternal and child " in various places during the epidemic. Yang Limin et al.proposed that the " Internet + maternal and child health " model should continuously integrate existing online and offline resources, improve service efficiency and level, and improve maternal and child health service experience[16]. Taking a maternal and child hospital in Shanghai as the research object, Shi Jingjin et al.proposed that a series of supporting policies such as online payment of medical insurance, online sales of prescription drugs, drug logistics distribution, information data sharing and opening, and service price formulation in " Internet + maternal and child health " still need to be improved. It is necessary to explore convenient, efficient and high-quality maternal and child health services centered on patients and promote appropriate technologies to improve the health of women and children [17].

In summary, domestic and foreign scholars have explored the impact of Internet technology on maternal and child health during pregnancy from various angles during pregnancy, and most of them agree with the positive role of ' Internet + maternal and child health '. However, few scholars have studied the influencing factors of their choice of ' Internet + maternal and child health care ' service form from the perspective of women of childbearing age.

3. Research Design

3.1. Data Resources

In this paper, 1608 questionnaires collected through questionnaires are used as research data. The respondents cover all major regions of the country, involving the basic characteristics of the respondents ' age, income, educational level, etc., so they are well representative. Before the formal processing of data, through data coding and entry, data purification and reliability and validity test, in order to ensure the authenticity and effectiveness of data processing.

3.2. Variable Declaration

This paper selects the willingness of school-age women to use the ' Internet + maternal and child health ' platform as the dependent variable. The respondents scored the self-selection willingness according to their own conditions, and the score was 0-100. The larger the number, the stronger the willingness to use the platform.

The independent variables used in this paper are divided into the following five categories. The first type of independent variables is the basic information of women of the right age, including the age, education, marital status, income level, and the city where they live, and the above independent variables are grouped in the study. The second type of independent variable is the medical background information of women of the right age, including whether they have suffered from various diseases and the number of physical examinations in the past three years ; the third type of independent variable is the information of pregnancy health behavior of women of childbearing age, which refers to the measures that women of childbearing age tend to take in the face of pregnancy health problems or other emergencies ; the fourth type of independent variable is the pregnancy demand information of women of the right age, including prenatal, intrapartum, postpartum and other needs ; the fifth type of independent variable is the pregnancy worry information of women of the right age, including data leakage, whether the information can be effectively integrated and so on.

4. Empirical Research

4.1. Correlation Analysis

This paper uses Kendall 's tau correlation analysis to test the collinearity of each variable. The correlation coefficient heat map is shown in Figure 1. The results show that the correlation between most variables is weak or not significant. Therefore, in this study, it can be considered that there is almost no multicollinearity problem in the collected variables, and there is a good independence between these indicators.

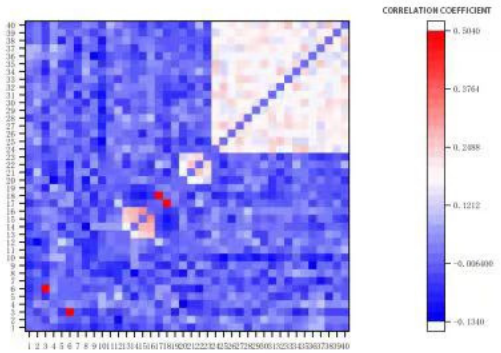

Figure 1. Correlation Coefficient Heat Map

4.2. Fitting Regression Analysis

This paper first considers the linear relationship between variables and constructs the following generalized linear model for fitting. Because there are many independent variables in this fitting, it is easy to cause over-fitting. Therefore, this paper uses the independent variable stepwise regression function to screen the independent variables, so as to help select the best combination of independent variables to fit the generalized linear model.

$$g(E(Y)) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p \quad (1)$$

After the screening of the stepwise regression function, only two independent variables and dependent variables showed a significant linear relationship, namely marital status and income level, as shown in Table 1. The results show that, on the one hand, there is a negative correlation between marital status and willingness to use. For every unit increase, the average score of willingness to use will decrease by about 1.7277 units. Divorced groups have the lowest willingness to use the platform, while unmarried groups have higher willingness to use the platform than married groups. This may be because some individuals in the married group have had fertility experience and are not expected to give birth again in the future, or according to the existing experience, they already have experience in dealing with maternal and child health problems, so the demand for the platform is relatively low. For single and unmarried groups, due to the lack of experience in dealing with maternal and child health problems, there are still high expectations for the Internet maternal and child health care platform.On the other hand, there is a positive correlation between income level and willingness to use. For each unit of income level, the average score of willingness to use will increase by about 0.794 units. This shows that when the individual 's income level increases, it shows a higher acceptance of Internet maternal and child health services. This phenomenon may be attributed to the improvement of individual material living standards, which in turn has a higher pursuit of physical health, thus putting forward higher requirements for maternal and child medical services, and expecting to obtain high-quality Internet medical services.

Table 1. Linear Regression Results of Marital Status and Income Level

	coef	**std**	**err**	**z**	**P>|z|**	**[0.025 0.975]**
const	85.962	2.293	37.486	0	81.468	90.457
Marital Status	-1.7277	0.739	-2.337	0.019	-3.177	-0.279
Income Level	0.794	0.401	1.979	0.048	0.008	1.58

4.3. Nonparametric Regression Analysis

Considering that the data does not obey the normal distribution and the specific relationship between the variables is unknown, this paper chooses the nonparametric regression method and uses the random forest model to explore the relationship between the willingness to use the ' Internet + maternal and child health ' platform and each dependent variable more comprehensively, so as to better reveal the possible non-linear relationship.

In this paper, we first fit the random forest model. At the same time, in order to prevent over-fitting, we use the recursive feature elimination method for feature selection, and only 19 important features are retained. The fitting results show that the R2 and explained variance of the random forest model are more than 0.8, indicating that the model can explain more than 80 % of the variability of the dependent variable. In addition, the average error of the model is only 4.230, and the maximum error is 12.5.Among the dependent variables represented by the percentile score, the error range is

acceptable. The importance scores and rankings of each variable obtained by the random forest model are shown in Figure 2.

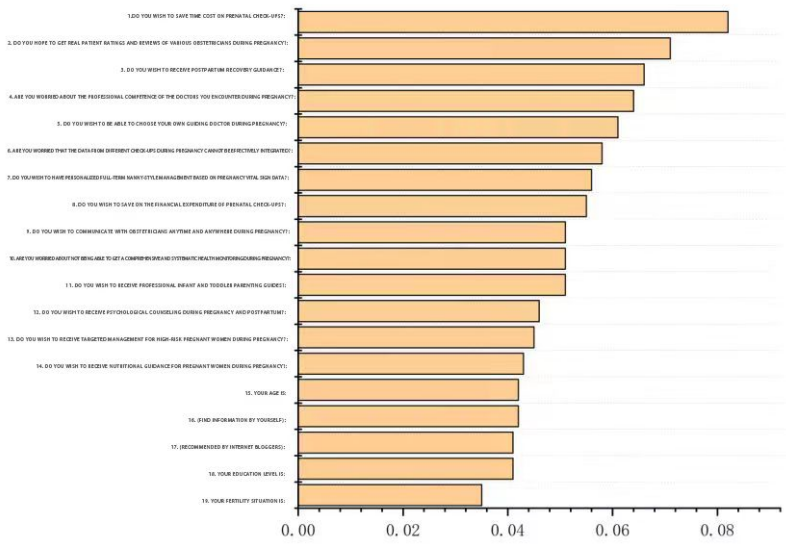

Figure 2. The Importance Score and Ranking Diagram of Each Variable in the Random Forest Model

The results show that the respondents ' demand for pregnancy has a higher degree of influence, among which ' saving time cost ' is considered to be the most important demand feature. At the same time, the three demand characteristics of patients ' true evaluation of doctors, postpartum recovery guidance and self-selection of doctors are also in the top five in the order of importance. In addition, the concerns of pregnancy also have an important impact on the willingness to use the 'Internet + maternal and child health' platform. Among them, the concerns about the lack of professionalism of doctors, the inability to effectively integrate medical data, and the lack of comprehensive health monitoring are among the top ten in the importance ranking.

5. Conclusion and Foresight

This study uses a questionnaire survey method to explore the impact of basic information, medical background, pregnancy health behavior, pregnancy needs, and pregnancy concerns of women of childbearing age on their willingness to use the ' Internet + maternal and child health ' platform. First, Kendall 's tau correlation analysis results show that there is a good independence between the indicators. Secondly, the regression results of generalized linear model show that high-income groups have higher willingness to use than low-income groups, while single and unmarried groups have higher willingness to use than married and divorced groups. Thirdly, using the random forest model for fitting analysis, the results show that the various needs and concerns of women of childbearing age during the incubation period are important factors affecting the willingness to use the ' Internet + maternal and child health ' platform.

This paper hopes to provide practical suggestions for the future development of the ' Internet + maternal and child health ' platform. First, the platform should pay attention to the single unmarried group market and open up the middle and low income group market. Second, the platform should pay attention to the needs of women of childbearing age during pregnancy and pay attention to their concerns during pregnancy, and provide personalized and comprehensive support including professional consultation, guidance and information sharing, so as to enhance the user experience and reduce the anxiety and concern of women of childbearing age during pregnancy.

This article also has the following shortcomings. First, when collecting questionnaire data, the respondents ' own understanding of the ' Internet + maternal and child health ' platform was not fully taken into account, and some respondents who did not understand the cloud maternal and child health

platform may have a certain impact on the data results ; second, the data of this paper only come from the questionnaire survey, so the generality of the conclusion needs to be further investigated. Thirdly, this paper does not consider the distribution of data before processing data, so the generalized linear model is adopted, which weakens the accuracy of model analysis to a certain extent.

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