Prevalence, Self-Management, and Influencing Factors of Hypertension Based on Structural Equation Modeling in Rural Dayao County, Yunnan Province: A Postprint

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Abstract

Background The control of hypertension in China remains unsatisfactory, with the number of patients continuing to increase. Self-management helps prevent related complications and reduce disease burden. The influencing factors of hypertension prevalence and self-management are complex and diverse, but current research lacks clarification of the magnitude of pathways and indirect effects among various factors.

Objective To analyze the current status and influencing factors of hypertension prevalence and self-management among rural residents in Dayao County, Yunnan Province.

Methods In July 2022, rural permanent residents aged 35 years and above in Dayao County, Yunnan Province, were selected as study subjects using a multistage stratified random sampling method. A self-designed questionnaire was used for face-to-face on-site surveys. The questionnaire content included basic demographic characteristics (gender, age, education level, annual per capita household income, accessibility of medical services), smoking, alcohol consumption, physical activity, family history of hypertension, hypertension prevalence, and self-management status (medication adherence, self-monitoring of blood pressure, and blood pressure-lowering measures taken within the past 2 weeks), etc. Principal Component Analysis (PCA) was used to construct the Socioeconomic Position (SEP) of the respondents, and Structural Equation Modeling (SEM) was used to analyze the influencing factors of hypertension prevalence and self-management.

Results A total of 2,526 questionnaires were distributed, and 2,499 valid questionnaires were recovered, with an effective recovery rate of 98.9%. The preva-

lence of hypertension, medication adherence rate, self-monitoring of blood pressure rate, and rate of taking blood pressure-lowering measures in Dayao County, Yunnan Province were 53.7%, 84.5%, 82.0%, and 88.3%, respectively. Among males, these rates were 52.4%, 82.2%, 80.8%, and 87.8%, respectively; among females, they were 55.0%, 86.8%, 83.2%, and 88.0%, respectively. The prevalence of hypertension increased with age (^{2} trend = 224.142, p < 0.001); the rate of self-monitoring blood pressure decreased with age (^{2} trend = 4.012, P < 0.05); those with lower education level and socioeconomic status had higher hypertension prevalence (^{2} trend = 28.036, ^{2} trend = 12.147, p < 0.001); those with better accessibility of medical services had higher rates of self-monitoring blood pressure (^{2} = 10.137, P < 0.05). SEM results showed that SEP, body shape (including overweight/obesity and central obesity), lack of physical activity, and family history of hypertension had direct effects on hypertension prevalence, with path coefficients of -0.43, 0.16, 0.06, and 0.15, respectively; gender had an indirect effect on hypertension prevalence through SEP, and age had indirect effects through SEP and lack of physical activity, with path coefficients of 0.23 and 0.35, respectively; SEP, alcohol consumption behavior, and disease status of hypertensive patients (including disease duration and complications) had direct effects on self-management, with path coefficients of 0.20, -0.17, and 0.53, respectively; gender had an indirect effect on hypertension self-management through alcohol consumption behavior, with a path coefficient of 0.06.

Conclusion The prevalence of hypertension in Dayao County is relatively high, while self-management status is generally good. Health education and management of hypertension should be strengthened for the elderly, those with low socioeconomic status, and those with unhealthy lifestyles.

Full Text

Analysis of the Prevalence and Self-Management of Hypertension and Its Influencing Factors Based on Structural Equation Modeling in Rural Dayao County, Yunnan Province

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Abstract

Background: Hypertension control in China remains unsatisfactory, with the number of patients continuing to increase. Self-management plays a positive role in preventing related complications and reducing the economic burden of disease. The influencing factors of hypertension prevalence and self-management are complex and diverse, but few studies have identified path coefficients and indirect effects among these factors.

Objective: This study aimed to analyze the prevalence of hypertension and self-management behaviors and their influencing factors among rural residents aged 35 years and older in Dayao County, Yunnan Province.

Methods: A multistage stratified random sampling method was used to select rural permanent residents aged 35 years and older from Dayao County, Yunnan Province, in July 2022. Participants underwent a one-on-one field survey using a self-designed questionnaire and physical examination. The questionnaire covered basic demographic characteristics (gender, age, education level, annual per capita household income, medical service accessibility), smoking, alcohol consumption, physical activity, family history of hypertension, hypertension status, and self-management behaviors (medication adherence, blood pressure self-monitoring, and antihypertensive measures taken within the past two weeks). Principal component analysis (PCA) was used to construct a socioeconomic position (SEP) index, while structural equation modeling (SEM) was employed to analyze influencing factors of hypertension prevalence and self-management.

Results: A total of 2,526 questionnaires were distributed, with 2,499 valid questionnaires returned (effective response rate: 98.9%). The prevalence of hypertension was 53.7%, and the rates of medication adherence, blood pressure self-monitoring, and antihypertensive measure adoption were 84.5%, 82.0%, and 88.3%, respectively. Hypertension prevalence increased with age (^{2} trend = 224.142, $P < 0.001$), while blood pressure self-monitoring rates decreased with age (^{2} trend = 4.012, $P < 0.05$). Individuals with lower education levels and lower SEP had higher hypertension prevalence ($^2 = 28.036$, ^{2} trend = 12.147, $P < 0.001$). Those with better medical service accessibility had higher blood

pressure self-monitoring rates ($^2 = 10.137$, $P < 0.05$). SEM results showed that SEP, body shape (including overweight/obesity and central obesity), physical inactivity, and family history of hypertension had direct effects on hypertension prevalence, with path coefficients of -0.43, 0.16, 0.06, and 0.15, respectively. Gender had an indirect effect on hypertension prevalence through SEP (path coefficient: 0.23), while age had an indirect effect through SEP and physical inactivity (path coefficient: 0.35). SEP, alcohol consumption, and hypertension severity (including disease duration and complications) had direct effects on self-management, with path coefficients of 0.20, -0.17, and 0.53, respectively. Gender had an indirect effect on self-management through alcohol consumption (path coefficient: 0.06).

Conclusion: Rural Dayao County has a relatively high prevalence of hypertension but overall good self-management. Health education and management for hypertension should be strengthened among the elderly, individuals with low SEP, and those with unhealthy lifestyles.

Keywords: Hypertension; Prevalence; Self-management; Root Cause Analysis; Structural equation modeling

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Introduction

Hypertension affects over 1 billion people globally, with deaths attributable to hypertension increasing by 56.1% over the past decade, making it a major risk factor for cardiovascular disease and premature mortality [1-2]. China has approximately 245 million hypertension patients, most of whom fail to achieve adequate blood pressure control [3-4]. Sustained uncontrolled hypertension can lead to complications such as stroke and chronic kidney disease, while self-management among hypertensive patients plays a positive role in preventing these complications [5].

Currently, numerous domestic studies have identified diverse factors influencing hypertension prevalence and self-management. However, these studies have focused only on direct effects of related factors on outcomes, neglecting indirect effects among factors [6-8]. Structural equation modeling (SEM) can clearly quantify direct and indirect relationships and path coefficients among variables, addressing limitations of previous research. This study conducted a field survey of 2,499 rural residents aged 35 years and older in Dayao County, Yunnan Province, to analyze the current status of hypertension prevalence and self-management and explore influencing factors using SEM, providing scientific evidence for hypertension prevention and health management system improvement in rural Yunnan.

Methods

Study Population In July 2022, we used a multistage stratified random sampling method to select rural permanent residents aged 35 years and older from Dayao County, Yunnan Province, as study subjects. All participants provided informed consent.

The sampling procedure was as follows: First, the 12 townships in Dayao County were stratified into two levels based on gross domestic product (GDP)—good and poor. One township was randomly selected from each level. Second, using probability proportional to size (PPS) sampling, seven villages were selected from each of the two townships based on village population size. Third, residents aged 35 years and older were randomly selected from the 14 sample villages as survey participants.

Data Collection **Questionnaire Survey:** Trained graduate students from Kunming Medical University conducted one-on-one field interviews using a self-designed questionnaire. The questionnaire covered basic demographic characteristics (gender, age, education level, annual per capita household income, medical service accessibility), smoking, alcohol consumption, physical activity, family history of hypertension, hypertension status, and self-management behaviors (medication adherence, blood pressure self-monitoring, and antihypertensive measures taken within the past two weeks).

Physical Examination: Trained investigators measured participants' blood pressure, height, weight, and waist circumference. Before blood pressure measurement, participants rested for at least 5 minutes. A calibrated Omron electronic sphygmomanometer was used to measure seated upper-arm blood pressure. Measurements were repeated after 1-2 minutes, and the average of two readings was recorded. If systolic or diastolic readings differed by more than 5 mmHg, a third measurement was taken, and the average of three readings was used. All measurements were recorded as integers.

Diagnostic Criteria and Definitions

1. **Hypertension:** Defined according to the 2018 revision of the Chinese Guidelines for Prevention and Treatment of Hypertension [9]: systolic blood pressure $\geq$ 140 mmHg and/or diastolic blood pressure $\geq$ 90 mmHg without antihypertensive medication, or a history of hypertension with current use of antihypertensive medication (even if blood pressure $<$ 140/90 mmHg).
2. **Medication Adherence Rate:** (Number of patients taking antihypertensive medication as prescribed / Number of patients aware of their hypertension) $\times$ 100%.
3. **Blood Pressure Self-Monitoring Rate:** (Number of patients who self-monitor blood pressure / Number of patients aware of their hypertension)

$\times$ 100%.

4. **Antihypertensive Measure Adoption Rate:** (Number of patients who adopted any antihypertensive measure within two weeks before the survey / Number of patients aware of their hypertension) $\times$ 100%. Measures included low-salt diet, physical exercise, weight control, smoking cessation, and alcohol limitation.
5. **Annual Per Capita Household Income:** Categorized using the median of 8,333 yuan as the cutoff; $\geq$ 8,333 yuan was defined as high income, $<$ 8,333 yuan as low income.
6. **Medical Service Accessibility:** Defined as poor if travel time from home to the nearest medical institution was $\geq$ 30 minutes on foot, and good if $<$ 30 minutes [10].
7. **Socioeconomic Position (SEP):** A latent construct measured using three indicators: education level, annual per capita household income, and medical service accessibility.
8. **Overweight/Obesity:** Based on the Guidelines for Prevention and Control of Overweight and Obesity in Chinese Adults [11]: 24.0 kg/m^2 $\leq$ BMI $<$ 28.0 kg/m^2 as overweight, BMI $\geq$ 28.0 kg/m^2 as obesity.
9. **Central Obesity:** Defined as waist circumference (WC) $\geq$ 85.0 cm for men and $\geq$ 80.0 cm for women.
10. **Smoking:** Defined as having smoked $\geq$ 100 cigarettes or $\geq$ 150 g of tobacco before the survey [10].
11. **Alcohol Consumption:** Defined as drinking at least once per week for 12 consecutive or cumulative months [12].
12. **Physical Inactivity:** Defined as sitting for $\geq$ 4 hours daily or only able to engage in light physical activity [13].

Quality Control Before the survey, investigators explained the study purpose, significance, and confidentiality principles to participants to obtain their trust. During the survey, investigators maintained neutrality, used uniformly trained language to interview participants, and completed questionnaires on their behalf to ensure standardization. After the survey, investigators immediately checked questionnaires for missing items, writing errors, and logical inconsistencies to ensure data reliability. Questionnaires with identity errors, severe missing items, random responses, or uncorrectable errors were excluded as invalid.

Statistical Analysis Data were double-entered using EpiData 3.1 and analyzed using SPSS 22.0. Categorical data were expressed as relative frequencies, and comparisons between groups used ^{2} tests. Principal component analysis

(PCA) was used to construct the SEP index, with eigenvalues > 1 determining the number of components to extract. Amos 24.0 was used to build SEM, with maximum likelihood (ML) estimation for parameter estimation. The significance level was set at $\alpha = 0.05$.

Results

General Characteristics A total of 2,526 questionnaires were distributed, yielding 2,499 valid questionnaires (effective response rate: 98.9%). The sample included 1,232 men (49.3%) and 1,267 women (50.7%). Age distribution was: 35-44 years (204 cases, 8.2%), 45-54 years (521 cases, 20.8%), 55-64 years (646 cases, 25.9%), 65-74 years (647 cases, 25.9%), and $\geq$ 75 years (481 cases, 19.2%). Education level: illiterate (513 cases, 20.5%) and primary school or above (1,986 cases, 79.5%). Annual per capita household income: low (1,140 cases, 45.6%) and high (1,359 cases, 54.4%). Medical service accessibility: poor (936 cases, 37.5%) and good (1,563 cases, 62.5%). Overweight/obesity was present in 690 cases (27.6%); central obesity in 925 cases (37.0%); smoking in 832 cases (33.3%); alcohol consumption in 442 cases (17.7%); physical inactivity in 884 cases (35.4%); and family history of hypertension in 610 cases (24.4%).

Construction of Socioeconomic Position (SEP) PCA results showed that education level, annual per capita household income, and medical service accessibility were not independent (KMO statistic = 0.506, Bartlett' s test ^{2} = 13.486, P $<$ 0.005), with only one eigenvalue > 1, so one principal component was extracted. The SEP composite score function was: SEP score = 0.342 $\times$ annual per capita household income + 0.683 $\times$ education level + 0.645 $\times$ medical service accessibility. Based on tertiles of the SEP composite score ($<$ 33.3%, 33.3%-66.7%, $>$ 66.7%), participants' SEP was categorized as low (979 cases, 39.2%), medium (778 cases, 31.1%), and high (742 cases, 29.7%). Men had higher SEP than women [men: low (417 cases, 33.8%), medium (562 cases, 44.4%), high (350 cases, 27.6%); women: low (562 cases, 44.4%), medium (355 cases, 28.0%), high (350 cases, 27.6%)] (^{2} = 29.312, P $<$ 0.001). SEP decreased with age [35-44 years: low (47 cases, 23.0%), medium (57 cases, 27.9%), high (100 cases, 49.0%); 45-54 years: low (134 cases, 25.7%), medium (175 cases, 33.6%), high (212 cases, 40.7%); 55-64 years: low (227 cases, 35.1%), medium (220 cases, 34.1%), high (199 cases, 30.8%); 65-74 years: low (314 cases, 48.5%), medium (190 cases, 29.4%), high (140 cases, 22.1%); $\geq$ 75 years: low (257 cases, 53.4%), medium (136 cases, 28.3%), high (88 cases, 18.3%)] (^{2} trend = 156.047, P $<$ 0.001).

Hypertension Prevalence and Self-Management Status Among the surveyed population, 1,343 cases of hypertension were identified, yielding a prevalence of 53.7%. The rates of medication adherence, blood pressure

self-monitoring, and antihypertensive measure adoption were 84.5%, 82.0%, and 88.3%, respectively. Hypertension prevalence increased with age (^{2} trend = 224.142, P < 0.001), while blood pressure self-monitoring rates decreased with age (^{2} trend = 4.012, P < 0.05). Illiterate individuals had higher hypertension prevalence than those with primary school education or above (^{2} = 28.036, P < 0.001). Lower SEP was associated with higher hypertension prevalence (^{2} trend = 12.147, P < 0.001). Participants with good medical service accessibility had higher blood pressure self-monitoring rates than those with poor accessibility (^{2} = 10.137, P < 0.05). Individuals with family history of hypertension, overweight/obesity, central obesity, or physical inactivity had higher hypertension prevalence than those without these risk factors (P < 0.001). Patients with alcohol consumption had lower rates of medication adherence, blood pressure self-monitoring, and antihypertensive measure adoption than non-drinkers (P < 0.05). Detailed data are presented in Table 1 .

SEM Construction and Analysis Model Construction: Two SEMs were constructed with hypertension status and self-management among hypertensive patients as endogenous outcome variables. Hypertension status was an endogenous observed variable; self-management was an endogenous latent variable comprising three observed variables (medication adherence, blood pressure self-monitoring, and antihypertensive measure adoption). Age, gender, alcohol consumption, physical inactivity, and family history of hypertension were exogenous observed variables; body shape, SEP, and hypertension severity were exogenous latent variables. Body shape included overweight/obesity and central obesity; SEP included education level, annual per capita household income, and medical service accessibility; hypertension severity included disease duration and presence of complications. In the models, ellipses represent latent variables, rectangles represent observed variables, and single-headed arrows represent effects of exogenous on endogenous variables. Based on modification indices from AMOS and maximum likelihood estimation results, the model was refined by removing non-significant paths. The final model showed acceptable absolute, incremental, and parsimonious fit indices, indicating good model fit (Table 2 , Figure 1 [Figure 1: see original paper], Figure 2 [Figure 2: see original paper]).

Path Analysis: Results showed that among influencing factors of hypertension prevalence, gender had an indirect effect through SEP (path coefficient: 0.23), and age had an indirect effect through SEP and physical inactivity (path coefficient: 0.35). Body shape, physical inactivity, family history of hypertension, and SEP had direct effects on hypertension prevalence, with path coefficients of 0.16, 0.06, 0.15, and -0.43, respectively. Within body shape, central obesity had the greatest impact (path coefficient: 0.14); within SEP, education level had the greatest impact (path coefficient: -0.17). The largest path coefficient was for SEP (-0.43), indicating that each one-level increase in SEP decreased hypertension risk by 0.43; the second largest was for age (0.35), indicating that older age increased hypertension risk by 0.35. Central obesity, physical inactivity, family

history of hypertension, and lower education level increased hypertension risk by 0.14, 0.06, 0.15, and 0.17, respectively.

For self-management among hypertensive patients, gender had an indirect effect through alcohol consumption (path coefficient: 0.06). SEP, alcohol consumption, and hypertension severity had direct effects on self-management, with path coefficients of 0.20, -0.17, and 0.53, respectively. Within SEP, education level had the greatest impact (path coefficient: 0.03); within hypertension severity, disease duration had the greatest impact (path coefficient: 0.31). The largest path coefficient was for hypertension severity (0.53), indicating that disease progression increased self-management behaviors by 0.53; the second largest was for SEP (0.20), indicating that each one-level increase in SEP increased self-management behaviors by 0.20. Detailed path coefficients are shown in Table 3 .

Discussion

This survey revealed a hypertension prevalence of 53.7% among rural residents in Dayao County, Yunnan Province, which is higher than that in rural Yunnan Province overall (38.4%) [14], rural Sichuan Province (26.06%) [15], rural Guizhou Province (35.38%) [16], and rural China nationally (29.4%) [17]. These findings indicate that hypertension prevalence in this region is at a high level, posing a serious threat to local residents' health, and that relevant authorities should intensify prevention and control efforts. The survey also showed that medication adherence and blood pressure self-monitoring rates among hypertensive patients were 84.5% and 82.0%, respectively, higher than those in rural Henan Province (61.17%) [18] and rural Jiangsu Province (64.6%) [19]; the antihypertensive measure adoption rate was 88.3%, lower than that in rural Luoping County, Yunnan (96.2%) [20]. These results suggest that self-management among hypertensive patients in this region is generally good, with relatively well-developed primary healthcare resources, though lifestyle interventions still need strengthening.

This study found that lower SEP was associated with higher hypertension prevalence, and that women had lower SEP than men, consistent with domestic and international research [21-23]. SEM results showed that SEP had a direct effect on hypertension prevalence, with each one-level increase in SEP decreasing hypertension risk by 0.43. This indicates that individuals with lower socioeconomic status, particularly women, are priority populations for hypertension prevention. Among the three indicators constituting SEP, education level had the greatest impact on hypertension prevalence, with lower education increasing hypertension risk by 0.17 compared to higher education. Therefore, local governments should develop personalized interventions targeting individuals with low education levels to improve their hypertension prevention awareness and management capabilities.

This study also found that hypertension prevalence increased progressively with age, consistent with previous research [24-25]. In the SEM, age had an indirect effect on hypertension prevalence through physical inactivity and SEP, with older adults having lower SEP and higher rates of physical inactivity, resulting in greater hypertension risk. Additionally, family history of hypertension and body shape, particularly central obesity, were risk factors for hypertension. These findings suggest that primary healthcare institutions should focus health education efforts on older adults, individuals with central obesity, and those with family history of hypertension, promoting moderate exercise and weight control for prevention.

SEM results indicated that SEP had a direct effect on self-management among hypertensive patients, with higher SEP associated with better self-management behaviors. This may be because higher education and income enable access to better healthcare resources, and good medical service accessibility facilitates timely physician training and feedback, promoting sustained blood pressure self-management [26-27].

SEM results also showed that hypertension severity had a direct effect on self-management, with longer disease duration and presence of complications associated with better self-management adherence. This may be related to increased disease awareness during the illness course [28-29]. As disease duration extends and complications emerge, patients gradually master blood pressure measurement techniques and develop habits of timely medication intake and healthy living. However, patients with alcohol consumption showed poorer self-management adherence, indicating that drinkers are a key population for health management. Risk perception education should be strengthened in this group to improve self-management capacity and reduce complications.

This study has limitations. All participants were from a single region, limiting sample representativeness. Future research will conduct multicenter, large-sample surveys across different age groups of hypertensive patients for validation. Longitudinal follow-up studies will also be conducted to explore how variable relationships change over time and to understand factors influencing hypertension self-management and health promotion behaviors.

References

[1] VIRANI S S, ALONSO A, BENJAMIN E J, et al. Heart disease and stroke statistics-2020 update: a report from the American heart association[J]. Circulation, 2020, 141(9): e139-e596. DOI: 10.1161/CIR.0000000000000757.

[2] COLLABORATORS G 2 R F. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the global burden of disease study 2019[J]. Lancet, 2020, 396(10258): 1223-1249. DOI: 10.1016/S0140-6736(20)30752-2.

[3] Ma LY, Wang ZW, Fan J, et al. Key points interpretation of the "China Cardiovascular Health and Disease Report 2022" [J]. Chinese General Practice, 2023, 26(32): 3975-3979.

[4] MA S J, YANG L, ZHAO M, et al. Trends in hypertension prevalence, awareness, treatment and control rates among Chinese adults, 1991-2015[J]. J Hypertens, 2021, 39(4): 740-748. DOI: 10.1097/HJH.0000000000002698.

[5] TAN F C J H, OKA P, DAMBHA-MILLER H, et al. The association between self-efficacy and self-care in essential hypertension: a systematic review[J]. BMC Fam Pract, 2021, 22(1): 44. DOI: 10.1186/s12875-021-01391-2.

[6] Fang JY, He LP, Fu HC, et al. Analysis of blood pressure level distribution characteristics and hypertension epidemic status among adult residents in Yunnan Province[J]. Modern Preventive Medicine, 2023, 50(6): 1128-1132, 1152. DOI: 10.20043/j.cnki.MPM.202208397.

[7] Liu ZF, Sun FS, Chong GF, et al. Analysis of hypertension prevalence and influencing factors among adult residents in hilly rural areas of Shandong Province[J]. Chinese Journal of Prevention and Control of Chronic Diseases, 2022, 30(10): 764-767. DOI: 10.16386/j.cjpccd.issn.1004-6194.2022.10.010.

[8] Ao YZ. Research progress on self-management of hypertensive patients and its influencing factors[J]. Shenzhen Journal of Integrated Traditional Chinese and Western Medicine, 2022, 32(5): 133-136. DOI: 10.16458/j.cnki.1007-0893.2022.05.041.

[9] Chinese Hypertension Prevention and Treatment Guidelines Revision Committee, Hypertension League (China), Chinese Society of Cardiology, Chinese Medical Association, et al. Chinese guidelines for prevention and treatment of hypertension (2018 revised edition)[J]. Chinese Journal of Cardiovascular Medicine, 2019, 24: 24-56.

[10] Liu L, Wang XM, Li JB, et al. Prevalence of chronic obstructive pulmonary disease and influencing factors based on structural equation modeling among rural residents in Yunnan Province[J]. Chinese Journal of Disease Control & Prevention, 2022, 26(11): 1332-1338. DOI: 10.16462/j.cnki.zhjbkz.2022.11.016.

[11] Working Group on Obesity in China. Guidelines for prevention and control of overweight and obesity in Chinese adults (excerpt)[J]. Acta Nutrimenta Sinica, 2004, 26(1): 1-4.

[12] Hu CY. Causal association between alcohol consumption and incidence and mortality of cardiovascular disease in Chinese population[D]. Beijing: Peking Union Medical College, 2021.

[13] Li X, Shen JR, Liu YN, et al. Prevalence of diabetes and influencing factors based on structural equation modeling among rural elderly in Yunnan Province[J]. Chinese Journal of Disease Control & Prevention, 2023, 27(5): 546-550. DOI: 10.16462/j.cnki.zhjbkz.2023.05.009.

[14] Yang CJ, Qin MF, Yang YF, et al. Survey on prevalence, awareness, treatment, and control of hypertension among adult residents in Yunnan Province[J]. Chinese Journal of Public Health, 2019, 35(10): 1289-1292.

[15] Wang QQ, Wan SP, Wu WB, et al. Analysis of hypertension prevalence and influencing factors among urban and rural residents in Sichuan Province[J]. Chinese Journal of Hypertension, 2019, 27(8): 764-770. DOI: 10.16439/j.cnki.1673-7245.2019.08.019.

[16] Liu ZJ, Ou FY, Rao WB, et al. Analysis of hypertension prevalence and its influencing factors among urban and rural residents in Guizhou Province[J]. Chinese Journal of Public Health, 2019, 35(10): 1293-1296.

[17] Zhang M, Wu J, Zhang X, et al. Study on hypertension prevalence and control status among Chinese adult residents in 2018[J]. Chinese Journal of Epidemiology, 2021, 42(10): 1780-1789.

[18] Li HJ, Chen XJ, Hu XQ, et al. Analysis of medication status and influencing factors for hypertension among elderly people in Henan Province[J]. Modern Preventive Medicine, 2022, 49(7): 1264-1268.

[19] Shu J. Study on unhealthy lifestyle status and influencing factors among middle-aged and elderly hypertensive patients in rural Lianyungang[D]. Hefei: Anhui Medical University, 2018.

[20] Mo Y, Liu L, Li JB, et al. Study on hypertension prevalence and self-management status and their impact on activities of daily living among rural elderly in Luoping County, Yunnan Province[J]. Chongqing Medicine, 2023, 52(18): 2839-2843. DOI: 10.3969/j.issn.1671-8348.2023.18.023.

[21] Lin SR, Su X, Wu YL, et al. Prospective cohort study on socioeconomic status, healthy lifestyle and hypertension incidence[J]. Chinese Journal of Disease Control & Prevention, 2023, 27(4): 379-384, 398. DOI: 10.16462/j.cnki.zhjbkz.2023.04.002.

[22] MA H, LIU F C, LI J X, et al. Sex differences in associations between socioeconomic status and incident hypertension among Chinese adults[J]. Hypertension, 2023, 80(4): 783-791. DOI: 10.1161/HYPERTENSIONAHA.122.20061.

[23] NEUFCOURT L, DEGUEN S, BAYAT S, et al. Gender differences in the association between socioeconomic status and hypertension in France: a cross-sectional analysis of the CONSTANCES cohort[J]. PLoS One, 2020, 15(4): e0231878. DOI: 10.1371/journal.pone.0231878.

[24] Zhang SJ, Wang WL, Sun JX, et al. Analysis of hypertension prevalence and influencing factors among adults in Xinjiang in 2018[J]. Chinese Journal of Prevention and Control of Chronic Diseases, 2023, 31(5): 349-353. DOI: 10.16386/j.cjpccd.issn.1004-6194.2023.05.006.

[25] Feng YC, Feng M, Ma YH, et al. Differential analysis of influencing factors of hypertension prevalence and public health prevention and control strategies

among adult residents in northern and southern China[J]. Chinese Journal of Health Statistics, 2023, 40(6): 860-864.

[26] NATALE P, NI J Y, MARTINEZ-MARTIN D, et al. Perspectives and experiences of self-monitoring of blood pressure among patients with hypertension: a systematic review of qualitative studies[J]. Am J Hypertens, 2023, 36(7): 372-384. DOI: 10.1093/ajh/hpad021.

[27] KONLAN K D, AFAM-ADJEI C J, AFAM-ADJEI C, et al. Practice and sociodemographic factors influencing self-monitoring of blood pressure in ghanaians with hypertension[J]. Int J Chronic Dis, 2020, 2020: 6016581. DOI: 10.1155/2020/6016581.

[28] Li H, Zhang JN, Ma YX, et al. Risk perception of cardiovascular disease and its impact on self-management among rural elderly hypertensive patients[J]. Journal of Nursing Science, 2023, 38(19): 12-15, 33.

[29] Zheng XL. Current status of self-management ability and its risk factors in hypertensive patients[J]. Cardiovascular Disease Prevention Knowledge, 2022, 12(8): 27-30.

Author Contributions: YU Zizi was responsible for statistical analysis, drafting the manuscript, and revision follow-up. LIU Duli, LI Ximin, and RUAN Chunyi conducted field surveys and data collection. YIN Xiangyang coordinated fieldwork and performed quality control and review. CAI Le secured funding, provided resources, supervised the study, performed quality control, and took overall responsibility for the article. All authors approved the final manuscript.

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