INFLUENCING FACTORS OF HEALTH SERVICES UTILIZATION AMONG THE ELDERLY IN GUANGXI, CHINA: EVIDENCE FROM CHARLS 2020

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Abstract

Objective: This study aimed to analyze factors influencing health services utilization among the elderly in Guangxi, China, using the Andersen model. Given Guangxi's aging population and limited healthcare resources, understanding these factors can inform policies to improve healthcare access for the elderly. Method: Data were obtained from the China Health and Retirement Longitudinal Study (CHARLS) 2020, including 390 individuals aged 60 and above. Health services utilization was categorized into outpatient and inpatient services utilization. Independent variables were selected based on the Andersen model, covering predisposing, enabling, and need characteristics. Statistical analyses included χ^2 tests, rank-sum tests, and logistic regression models. Result: Univariate analysis showed statistically significant difference between outpatient services utilization and educational level, smoking, self-rated health (SRH), chronic disease, and pain ($p < 0.05$). Inpatient services utilization was statistically significant difference with age, educational level, working status, physical activity, smoking, pension insurance, SRH, chronic disease, pain, and fall ($p < 0.05$). Logistic regression confirmed that pain and poorer SRH significantly influenced outpatient services utilization, while age, smoking cessation, pension insurance, chronic disease, and poorer SRH significantly influenced inpatient services utilization ($p < 0.05$). Conclusion: The study highlights the critical role of need characteristics, particularly SRH and chronic diseases, in predicting health services utilization. Policy efforts in Guangxi should prioritize improving chronic disease management, expanding pension insurance coverage, and promoting health awareness to enhance healthcare access and extend healthy lifespans among the elderly.

Keywords: Health services utilization; The elderly; Guangxi

Introduction

Based on the results of the Seventh National Census in China, as of November 1, 2020, the population aged 60 years and above in Guangxi reached over 8.36 million, accounting for 16.69% of the total population in Guangxi. Among them, the population aged 65 years and above exceeded 6.11 million, representing 12.20%. With the issue of population aging intensifying, the demand for health services among the elderly in Guangxi continues to grow. However, Guangxi, as an economically underdeveloped region in western China, faces

relatively limited medical resources. Previous studies have shown that the level of health services utilization in economically developed eastern regions China is significantly higher than that in western regions (Xiang et al., 2023). People with better economic income will have higher health services utilization (Jang & Suh, 2023; Kabir, 2021). Therefore, this study, grounded in Andersen behavioral model of health services use (Andersen model), aims to analyze the factors influencing health services utilization among the elderly in Guangxi. The findings will provide policy recommendations to enhance health services utilization for the elderly in Guangxi.

Data and Methodology

1. Data Collection

The data for this study were sourced from the CHARLS 2020. This large-scale interdisciplinary survey project was jointly conducted by Wuhan University and Peking University. Its aim was to collect a high-quality micro-level dataset representative of Chinese individuals and households aged 45 and above, to facilitate analysis of aging-related issues in China (Zhao et al., 2012). After selecting the Guangxi region and completing the filling of the missing values in the samples, a total of 390 the elderly people aged 60 and above were analyzed

2. Variable selection

2.1 dependent variable

The dependent variable in this study is health services utilization, categorized into outpatient service utilization and inpatient service utilization. These correspond to the questions: "In the past month, have you visited a medical institution for outpatient or received home-based health services?" and "Have you been hospitalized in the past year?" Responses were coded as 1 for "yes" and 0 for "no."

2.2 independent variable

The Andersen model has been extensively applied in studies of health services utilization, particularly in the context of aging populations (Li & Lu, 2017). The Andersen behavioral model is well-suited for examining health services utilization among the elderly, as it comprehensively addresses the predisposing, enabling, and need characteristic that allows us to capture the multifaceted determinants of healthcare access in this population. (Babitsch et al., 2012; Lederle et al., 2021). (1) Predisposing characteristics include demographic and social structure variables. Variables such as gender, age, marital status, educational level, residence, working, physical exercise, smoking and drinking were selected. (2) Enabling characteristics include individual and family resources. Variables such as individual income, pension insurance, and medical insurance were selected. (3) Need characteristics include perceived and evaluated needs. Variables such as SRH, chronic diseases, pain, fall, and activities of daily living (ADL) were selected. Among the independent variables, income and SRH (coded as 1 for "very good" and 5 for "very bad") were continuous variables, while the remaining variables were categorical.

3. Research Methodology

Categorical variables were expressed as composition ratios or rates, and group comparisons were performed using the χ^2 test or Fisher's exact test. Continuous variables that did not follow a normal distribution were analyzed using the rank-sum test. Variables with statistically significant differences in the univariate analysis were included in the multivariate logistic regression analysis. Data were processed, weighted, and analyzed using Stata 16 with a significance level of $\alpha = 0.05$.

Result

1. Sample characteristics

Among the sample of 390 the elderly in Guangxi, 171 (43.85%) were male, and 219 (56.15%) were female. Younger the elderly (<75 years old) accounted for 280 (71.79%), while older the elderly (≥75 years old) accounted for 110 (28.21%). Regarding marital status, 284 (72.82%) had a spouse (including partners), and 106 (27.18%) were without a spouse (including partners). In terms of educational level, 281 (72.05%) had primary school education or below, 105 (26.92%) had secondary education, and 4 (1.03%) had college education or above. Regarding residence, 94 (24.12%) lived in urban center, 30 (7.69%) in suburban area, and 265 (67.95%) in rural area. Working status showed that 199 (51.03%) were employed, while 191 (48.97%) were unemployed. After logarithmic transformation, the median income was 7.36. (Table 1)

2. Univariate analysis of health services utilization

Regarding health services utilization, 107 (27.44%) reported outpatient in the past month, and 108 (27.69%) reported hospitalizations in the past year. Univariate analysis showed that educational level, smoking, SRH, chronic disease, and pain were statistically significant with outpatient ($p < 0.05$). Additionally, age, educational level, working, physical activity, smoking, pension insurance, SRH, chronic disease, pain, and slip were statistically significant with inpatient ($p < 0.05$). (Table 1)

Table 1: Descriptive statistics of sample characteristics

n=390

Variable	Total	Outpatient			Inpatient		
		Num	rate/ %	χ^2/z	Num	rate/ %	χ^2/z
Predisposing characteristic							
Sex (Female=0)	219	66	30.14	1.830	65	29.68	0.986
Male=1	171	41	23.98		43	25.15	
Age (<75 years old=0)	280	72	25.71	1.478	62	22.14	15.286***
≥75 years old=1	110	35	31.82		46	41.82	
Marital status (No=0)	106	32	30.19	0.554	35	33.02	2.063
Yes=1	284	75	26.41		73	25.70	
Educational level				6.432*			8.253*
Primary school education or below=0	281	81	28.83		84	29.89	
Secondary education=1	105	23	21.90		21	20.00	
College education or above=2	4	3	75.00		3	75.00	
Residence				0.332			1.066
Urban center=0	94	27	28.72		30	31.91	
Suburban area=1	30	7	23.33		8	26.67	
Rural area=2	265	73	27.55		70	26.42	
Working (No=0)	191	58	30.37	1.615	69	36.13	13.295***
Yes=1	199	49	24.62		39	19.60	
Physical activity (No=0)	34	12	35.29	1.155	15	44.12	5.019*
Yes=1	356	95	26.69		93	26.12	
Smoking				8.729*			10.199**
No quit=0	75	12	16.00		11	14.67	

Variable	Total	Outpatient			Inpatient		
		Num	rate/ %	χ^2/z	Num	rate/ %	χ^2/z
Quit=1	42	17	40.48		17	40.48	
Never=2	271	78	28.78		80	29.52	
Drinking				1.772			4.618
No=0	265	78	29.43		81	30.57	
More than once a month=1	90	20	22.22		17	18.89	
Less than once a month=2	34	9	26.47		10	29.41	
Enabling characteristic							
Medical insurance (No=0)	22	4	18.18	1.003	5	22.73	0.287
Yes=1	368	103	27.99		103	27.99	
Pension insurance (No=0)	108	28	25.93	0.171	20	18.52	6.278*
Yes=1	282	79	28.01		88	31.21	
Income (ln)	390	7.47	-	-0.994	7.50	-	-1.508
Need characteristic							
Chronic disease (No=0)	241	54	22.41	8.014**	47	19.50	21.132***
Yes=1	149	53	35.57		61	40.94	
Pain (No=0)	176	25	14.20	28.523***	39	22.16	5.034*
Yes=1	213	82	38.50		69	32.39	
Slip (No=0)	315	84	26.67	0.586	75	23.81	12.908***
Yes=1	74	23	31.08		33	44.59	
ADL				2.655			5.126
Normal=0	366	100	27.32		101	27.60	
Mild disability = 1	16	5	31.25		3	18.75	
Moderate disability=2	4	0	0.00		1	25.00	
Severe disability=3	4	2	50.00		3	75.00	
SRH	390	3	-	-4.618***	3	-	-3.633***

Note: *p<0.05, **p<0.01, ***p<0.001, this also applies to all tables.

3. Multivariate analysis of health services utilization

3.1 Outpatient services utilization

Logistic regression analysis of factors influencing outpatient services utilization showed that the elderly experiencing pain were more likely to utilize outpatient services ($p < 0.05$). Additionally, those with higher scores of SRH, indicating poorer perceived health, demonstrated increased outpatient service utilization ($p < 0.05$). (Table 2)

Table 2: Influencing factor of outpatient services utilization among the elderly in Guangxi

Variable	Coef.	S.E.	z-value	OR (95%CI)
Predisposing characteristic				
Educational level (ref: Primary school education or below)				
Secondary education	0.001	0.350	0.00	1.001 (0.504~1.988)
College education or above	-0.908	1.640	-0.55	0.403 (0.016~10.027)
Smoking (ref: No quit)				
Quit	1.021	0.571	1.79	2.777 (0.907~8.502)
Never	0.401	0.440	0.91	1.493 (0.630~3.538)

Variable	Coef.	S.E.	z-value	OR (95%CI)
Need characteristic				
Chronic disease (ref: No)				
Yes	0.523	0.301	1.74	1.688 (0.935~3.046)
Pain (ref: No)				
Yes	1.347	0.333	4.04***	3.845 (2.001~7.390)
SRH	0.567	0.216	2.62**	1.764 (1.154~2.695)
Pseudo R^2			0.1437	
p-value			0.0000	

3.2 Inpatient services utilization

Logistic regression analysis of factors influencing inpatient services utilization showed the following results: older adults aged 75 years or above had higher inpatient services utilization; compared to those who currently smoke, the elderly who had quit smoking had higher inpatient services utilization; the elderly enrolling in pension insurance, having chronic diseases and higher scores of SRH (indicating poorer perceived health) had higher inpatient services utilization ($p < 0.05$). (Table 3)

Table 3: Influencing factor of inpatient services utilization among the elderly in Guangxi

Variable	Coef.	S.E.	z-value	OR (95%CI)
Predisposing characteristic				
Age (ref: <75 years old)				
≥75 years old	0.872	0.352	2.47*	2.392 (1.199~4.771)
Educational level (ref: Primary school education or below)				
Secondary education	-0.203	0.369	-0.55	0.816 (0.396~1.684)
College education or above	0.242	1.220	0.20	1.274 (0.117~13.928)
Working (ref: No)				
Yes	-0.240	0.325	-0.74	0.787 (0.416~1.489)
Physical activity (ref: No)				
Yes	-0.194	0.473	-0.41	0.824 (0.326~2.081)
Smoking (ref: No quit)				
Quit	1.383	0.640	2.16*	3.986 (1.137~13.978)
Never	0.486	0.461	1.05	1.626 (0.659~4.014)
Enabling characteristic				
Pension insurance (ref: No)				
Yes	0.756	0.381	1.99*	2.130 (1.010~4.490)
Need characteristic				
Chronic disease (ref: No)				
Yes	1.221	0.317	3.85***	3.391 (1.821~6.315)
Pain (ref: No)				
Yes	0.016	0.344	0.05	1.016 (0.518~1.994)
Slip (ref: No)				
Yes	0.436	0.361	1.21	1.547 (0.762~3.141)
SRH	0.390	0.199	1.96*	1.476 (1.000~2.180)
Pseudo R^2			0.1704	
p-value			0.0000	

4. Robustness test

To further validate the results of the Logistic regression analysis on factors influencing health services utilization among the elderly in Guangxi, this study performed a robustness test using Probit regression. The Probit regression analysis revealed that the significance and sign of the coefficients for each variable were consistent with the Logistic regression results, indicating strong robustness of the findings.

Discussion

1. Predisposing characteristics

Age and smoking status significantly influenced inpatient services utilization ($p < 0.05$). The elderly aged 75 and above had higher hospitalization rates, likely due to age-related declines in physiological function and increased vulnerability (Kim & Kim, 2021; Loyd et al., 2020). Former smokers were more likely to be hospitalized than current smokers (OR = 3.986), suggesting that health issues linked to prior smoking may necessitate hospitalization, during which patients are often advised to quit (Henley et al., 2019). These findings underscore the need for community health initiatives to prioritize smoking cessation and health education in Guangxi. Enhancing risk perception and promoting preventive care could reduce the strain on healthcare systems by addressing predisposing factors.

2. Enabling characteristics

Pension insurance significantly affected inpatient services utilization ($p < 0.05$). While 72.31% of the elderly in Guangxi were enrolled in pension insurance, this rate is lower than the 94.36% enrolled in medical insurance, highlighting a coverage gap. Pension insurance alleviated financial barriers to hospitalization, as evidenced by its positive impact on healthcare access among low- and middle-income elderly (Chen et al., 2020). Similar effects have been observed in Mexico, where pensions shifted healthcare demand toward formal services (Carlos & Emma, 2019). To improve the elderly health services utilization, policymakers in Guangxi should integrate pension and medical insurance systems, reduce costs, and encourage early enrollment. Expanding long-term care insurance could further enhance healthcare access and financial security for the elderly (Jiang et al., 2024; Tao & Zeng, 2022).

3. Need characteristics

Self-rated health (SRH), chronic diseases, and pain were significant determinants of health services utilization ($p < 0.05$). SRH, a global predictor of healthcare use (Deng & Chen, 2023; Hajek et al., 2021; Hita et al., 2021), influenced both outpatient and inpatient services utilization. Chronic diseases were strongly associated with inpatient care (OR = 3.391), consistent with prior studies (Kim et al., 2020; Li, 2024; Sahoo et al., 2021). However, unlike previous research (Hajat et al., 2021), chronic diseases did not significantly affect outpatient utilization in our study. Pain significantly increased outpatient visits (OR = 3.845) but not hospitalizations, aligning with findings that pain often leads to non-emergency outpatient care rather than inpatient treatment (Torres et al., 2018). These results suggest that improving health awareness, chronic disease management, and pain interventions could better meet the medical needs of Guangxi's elderly population. Relatives, communities, and nursing homes should prioritize pain management and chronic disease care to prevent worse health outcomes.

Conclusion

Our findings emphasize the need to address need characteristics, which had the most significant impact on health services utilization, consistent with previous studies (Kim & Lee, 2016; Li & Lu, 2017; Lin & Xiao, 2019). Policymakers in Guangxi should focus on enhancing health education to improve risk perception and preventive care utilization, as well as

expanding long-term care insurance to ensure sustainable healthcare access for the elderly. Strengthening chronic disease and pain management at the community level could further reduce inpatient services utilization and improve the quality of life for the elderly. Future research should explore the psychological factors influencing SRH, such as health anxiety and self-efficacy, which were beyond the scope of this study due to data limitations. Additionally, longitudinal studies could provide deeper insights into the causal relationships between smoking cessation, chronic disease management, and health services utilization.

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