Structural Equation Modeling Analysis of Factors Influencing Non-Consultation for Two-Week Illness Among Rural Residents (Postprint)

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Abstract

Background In recent years, health services research has become an important field in China's health sector. Previous studies have mostly focused on analyzing the current status of residents' two-week morbidity, two-week medical consultation, and related influencing factors, while research on two-week illness without medical consultation, as a negative indicator, is relatively rare. Objective To investigate the current status of two-week illness without medical consultation among rural residents, explore its influencing factors and analyze the underlying reasons, thereby proposing targeted recommendations. Methods A multistage stratified cluster random sampling method was used to investigate the situation of two-week illness without medical consultation among 21,451 residents in 4 counties of rural Ningxia, and structural equation modeling was employed to analyze its influencing factors. Results The two-week illness prevalence rate and the rate of illness without medical consultation among rural residents in Ningxia were 15.0% and 69.5%, respectively. Chi-square test and Fisher' s exact test indicated that there were statistically significant differences in two-week illness without medical consultation among residents of different genders, ages, education levels, occupations, self-rated health status, chronic disease status, days of bed rest due to two-week illness, and travel time to secondary-level or higher medical institutions ($P<0.05$). Structural equation model fitting results showed that health characteristics had the greatest impact on rural residents' two-week medical consultation, with a standardized regression coefficient of -0.313. Demographic characteristics were second only to health characteristics, with a total effect value of -0.101, including both direct and indirect effects. Conclusion The rate of two-week illness without medical consultation is relatively high among rural residents in Ningxia, indicating insufficient utilization of existing health services. Corresponding measures should be taken and relevant policies formulated based on these influencing factors, thereby optimizing

the allocation of medical and health resources and improving the level of health service utilization and social equity.

Full Text

Structural Equation Model Analysis of Influencing Factors for Two-Week Illness Without Medical Consultation Among Rural Residents

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Abstract

Background: Health services research has become a critical field in China' s healthcare sector. While previous studies have predominantly analyzed the status of residents' two-week illness prevalence and consultation rates, research on the negative indicator of two-week illness without medical consultation remains scarce.

Objective: To investigate the current situation of rural residents who did not seek medical consultation within two weeks of illness, explore its influencing factors, analyze the underlying reasons, and propose targeted recommendations.

Methods: A multi-stage stratified cluster random sampling method was employed to survey 21,451 residents across four counties in rural Ningxia regarding their two-week illness consultation patterns. Structural equation modeling was used to analyze influencing factors.

Results: The two-week illness prevalence rate among rural Ningxia residents was 15.0%, with a non-consultation rate of 69.5%. Chi-square tests and Fisher' s exact probability tests revealed statistically significant differences in non-consultation rates across gender, age, education level, occupation, self-assessed health status, chronic disease status, days of bed rest due to illness, and travel time to secondary or higher-level medical institutions ($P<0.05$). The structural equation model showed that health characteristics had the greatest impact on consultation behavior, with a standardized regression coefficient of -0.313. Demographic characteristics ranked second, with a total effect value of -0.101, comprising both direct and indirect effects.

Conclusion: Rural Ningxia exhibits a high rate of non-consultation within two weeks of illness, indicating underutilization of existing health services. Targeted measures and policies addressing these influencing factors are needed to optimize healthcare resource allocation and improve both health service utilization levels and social equity.

Keywords: Health services; Two-week illness without medical consultation; Influencing factor analysis; Structural equation model

1. Introduction

Health service surveys constitute an essential component of China' s health investigation system, providing insights into residents' health status, medical security levels, healthcare needs and utilization, and the interrelationships among influencing factors. Healthcare utilization patterns objectively reflected in these surveys serve as important indicators for evaluating the social and economic benefits of health services. The two-week illness prevalence rate is commonly used to reflect healthcare needs, while the two-week consultation rate measures utilization. In contrast, the two-week non-consultation rate serves as a negative indicator reflecting consultation patterns, and studying its status and influencing factors provides a key basis for promoting healthcare development, planning, and management [1].

The National Sixth Health Service Survey Report indicates that compared with 2013, China' s conversion of healthcare needs into utilization has improved [2]. However, western China lags behind eastern and central regions in both economic development and healthcare service utilization levels [3]. To understand the current status of healthcare utilization among rural residents in western China and enable more rational allocation of health resources, we conducted a survey in December 2019 on healthcare needs, demand, and utilization patterns related to two-week illness non-consultation among 21,451 residents across four counties in rural Ningxia.

2. Methods

2.1 Data Source

This study utilized 2019 follow-up data from a pilot project jointly conducted by Ningxia Health Administrative Department and research teams from Harvard/Oxford Universities. Following cost-effective sampling principles, we employed multi-stage stratified cluster random sampling: (1) All administrative villages in townships across four Ningxia counties were stratified into good, medium, and poor economic status layers, with 40% of villages randomly selected from each layer; (2) Systematic sampling was used to select 20-33 resident households in each chosen village, with all permanent family members (residing 6+ months) as survey subjects. After double data entry and verification, 27,196 questionnaires were obtained. Valid questionnaires (with no missing or ambiguous values) totaled 21,451, yielding a valid response rate of 78.88%.

2.2 Survey Methods and Definitions

2.2.1 Survey Method A questionnaire developed by project experts was used. Investigators received centralized training and participated in pilot surveys before formal implementation. With informed consent, investigators conducted household interviews, with parents responding on behalf of children. Survey content included: demographic and socioeconomic characteristics, household 基本情况, healthcare accessibility, health behaviors, two-week illness status, and healthcare utilization. Household income was ranked from low to high and divided into five groups using the 20th, 40th, 60th, and 80th percentiles: lowest, lower-middle, middle, upper-middle, and highest income groups (Groups I, II, III, IV, and V) [4].

2.2.2 Indicator Definitions [5]

1. **Two-week illness prevalence rate:** (Number of ill individuals within two weeks prior to survey / Total surveyed population) × 100%
2. **Two-week consultation rate:** (Number of individuals seeking care at any medical institution within two weeks / Total surveyed population) × 100%
3. **Two-week non-consultation rate:** (Number of ill individuals not seeking consultation within two weeks / Total ill population) × 100%. Non-consultation includes: (a) no treatment measures, and (b) self-medication.

2.3 Quality Control

Investigators were provided training manuals and received centralized training. A daily review system was implemented, with investigation teams (investigators, team leaders, and quality control officers) promptly verifying questionnaires upon daily completion to ensure completeness and validity. Double data entry was employed.

2.4 Statistical Analysis

2.4.1 Univariate Analysis Questionnaire data were entered using EpiData 2.1 software with double entry and logical verification. SPSS 26.0 was used for descriptive statistical analysis (frequencies and proportions) and chi-square tests to compare non-consultation rates across different characteristics. $P<0.05$ was considered statistically significant.

2.4.2 Structural Equation Modeling Structural equation models comprise measurement models (examining relationships between observed and latent variables) and structural models (analyzing relationships between latent variables). Model building involves: (1) model specification, (2) model identification, (3) parameter estimation (maximum likelihood estimation used herein), and (4) model evaluation and modification using fit indices (GFI, RMSEA, AGFI, NFI,

etc.) with iterative refinement as needed [6]. Amos 26.0 software was used to fit and analyze the structural equation model.

3. Results

3.1 Basic Characteristics of Respondents

The survey included 21,451 individuals: 11,172 males (52.1%) and 10,279 females (47.9%). The 15-24 age group was largest (17.7%), followed by those under 15 (16.8%). Regarding marital status, 36.1% were unmarried. Among occupations, agricultural workers accounted for 39.8%. Detailed characteristics are shown in .

3.2 Two-Week Illness Non-Consultation Status

Among 21,451 surveyed residents, 3,212 experienced illness within two weeks, yielding a two-week illness prevalence of 15.0%. Of these, 981 sought consultation (30.5% consultation rate) while 2,231 did not (69.5% non-consultation rate). Among non-consulters, 908 (40.7%) practiced self-medication, while 1,323 took no treatment measures.

3.3 Univariate Analysis Results

3.3.1 Demographic Characteristics Significant differences in non-consultation rates were observed across gender, age, education level, and occupation ($P<0.05$). Males showed higher rates than females. The 15-24 age group had the highest rate, followed by 25-34, <15, 35-44, 45-54, and $ $65 years, with the 55-64 group lowest. Among education levels, high school and above showed the highest rate, followed by primary school and junior high, with uneducated individuals lowest. Students had the highest occupational rate, while the unemployed had the lowest. Details are in .

3.3.2 Health Characteristics Significant differences existed across self-assessed health status, chronic disease status, days of bed rest, and travel time to secondary/higher-level institutions ($P<0.05$). Among non-consulters (excluding "refused to answer" at 100% and "don' t know" at 60%), those with "very good" self-assessed health showed the highest rate, followed by "good," "fair," and "poor," with "very poor" lowest. Non-chronic disease patients had higher rates than chronic disease patients. Among ill residents, those with 0-5 bed rest days showed the highest rate, followed by 11-14 days, with 6-10 days lowest. For travel time to secondary/higher-level institutions, the 0-15 minute group had the highest rate, while >45 minutes had the lowest. Details are in .

3.4 Structural Equation Model Analysis

3.4.1 Model Specification and Modification The outcome variable was two-week illness consultation status (0=non-consultation, 1=consultation), with two latent variables: demographic characteristics and health characteristics. Demographic characteristics were measured by gender, occupation, education level, and age. Health characteristics were measured by bed rest days, chronic disease status, self-assessed health, and travel time to secondary/higher-level institutions.

The initial model was run in Amos 26.0 [Figure 1: see original paper]. Based on modification indices and domain knowledge, unreasonable paths were removed . The modification index suggested correlating residuals between age and chronic disease status, which was biologically plausible given increasing chronic disease probability with age. After iterative refinement, the modified model achieved acceptable fit indices [Figure 2: see original paper].

3.4.2 Model Evaluation Fit indices for the structural equation model showed: ^{2}/df = 1.835, GFI = 0.998, RMSEA = 0.016, AGFI = 0.995, NFI = 0.991, RFI = 0.982, IFI = 0.995, TLI = 0.996, and CFI = 0.996, all within recommended ranges, indicating good model fit.

3.4.3 Model Path Analysis Standardized coefficients quantified the magnitude of influencing factors, with all path coefficients statistically significant (P<0.05) . Demographic characteristics had a total effect of -0.101 on consultation behavior (direct effect: 0.107; indirect effect through health characteristics: -0.208). Health characteristics had only a direct effect of -0.210 .

4. Discussion

4.1 High Rate of Two-Week Illness Non-Consultation

Two-week illness consultation status reflects healthcare utilization [1]. This study found a 69.5% non-consultation rate among rural Ningxia residents, substantially higher than the 22.2% reported in the Fifth National Health Service Survey for western rural areas. This indicates that nearly 70% of healthcare needs failed to translate into demand and utilization, suggesting poor initiative in utilizing medical resources. This may stem from relatively backward economic and educational conditions in western rural China, resulting in inadequate self-health management awareness and economic constraints. Among non-consulters, 40.7% practiced self-medication—a convenient but risky approach [7]. Health education should be strengthened to disseminate health knowledge and promote proper health concepts, continuously improving health literacy.

4.2 Influencing Factors

4.2.1 Health Characteristics Health characteristics showed only direct effects on non-consultation, with a standardized coefficient of -0.313, exerting greater influence than demographic characteristics. Among causal variables, self-assessed health and chronic disease status positively affected consultation, while bed rest days negatively affected it.

1. **Self-assessed health** reflects subjective health perceptions and provides stable health measurements [8]. Our results show non-consulters generally had fair self-assessed health, with only 31.42% rating their health as "very good" or "good." This discrepancy between health perception and consultation behavior suggests insufficient health education effectiveness in rural areas.
2. **Chronic disease patients** may be more likely to seek consultation due to disease-specific risks and complications, supported by chronic disease insurance policies and health management programs that facilitate access. This reflects effective chronic disease management and health promotion by local healthcare institutions.
3. **Bed rest days** indicate disease severity. The highest non-consultation rate occurred among those with $ $5 bed rest days, but rates did not consistently decline with increasing bed rest days. This may reflect that those with fewer bed rest days perceived their illness as mild, while those with more days may have already understood their condition, reducing consultation intention.

4.2.2 Demographic Characteristics Demographic characteristics had a total effect of -0.101 on non-consultation, including both direct and indirect effects.

1. **Age** most strongly influenced demographic characteristics. Residents under 35, particularly the 15-24 age group, showed high non-consultation rates, possibly due to academic, work, and family commitments leading to self-medication or "toughing it out" for minor illnesses. This highlights the need to monitor health in younger populations and emphasizes guardians' responsibility for children' s health [9]. Elderly residents may have higher utilization due to chronic diseases or disabilities requiring ongoing medication and consultation [10].
2. **Education** showed an inverse relationship: higher education correlated with lower utilization, contrary to some previous findings but consistent with others [11]. This may reflect that educated individuals have broader treatment options beyond hospital visits and can use their medical knowledge to judge consultation necessity.
3. **Occupation:** Students showed the highest non-consultation probability, likely due to busy academic schedules. Agricultural workers had lower rates than non-agricultural workers, possibly because the survey period

(post-harvest, winter leisure) coincides with peak medical-seeking time for farmers, while non-agricultural workers face occupational time constraints.

4. **Indirect effects:** Demographic characteristics indirectly affect consultation through health characteristics, as age influences chronic disease status.

4.3 Recommendations

Multiple factors influence the high non-consultation rate in rural Ningxia. Policy development should consider regional specificities. To improve health service utilization in western mountainous areas and reduce non-consultation, we recommend:

1. Conducting personalized, diversified health education in rural areas using accessible methods to improve health awareness, preventive knowledge, and rational medication use, fostering proper healthcare-seeking attitudes.
2. Establishing health service models tailored for children and adolescents, with sustainable long-term plans to ensure health education and promotion in rural areas [13].
3. Continuously improving the scientific chronic disease management system at primary care levels through multi-level institutional collaboration to enhance prevention and treatment standards.
4. Strengthening primary care general practice, leveraging medical insurance policies to promote family doctor contract services, and fostering stable, accessible, continuous relationships between family doctors and residents to improve consultation initiative [14, 15].

Author Contributions: LI Peiwen: data cleaning; HE Jiahui: study design, data analysis, and manuscript writing; MA Ximin: model guidance, manuscript revision, and English editing; QIAO Hui: theoretical guidance, quality control, and revision suggestions.

Conflict of Interest: The authors declare no conflict of interest.

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Note: Figure translations are in progress. See original paper for figures.