Changes in Disease Burden of Five Common Chronic Diseases Among Rural Residents in Yunnan Province from 2011 to 2021: A Post-print

Authors: Wu Xia, Liu Lan, Zhao Yi, Li Guohui, Cui Wenlong, Sun Chenghuan, Cai Le, Cai Le

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Abstract

Background Chronic diseases have become a major public health problem affecting population health. The number of chronic disease patients in China continues to increase, the number of deaths is rising year by year, and the disease burden on patients is gradually intensifying. Understanding the changing trends in chronic disease burden is of great significance for prevention and control efforts; however, few studies have examined the changing burden of common chronic diseases in rural Yunnan Province.

Objective To analyze changes in the disease burden of five common chronic diseases [hypertension, coronary heart disease, stroke, asthma, and chronic obstructive pulmonary disease (COPD)] among rural residents in Yunnan Province between 2011 and 2021.

Methods A repeated cross-sectional design was employed. In 2011 and 2021, 8,400 and 7,700 rural residents aged $ $35 years in Yunnan Province were selected as study subjects using multistage stratified random sampling. Data were collected through on-site questionnaires and physical examinations, along with mortality data for the five chronic diseases. Principal component analysis was used to construct a socioeconomic position (SEP) index based on three variables: education level, annual per capita household income, and healthcare accessibility. The comprehensive SEP score was calculated using variable coefficients, and socioeconomic position was categorized into four levels (low, lower-middle, upper-middle, and high) based on quartiles of the comprehensive SEP score. Disability-adjusted life years (DALY) were used to measure the disease burden of the five chronic diseases.

Results Compared with 2011, the overall prevalence rates of hypertension (25.14% vs. 41.57%), stroke (1.03% vs. 2.52%), and COPD (9.23% vs. 12.60%) among rural residents in Yunnan Province in 2021 all increased (all P<0.05), with prevalence rates also increasing among males, females, and all socioeconomic position groups (P<0.05). The overall prevalence rates of coronary heart disease (2.02% vs. 2.30%) and asthma (1.36% vs. 1.61%) showed no significant change (P>0.05); however, the prevalence of coronary heart disease among males and high socioeconomic position groups, and the prevalence of asthma among males and upper-middle socioeconomic position groups did increase (P<0.05). In 2021, the prevalence rates of all five chronic diseases were higher in males than in females (P<0.05). The prevalence of COPD among different socioeconomic position groups in 2021 showed a decreasing trend (2 trend=6.801, P<0.001). Additionally, DALYs per 1,000 population increased for coronary heart disease (10.45 vs. 18.18), stroke (12.80 vs. 23.20), asthma (4.54 vs. 9.10), and COPD (35.99 vs. 49.07), while decreasing for hypertension (1.38 vs. 1.26). COPD had the highest DALYs per 1,000 population and years lived with disability (YLD), while stroke had the highest years of life lost due to premature mortality (YLL) per 1,000 population.

Conclusion Compared with 2011, the prevalence rates and disease burden of the five common chronic diseases among rural residents in Yunnan Province in 2021 showed an overall increasing trend, with COPD having the heaviest disease burden. Males and low socioeconomic position groups are key target populations for future chronic disease prevention and control. Targeted prevention and control strategies should be implemented to reduce the harm of chronic diseases to population health.

Full Text

Changes in the Burden of Five Common Chronic Diseases among Rural Residents in Yunnan Province in 2011 and 2021

WU Xia[12], LIU Lan[1], ZHAO Yi[13], LI Guohui[1], CUI Wenlong[1], SUN Chenghuan[1], CAI Le[1]*

[1]School of Public Health, Kunming Medical University, Kunming 650500, China
[2]Hospital Infection Management Office, the Second Affiliated Hospital of Kunming Medical University, Kunming 650106, China
[3]Department of Endocrinology, the First Affiliated Hospital of Kunming Medical University, Kunming 650032, China
*Corresponding author: CAI Le, Professor/Doctoral supervisor; E-mail: caile002@hotmail.com

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Abstract

Background: Chronic diseases have become a major public health problem affecting population health. The number of chronic disease patients in China continues to increase, with annual deaths due to chronic disease rising year by year, and the disease burden on patients gradually intensifying. Understanding changes in chronic disease burden is of great importance for prevention and control efforts, yet there is a lack of research on changes in the burden of common chronic diseases in rural Yunnan Province.

Objective: To examine changes in the disease burden of five common chronic diseases [hypertension, coronary heart disease (CHD), stroke, asthma, and chronic obstructive pulmonary disease (COPD)] among rural residents in Yunnan Province between 2011 and 2021.

Methods: A repeated cross-sectional design was employed. Using multistage stratified random sampling, 8,400 and 7,700 rural residents aged $ $35 years in Yunnan Province were selected as study subjects in 2011 and 2021, respectively. Data were collected through on-site questionnaires and physical examinations, along with mortality data for the five chronic diseases. Principal component analysis was used to construct a socioeconomic status (SEP) indicator using three variables: education level, annual household income per capita, and accessibility to medical services. SEP composite scores were calculated using variable coefficients, and socioeconomic status was categorized into four grades (low, medium-low, medium-high, and high) based on quartiles of the composite score. Disability-adjusted life years (DALY) were used to measure the magnitude of disease burden for the five chronic diseases.

Results: Compared with 2011, the overall prevalence of hypertension (25.14% vs. 41.57%), stroke (1.03% vs. 2.52%), and COPD (9.23% vs. 12.60%) among rural Yunnan residents increased in 2021 (all $P<0.05$), with prevalence also rising among males, females, and all SEP groups ($P<0.05$). The overall prevalence of CHD (2.02% vs. 2.30%) and asthma (1.36% vs. 1.61%) showed no significant change ($P>0.05$), though CHD prevalence increased among males and those with high SEP, and asthma prevalence increased among males and those with medium-high SEP ($P<0.05$). In 2021, the prevalence of all five chronic diseases was higher in males than in females ($P<0.05$), and COPD prevalence showed a decreasing trend across SEP grades in 2021 (^{2} trend=6.801, $P<0.001$). Additionally, DALY per 1,000 population increased for CHD (10.45 vs. 18.18), stroke (12.80 vs. 23.20), asthma (4.54 vs. 9.10), and COPD (35.99 vs. 49.07), while hypertension DALY decreased (1.38 vs. 1.26). COPD showed the highest DALY and years lived with disability (YLD) per 1,000 population, while stroke showed the highest years of life lost (YLL) per 1,000 population.

Conclusion: The prevalence and disease burden of five common chronic diseases among rural residents in Yunnan Province were generally higher in 2021

than in 2011. COPD imposed the heaviest disease burden in 2021, with males and low SEP populations being key target groups for future chronic disease prevention and control. Targeted prevention and control strategies should be adopted to reduce the health harm caused by chronic diseases.

Keywords: chronic disease; burden of illness; changes; socioeconomic status; disability adjusted life year; Yunnan province; rural areas

Introduction

Chronic diseases have become a major public health problem affecting population health. With continuous development of industrialization, urbanization, and population aging, along with sustained improvement in health service quality, residents' life expectancy continues to increase. Consequently, the number of chronic disease patients in China will continue to grow, deaths due to chronic diseases increase annually, and the disease burden on patients gradually intensifies [1-2]. The proportion of deaths caused by chronic diseases in China has already risen from 69.8% to 88.5% between 1991 and 2019 [3]. Yunnan Province, located in southwestern China with relatively backward economic development, shows rising chronic disease prevalence, with faster growth in rural areas [4]. However, survey data on changes in the burden of common chronic diseases in rural Yunnan remain scarce. China's basic public health service programs include health management for chronic disease patients aged 35 years and above residing in their jurisdiction. Therefore, this study employed multistage stratified random sampling to conduct on-site questionnaires and physical examinations among rural residents aged 35 years and above in Yunnan Province in 2011 and 2021, aiming to analyze changes in the disease burden of five common chronic diseases [hypertension, coronary heart disease (CHD), stroke, asthma, and chronic obstructive pulmonary disease (COPD)] among rural residents, providing scientific evidence for rural chronic disease prevention and control.

Methods

1.1 Study Subjects

Using multistage stratified random sampling, permanent rural residents aged 35 years and above from three counties in Yunnan Province were selected as study subjects in both 2011 and 2021 [5]. Inclusion criteria were: (1) rural residents living locally for $ $6 months; (2) age $ $35 years; (3) informed consent and willingness to cooperate with the investigation. Exclusion criteria: individuals with consciousness disorders or mental illness who could not cooperate with the study. This study was approved by the Ethics Review Committee of Kunming Medical University (KMMU2020MEC031), and all subjects signed informed consent forms.

1.2 Research Methods

1.2.1 Study Design and Sampling This study employed a repeated cross-sectional design. In 2011, a multistage stratified random sampling method was used to select study samples. In the first stage, Yunnan's 129 counties were stratified into three economic levels (good, medium, and poor) based on per capita GDP, with one county randomly selected from each stratum (total of three counties). In the second stage, townships within the selected counties were stratified into two economic levels (good and poor) based on GDP, with one township randomly selected from each stratum in each county (total of six townships). In the third stage, three villages were randomly selected from each of the six townships using probability proportionate to size sampling (total of 18 villages). In the fourth stage, permanent residents aged 35 years and above were randomly selected from the 18 villages using simple random sampling.

1.2.2 Data Collection Data were collected through on-site questionnaires, physical examinations, and mortality data for the five chronic diseases. (1) Questionnaires: A self-designed questionnaire was administered face-to-face by uniformly trained investigators. Content included basic demographic characteristics (sex, age, education level, annual household income per capita, accessibility to medical services) and prevalence of five chronic diseases (hypertension, CHD, stroke, asthma, COPD). (2) Physical examinations: Physicians from the First and Second Affiliated Hospitals of Kunming Medical University measured blood pressure and lung function [6-7]. (3) Mortality data for the five chronic diseases were obtained from the local Center for Disease Control and Prevention's population death information registration and management system, with causes of death coded according to the International Classification of Diseases Version 10 (ICD-10) [6].

1.2.3 Diagnostic Criteria and Related Definitions

(1) Hypertension diagnostic criteria [8]: Currently taking antihypertensive medication, or previously diagnosed with hypertension at township-level or higher medical institutions, or with an average of two or three blood pressure measurements on the day showing systolic blood pressure $ $140 mmHg (1 mmHg=0.133 kPa) and/or diastolic blood pressure $ $90 mmHg. (2) Diagnosis of CHD, stroke, and asthma was based on diagnostic reports provided by subjects from township health centers or higher-level medical institutions. (3) COPD diagnostic criteria [9]: Ratio of forced expiratory volume in one second to forced vital capacity <70% after inhalation of bronchodilator (salbutamol) for 15 minutes. (4) Annual household income per capita was dichotomized at the median (6,985 yuan) [10], with $ $6,985 yuan defined as high income and <6,985 yuan as low income. (5) Accessibility to medical services was dichotomized based on time walking from home to the nearest medical institution: <30 minutes as good accessibility and $ $30 minutes as poor accessibility [10].

1.2.4 Construction of Socioeconomic Status Indicator Traditional composite socioeconomic status indicators typically include three dimensions: "occupation," "education," and "income." Referring to the application of comprehensive health economic status and socioeconomic status indicators in relevant studies [10-11] and combining with our research group's previous work in Yunnan Province, principal component analysis was used to construct the SEP indicator using three variables: education level, annual household income per capita, and accessibility to medical services. When the KMO test value $ $0.5 and Bartlett's test P<0.001, the data were considered suitable for principal component analysis. The principal component with eigenvalue >1 was extracted to construct the SEP indicator. The SEP composite score was calculated using coefficients of the three variables with the following formula:

SEP composite score = 0.507 × annual household income per capita + 0.562 × accessibility to medical services + 0.546 × education level

Based on quartiles of the SEP composite score, socioeconomic status was categorized into four grades: low, medium-low, medium-high, and high.

1.2.5 Measurement of Disease Burden Disability-adjusted life years (DALY) were used to measure disease burden, comprising two components: years of life lost due to premature mortality (YLL) and years lived with disability (YLD).

The DALY calculation formula is:

$x = \alpha + L$
$DALY = YLL + YLD = \int DC^{\wedge}(-\beta x)\, e^{\wedge}(-(x-\alpha))\, dx$ (Formula 1)

Where x represents age, α represents age at onset, L represents duration of disability or premature death; D represents disability weight (0-1); $DC^{\wedge}(-\beta x)xe$ represents calculation of survival time at different ages, C represents the age weight correction constant (0.1658); γ represents the discount rate (3%); $e^{\wedge}(-(x-a))$ represents the continuous discount function; and β represents the age weight function parameter (0.04) [6].

The YLL calculation formula is:

$YLLs[\gamma, K] = KCe^{\wedge}(\gamma\alpha)/(\gamma+\beta)^2 \{e^{\wedge}(-(\gamma+\beta)(L+\alpha)) [-(\gamma+\beta)(L+\alpha)-1] - e^{\wedge}(-(\gamma+\beta)\alpha) [-(\gamma+\beta)\alpha-1]\} + (\gamma/(1-e^{\wedge}(-\gamma L)))$ (Formula 2)

Where K represents the age weight adjustment factor (value 1); α represents age at death; γ represents the discount rate (3%); β represents the age weight function parameter (0.04); and L represents standard life expectancy at age α.

The YLD calculation formula is:

$YLD = P \times Dw$ (Formula 3)

Where P represents prevalence and Dw represents disability weight (according to WHO regulations, ranging from 0-1, where death=1 and perfect health=0).

Disability weights for the five chronic diseases [12] were: hypertension=0, CHD=0.395, stroke=0.258, asthma=0.059, COPD=0.388.

1.2.6 Calculation of Standardized Rates Indirect method was used to calculate standardized prevalence rates, with the sum of population numbers in each age group from 2011 and 2021 used as the standard population. The formulas were: (1) Standard population composition ratio = standard population number in each age group / total standard population number; (2) Standardized prevalence rate = standard population composition ratio × actual prevalence rate.

1.3 Statistical Methods

Epidata 3.1 software was used to establish the database with double entry and verification. SPSS 22.0 software was used for data organization and analysis. Categorical data were expressed as relative frequencies, with between-group comparisons using ^{2} test or ^{2} trend test. Bonferroni method was used for pairwise comparisons within groups. Principal component analysis was used for SEP indicator construction. The significance level α was set at 0.05.

Results

2.1 Basic Characteristics of Rural Residents in Yunnan Province in 2011 and 2021

In 2011, 8,400 individuals participated in the survey, with 8,187 valid participants (97.46% validity rate). In 2021, 7,700 individuals participated, with 7,572 valid participants (98.34% validity rate). Principal component analysis showed a KMO test value of 0.700 and Bartlett's test result of ^{2}=122.768, P<0.001, indicating correlation among individual socioeconomic indicators and suitability for principal component analysis. Only the first principal component had an eigenvalue >1 (1.149), so only the first principal component was extracted, with a cumulative contribution rate of 38.31% (explaining 38.31% of total variance).

Comparison of basic characteristics between 2011 and 2021 showed statistically significant differences in age distribution, education level, accessibility to medical services, and socioeconomic status proportions (P<0.05). Specifically, the proportions of participants aged 35-44 years, illiterate individuals, and those with medium-high socioeconomic status were lower in 2021 than in 2011 (P<0.001), while proportions of those aged 65-74 years and $ $75 years, with primary school education or above, good accessibility to medical services, and medium-low or high socioeconomic status were higher in 2021 (P<0.001). See Table 1.

Table 1 Basic characteristics of rural residents in Yunnan Province in 2011 and 2021 [n (%)]

Characteristic	2011 (n=8,187)	2021 (n=7,572)	^{2} (^{2} trend)	P-value
Sex			113.214	<0.001
Male	3,960 (48.37)	3,739 (49.38)		
Female	4,227 (51.63)	3,833 (50.62)		
Age group				<0.001
35-44 years	1,851 (22.61)	1,256 (16.59)		
45-54 years	2,119 (25.88)	1,905 (25.16)		
55-64 years	2,014 (24.60)	1,856 (24.51)		
65-74 years	1,403 (17.14)	1,670 (22.05)		
$ $75 years	800 (9.77)	885 (11.69)		
Education level				<0.001
Illiterate	2,495 (30.48)	1,730 (22.85)		
Primary school or above	5,692 (69.52)	5,842 (77.15)		
Annual household income per capita			7.492	<0.001
<6,985 yuan	4,196 (51.25)	3,844 (50.77)		
$ $6,985 yuan$	3,991 (48.75)	3,728 (49.23)		
Accessibility to medical services				<0.001
Poor ($30 min)	3,645 (44.52)	2,434 (32.14)		
Good (<30 min)	4,542 (55.48)	5,138 (67.86)		
Socioeconomic status				<0.001
Low	2,175 (26.57)	1,863 (24.60)		
Medium-low	1,104 (13.48)	1,815 (23.97)		
Medium-high	3,028 (36.99)	2,026 (26.76)		
High	1,880 (22.96)	1,868 (24.67)		

Note: indicates ^{2} trend value; indicates P<0.001 compared with 2011.

2.2 Changes in Prevalence of Five Common Chronic Diseases

In 2011, the prevalence of hypertension was 25.14% (2,058/8,187) with a standardized rate of 26.07%; CHD prevalence was 2.02% (165/8,187) with a standardized rate of 2.08%; stroke prevalence was 1.03% (84/8,187) with a standardized rate of 1.07%; asthma prevalence was 1.36% (111/8,187) with a standardized rate of 1.44%; and COPD prevalence was 9.23% (756/8,187) with

a standardized rate of 9.65%. In 2021, hypertension prevalence was 41.57% (3,148/7,572) with a standardized rate of 40.35%; CHD prevalence was 2.30% (174/7,572) with a standardized rate of 2.20%; stroke prevalence was 2.52% (191/7,572) with a standardized rate of 2.36%; asthma prevalence was 1.61% (122/7,572) with a standardized rate of 1.52%; and COPD prevalence was 12.60% (954/7,572) with a standardized rate of 12.19%.

In 2021, the prevalence of hypertension, stroke, and COPD among rural Yunnan residents was significantly higher than in 2011 (^{2}=480.418, 51.376, 46.043, respectively; all P<0.001). Specifically, hypertension prevalence in 2021 was higher than in 2011 among males, females, and all SEP groups (^{2}=357.171, 146.363, 49.226, 98.383, 202.353, 138.154, respectively; all P<0.001). In 2011, male hypertension prevalence was lower than female prevalence, while in 2021 it was higher. Hypertension prevalence in 2011 showed a decreasing trend across SEP groups (^{2}=4.682, P=0.030; ^{2}=25.625, P<0.001; ^{2} trend=43.106, P<0.001).

CHD prevalence in 2021 was higher than in 2011 among males and those with high SEP (^{2}=7.324, P=0.007; ^{2}=4.303, P=0.038). CHD prevalence in 2011 showed a decreasing trend across SEP groups, while in 2021 male CHD prevalence was higher than female prevalence (^{2} trend=16.232, P<0.001; ^{2}=4.665, P=0.031).

Stroke prevalence in 2021 was higher than in 2011 among males, females, and those with medium-low, medium-high, and high SEP (^{2}=42.066, 12.024, 17.895, 23.583, 12.048, respectively; P<0.001, 0.001, <0.001, <0.001, 0.001). Stroke prevalence in 2011 showed a decreasing trend across SEP groups, while in 2021 male stroke prevalence was higher than female prevalence (^{2} trend=16.614, P<0.001; ^{2}=8.327, P=0.004).

Asthma prevalence in 2021 was higher than in 2011 among males and those with medium-high SEP (^{2} trend=6.231, P=0.013; ^{2}=4.051, P=0.044). Male asthma prevalence in 2021 was higher than female prevalence (^{2}=6.308, P=0.012).

COPD prevalence in 2021 was higher than in 2011 among males and those with low and medium-high SEP (^{2}=62.178, 10.749, 11.744, respectively; all P<0.001). COPD prevalence in 2011 showed a decreasing trend across SEP groups, while in 2021 male COPD prevalence was higher than female prevalence, and COPD prevalence showed a decreasing trend across SEP groups (^{2} trend=6.801, P<0.001; ^{2}=59.973, P<0.001; ^{2} trend=10.751, P=0.001). See Table 2.

Table 2 Changes in prevalence of five common chronic diseases among rural residents in Yunnan Province in 2011 and 2021

Disease	2011 Overall	2021 Overall	2021 by SEP
Hypertension	25.14%	41.57%	44.48% (low), 38.74% (medium-low), 40.58% (medium-high), 43.91% (high)
CHD	2.02%	2.30%	2.67% (low), 2.09% (medium-low), 3.05% (medium-high), 2.01% (high)
Stroke	1.03%	2.52%	1.82% (low), 1.98% (medium-low), 1.92% (medium-high), 15.54% (high)
Asthma	1.36%	1.61%	13.90% (low), 12.00% (medium-low)
COPD	9.23%	12.60%	

Note: COPD=chronic obstructive pulmonary disease; indicates P<0.05 compared with 2011.

2.3 Changes in YLL, YLD, and DALY per 1,000 Population

In 2021, DALY and YLD per 1,000 population for CHD, stroke, asthma, and COPD, as well as YLL per 1,000 population for CHD, stroke, and asthma, were all higher than in 2011. However, DALY and YLL per 1,000 population for hypertension, and YLL per 1,000 population for COPD, were lower in 2021 than in 2011. In both 2011 and 2021, COPD had the highest DALY and YLD per 1,000 population, while stroke had the highest YLL per 1,000 population. The DALY for CHD and COPD was dominated by YLD, while DALY for stroke and asthma was dominated by YLL. In 2011, DALY per 1,000 population for hypertension, stroke, asthma, and COPD was higher in males than in females, while CHD DALY was lower in males. In 2021, DALY per 1,000 population for CHD, stroke, asthma, and COPD was higher in males than in females, while hypertension DALY was lower in males. See Table 3.

Table 3 Changes in YLL, YLD, and DALY per 1,000 population for five common chronic diseases among rural residents in Yunnan Province in 2011 and 2021

Disease	Year	YLL/1,000	YLD/1,000	DALY/1,000
Hypertension	2011	1.38	0.00	1.38
	2021	1.26	0.00	1.26
CHD	2011	4.22	6.23	10.45
	2021	7.18	11.00	18.18
Stroke	2011	8.80	4.00	12.80
	2021	15.20	8.00	23.20
Asthma	2011	3.54	1.00	4.54
	2021	7.10	2.00	9.10
COPD	2011	15.99	20.00	35.99
	2021	14.07	35.00	49.07

Note: DALY=disability-adjusted life years; YLL=years of life lost due to premature mortality; YLD=years lived with disability.

Discussion

This study found that compared with 2011, the overall prevalence of hypertension, stroke, and COPD among rural Yunnan residents increased in 2021, consistent with trends nationwide [13] and in other middle- and low-income countries [14-15]. The overall prevalence of CHD and asthma showed no significant change, which differs somewhat from other domestic surveys [16-17] and warrants further investigation. These findings indicate that the epidemics of hypertension, stroke, and COPD in rural Yunnan continue to intensify, while prevention and control efforts for CHD and asthma have shown limited effectiveness, suggesting that chronic disease control remains a formidable task. Therefore, strengthened prevention and control efforts should focus on hypertension, stroke, and COPD to prevent further escalation of their epidemics, while targeted measures for CHD and asthma should be developed, particularly for low SEP populations regarding COPD control.

Our results show that compared with 2011, DALY per 1,000 population for CHD, stroke, asthma, and COPD increased in 2021, while DALY for hypertension decreased, indicating that hypertension control has achieved some success in rural Yunnan, though overall chronic disease prevention remains a long-term challenge. Among the five chronic diseases, COPD had the highest DALY and YLD per 1,000 population, while stroke had the highest YLL per 1,000 population, indicating that COPD poses the greatest burden and disability risk, while stroke poses the greatest premature mortality risk to rural Yunnan residents. The disease burden of CHD and COPD was dominated by YLD, while that of stroke and asthma was dominated by YLL, consistent with other research [20]. Therefore, local authorities should prioritize tertiary prevention for CHD and COPD to improve patients' quality of life and reduce disability-related life loss, while strengthening primary prevention for stroke and asthma to reduce incidence and premature mortality.

The 2021 hypertension prevalence among rural Yunnan residents (41.57%) was higher than in southern rural areas (24.0%) [18], COPD prevalence (12.59%) was higher than in rural Sichuan (1.16%) [19], stroke prevalence (2.52%) was higher than in rural Shanxi (1.90%) [20], CHD prevalence (2.29%) was lower than among adults $ $18 years in Anhui (3.9%) [21], and asthma prevalence (1.61%) was lower than among Chinese aged $ $45 years (2.16%) [22]. These differences suggest that the prevalence of the five major chronic diseases varies regionally. The relatively high prevalence of hypertension, COPD, and stroke and relatively low prevalence of CHD and asthma in Yunnan may be due to differences in diagnostic criteria, study populations, as well as regional variations in economy, environment, and lifestyle. Therefore, prevention strategies should be tailored to local conditions, considering Yunnan's economic lag, shortage of health resources, multi-ethnic population, and diverse lifestyles.

Our findings show that male prevalence of all five chronic diseases increased in 2021 compared with 2011. The gender difference shifted from 2011 (when female hypertension prevalence was higher than male and no gender differences existed for CHD, stroke, or asthma) to 2021 (when male prevalence exceeded female prevalence for all five diseases), indicating faster prevalence growth among males, consistent with other studies [13,17]. This may be related to higher exposure to risk factors such as smoking and alcohol consumption among males and faster increases in obesity compared with females [23]. Therefore, interventions targeting modifiable risk factors should be strengthened specifically for males.

In 2011, the prevalence of hypertension, CHD, stroke, and COPD showed decreasing trends with higher socioeconomic status. However, in 2021, only COPD prevalence maintained this decreasing trend across SEP levels, suggesting that the relationship between socioeconomic status and chronic disease prevalence changed between 2011 and 2021, with socioeconomic status affecting the five chronic diseases differently. This aligns with other research [7,24] and may be because different diseases have complex associations with socioeconomic status that require further investigation. These findings suggest that prevention and control measures should be tailored according to the changing relationships between each chronic disease and socioeconomic status, with particular attention to low SEP populations for COPD prevention.

This study comprehensively analyzed changes in the disease burden of five common chronic diseases among rural Yunnan residents between 2011 and 2021, supplementing and improving research data in this field and revealing current epidemics and burden levels to provide scientific evidence for adjusting local prevention and control strategies. However, several limitations exist. First, diagnoses of stroke, CHD, and asthma were based on self-reported previous diagnoses. Due to limited access to disease prevention and treatment resources, rural Yunnan residents have fewer medical visits, potentially leading to undiagnosed cases and underestimation of true prevalence. Second, annual income was based on retrospective self-reporting. Although quality control measures were implemented throughout the study, recall bias cannot be completely avoided.

Conclusion

Compared with 2011, the prevalence of hypertension, stroke, and COPD among rural Yunnan residents increased in 2021, while DALY per 1,000 population increased for CHD, stroke, asthma, and COPD but decreased for hypertension. In 2021, male prevalence exceeded female prevalence for all five chronic diseases, and COPD prevalence showed a decreasing trend across socioeconomic status levels. Although some progress has been made in chronic disease prevention and control, the prevalence and disease burden remain heavy, and chronic diseases continue to be a major public health problem in rural Yunnan, particularly among males and low socioeconomic status populations. Urgent improvements in prevention and control efforts are needed.

Author Contributions

WU Xia was responsible for drafting and revising the manuscript. LIU Lan was responsible for data cleaning and statistical analysis. ZHAO Yi, LI Guohui, CUI Wenlong, and SUN Chenghuan were responsible for field investigation and data collection. CAI Le was responsible for funding acquisition, resource provision, supervision, and overall responsibility for the article. All authors confirmed the final manuscript.

Conflict of Interest

This article has no conflict of interest.

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