

Original Article



Characteristics of the HIV/AIDS Epidemic among People Aged ≥ 50 Years in China during 2018–2021

HOU Yu Shan, JIN Yi Chen, CAI Chang, TANG Hou Lin, QIN Qian Qian[#], and LYU Fan[#]

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing 102206, China

Abstract

Objective This study aimed to determine the current epidemiological status of PLWHA aged ≥ 50 years in China from 2018 to 2021. It also aimed to recommend targeted interventions for the prevention and treatment of HIV/AIDS in elderly patients.

Methods Data on newly reported cases of PLWHA, aged ≥ 50 years in China from 2018 to 2021, were collected using the CRIMS. Trend tests and spatial analyses were also conducted.

Results Between 2018 and 2021, 237,724 HIV/AIDS cases were reported among patients aged ≥ 50 years in China. The main transmission route was heterosexual transmission (91.24%). Commercial heterosexual transmission (CHC) was the primary mode of transmission among males, while non-marital non-CHC (NMNCHC; 60.59%) was the prevalent route in women. The proportion of patients with CHC decreased over time ($Z = 67.716$, $P < 0.01$), while that of patients with NMNCHC increased ($Z = 153.05$, $P < 0.01$). The sex ratio varied among the different modes of infection, and it peaked at 17.65 for CHC. The spatial analysis indicated spatial clustering, and the high-high clustering areas were mainly distributed in the southwestern and central-southern provinces.

Conclusion In China, PLWHA, aged ≥ 50 years, were predominantly infected through heterosexual transmission. The primary modes of infection were CHC and NMNCHC. There were variations in the sex ratio among different age groups, infected through various sexual behaviors. HIV/AIDS cases exhibited spatial clustering. Based on these results, the expansion of HIV testing, treatment, and integrated behavioral interventions in high-risk populations is recommended to enhance disease detection in key regions.

Key words: HIV/AIDS; Aged ≥ 50 years; China

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INTRODUCTION

With the progression of global population aging, widespread antiretroviral therapy use, and persistent high-risk behaviors among people aged ≥ 50 years, the incidence of human immunodeficiency virus (HIV) infections in this demographic has

continuously increased. The worldwide epidemic of HIV/AIDS has shown an aging trend^[1]. In China, the proportion of people living with HIV/AIDS (PLWHA) aged 50 and above, has increased steadily from 22% in 2011 to 44% in 2020^[2]. In 2022, 48.1% of the 107,000 reported HIV/AIDS cases involved patients, aged ≥ 50 years^[3].

By analyzing the epidemic trends and population

[#]Correspondence should be addressed to QIN Qian Qian, Tel: 86-10-58900956, E-mail: qinqq@chinaaids.cn; LYU Fan, Tel: 86-10-58900906, E-mail: fanlv@chinaaids.cn

Biographical note of the first author: HOU Yu Shan, female, born in 1993, PhD Candidate, majoring in HIV epidemiology.

characteristics of PLWHA, aged ≥ 50 , reported in China from 2018 to 2021, this study aimed to comprehend the epidemiological status and spatial distribution of this population and recommend targeted interventions. The results of this study will serve as the foundation for preventive and curative strategies against sexually transmitted HIV/AIDS among people, aged ≥ 50 years.

METHODS

Data Collection

This study used data from the Chinese HIV/AIDS Comprehensive Response Information Management System (CRIMS) to analyze the epidemiological status of newly reported HIV infections in people aged ≥ 50 years. Patients with newly reported HIV infections were identified through the web-based CRIMS by representatives of local Centers for Disease Control (CDCs) and medical institutions^[4]. A self-administered questionnaire was used to gather information on the demographics and high-risk behaviors of the infected individuals. Permission to use the data from the CRIMS was granted by the National Center for AIDS/STD Control and Prevention of the China CDC. The Institutional Review Board of the National Center for STD/HIV Control and Prevention approved the study (X220314677).

Data Management

The study included all newly reported PLWHA (237,724 cases) in the CRIMS from 2018 to 2021. The following inclusion criteria were developed to meet the study objectives: 1) HIV/AIDS cases reported between 2018 and 2021 and 2) aged ≥ 50 years old. All eligible patients were included in this study. Personal information was removed from the database to protect the participants' privacy. Demographic factors, including age, sex, ethnicity, marital status, occupation, education, transmission route, and regional division, were included in the analysis.

According to the 2022 China Statistical Yearbook, the national and provincial administrative divisions of China were based on the website of the National Bureau of Statistics. By the end of 2021, there were four municipalities, directly under the central government, and 333 prefecture-level administrative divisions. All in all, there were 337 geographical units at the city level. Population data for provincial- and prefecture-level administrative divisions were obtained from the National Bureau of Statistics.

Data Analysis

For the statistical analysis of qualitative data, the chi-square test was used to assess the differences, while the Cochran-Armitage trend test (statistic Z) was used to evaluate the linear trend between the independent and dependent variables. The linear trend between two ordered categorical variables was analyzed using Mantel-Haenszel χ^2 (with the statistic being trend χ^2) and Spearman's correlation, where the test level was $\alpha = 0.05$.

A spatial autocorrelation analysis was conducted using the proportion of HIV/AIDS cases among people aged ≥ 50 years at the city level. A rook spatial weight matrix was constructed, and Global Moran's I was used to determine spatial autocorrelation. The Local Moran's I was used to analyze the spatial clustering of geographic units near a certain city-level area, and high-high clustering areas were found. The time-space scan statistic was used to detect statistical significance in the temporal and spatial clustering of HIV/AIDS cases in people aged ≥ 50 years. A Poisson distribution model was used to perform a spatial clustering analysis of the number of HIV/AIDS cases among people, aged 50 years and older from 2018 to 2021.

Statistical software: The data analysis was performed using the SPSS software (version 24.0; IBM Inc., Armonk, NY, USA), Geoda 1.20 software (Arizona State University, AZ, USA), SaTScan 10.1.2, (M Kulldorff and Information Management Services Inc., Cambridge, Massachusetts), and Microsoft Excel 2016 (Microsoft Corp 2016).

Definitions

a. As of the time of reporting, "HIV" refers to the presence of an HIV infection. "AIDS" refers to patients who have been diagnosed with AIDS, and "HIV/AIDS" refers to either an HIV infection or AIDS case.

b. Marital heterosexual contact (MHC): Contraction of HIV from a partner of the opposite sex in the context of a marital or monogamous relationship.

c. Commercial heterosexual contact (CHC): Commercial sexual contact with a non-marital heterosexual partner, mainly people, who acquire HIV through the sale or purchase of sex.

d. Non-marital non-CHC (NMNCHC): Non-commercial sexual contact with an unmarried heterosexual partner, mainly including individuals, who contracted HIV from transitory partners in the context of a casual relationship.

RESULTS

Description Analysis

Between 2018 and 2021, there were 237,724 HIV/AIDS cases, reported in persons aged ≥ 50 years in China, accounting for 42.39% of all newly reported cases. The proportion of reported HIV/AIDS cases among people, aged ≥ 50 years, in China has increased from 37.5% in 2018 to 45.3% in 2021. Of these, 109,042 patients (45.87%) were aged 50–59 years, and 172,466 (72.55%) were male. The primary occupation was farming (159,233/237,724; 66.98%), and a significant number of patients received education below junior high school level (213,066/237,724; 89.63%). Heterosexual transmission was the leading mode of transmission (216,907/237,724; 91.24%). Cases were mainly concentrated in southwest China (121,196/237,724; 50.98%) (Table 1).

Analysis of Heterosexual Transmission

Although heterosexual transmission was predominant in both men and women aged ≥ 50 years, the type of heterosexual contact differed between the sexes. There was a significant difference in the proportion of heterosexual transmission among different sexes ($\chi^2 = 60834.971$, $P < 0.001$). For males, the primary mode of transmission was CHC (91,174/152,801; 59.67%), followed by NMNCHC (33.38%). In females, NMNCHC (60.59%) and MHC 28.19%) were the most prevalent routes.

There was a significant difference in the proportion of heterosexual transmission among different age groups ($\chi^2 = 2886.586$, $P < 0.001$). NMNCHC was the most prevalent route (45.89%) in patients, aged 50–59 years, while CHC (49.41%) was the primary route for those, 60 years and older. In male HIV/AIDS patients, a significant difference in the proportion of heterosexual transmission was observed among different age groups ($\chi^2 = 916.549$, $P < 0.001$). Moreover, the proportion of CHC among patients, aged 60 years old and above, increased to 62.50% (Table 2).

Among the newly reported cases of heterosexual transmission, involving patients aged ≥ 50 years in China from 2018 to 2021, the proportion of patients with CHC decreased ($Z = 70.56$, $P < 0.01$). Meanwhile, that of patients with NMNCHC increased ($Z = 156.46$, $P < 0.01$). The percentages of the other two contact methods ranged from 13.49% to 14.66%. There was a marked distinction between

sexes in terms of heterosexual contact. The sex ratio varied, depending on the mode of infection. In particular, the sex ratios were 17.05, 2.97, 1.31 and 0.29 for CHC, unknown, NMNCHC and MHC, respectively (Table 3).

Spatial Analysis

In 2018, 99.7% (336/337) of cities reported HIV/AIDS in people, aged 50 and above. However, the number of cities, reporting cases, decreased and stabilized at approximately 97% from 2019 to 2021.

A global spatial autocorrelation analysis was conducted using the proportion of HIV/AIDS cases in people, aged 50 and above, at the city-level geographic unit from 2018 to 2021. The Moran's I values were 0.651, 0.683, 0.732, and 0.725, respectively, and the P -values were all less than 0.001, indicating spatial clustering. The local spatial autocorrelation analysis showed that high-high clustering areas were mainly distributed in the southwestern and central-southern provinces, such as Guangxi, Guizhou, Hunan, Yunnan, Sichuan, and Guangdong.

From 2018 to 2021, four clustering areas were identified *via* a time-space scan analysis of HIV/AIDS cases in people, aged 50 years and above. The first clustering area had a wide distribution with a center point located in Yuxi City, Yunnan Province (24.13 N, 102.21 °E) and a radius of 895.09 km. It was distributed in 57 cities in provinces, including Yunnan, Guizhou, Sichuan, Guangxi, Chongqing, and Hunan, with a clustering period from 2018 to 2019 ($RR = 5.47$, $P < 0.001$) (Table 4).

DISCUSSION

From 2018 to 2022, PLWHA, aged ≥ 50 years, represented more than 40% of the total reported HIV/AIDS cases in China. Most patients were in the 50–59 years age group. The cohort had a male predominance, and the education level was below junior high school for most patients. The primary occupation was farming, and the PLWHA, aged ≥ 50 years, were mainly concentrated in southwest China. The spatial analysis indicated spatial clustering, and high-high clustering areas were mainly distributed in the southwestern and central-southern provinces, including Guangxi, Guizhou, Hunan, Yunnan, Sichuan, and Guangdong.

Among the newly reported HIV/AIDS patients, aged ≥ 50 years, the primary mode of transmission was heterosexual contact with a commercial sex partner. In a quantitative survey, 20.8% of the

Table 1. Basic characteristics of HIV/AIDS patients aged ≥ 50 years, 2018–2021 (*n*, %)

Characteristics	2018	2019	2020	2021	Total
	<i>n</i> = 55,761	<i>n</i> = 65,404	<i>n</i> = 57,919	<i>n</i> = 58,640	<i>n</i> = 237,724
Age group (years)					
50–59	24,710 (44.31)	28,735 (43.93)	27,353 (47.23)	28,244 (48.17)	109,042 (45.87)
60–69	20,469 (36.71)	23,866 (36.49)	19,545 (33.75)	18,994 (32.39)	82,874 (34.86)
70+	10,582 (18.98)	12,803 (19.58)	11,021 (19.03)	11,402 (19.44)	45,808 (19.27)
Gender					
Male	40,739 (73.06)	47,569 (72.73)	41,775 (72.13)	42,383 (72.28)	172,466 (72.55)
Female	15,022 (26.94)	17,835 (27.27)	16,144 (27.87)	16,257 (27.72)	65,258 (27.45)
Ethnicity					
Han	49,116 (88.08)	58,472 (89.40)	51,398 (88.74)	51,740 (88.23)	210,726 (88.64)
Other	6,645 (11.92)	6,932 (10.60)	6,521 (11.26)	6,900 (11.77)	26,998 (11.36)
Marital status					
Single	3,143 (5.64)	4,015 (6.14)	3,607 (6.32)	3,628 (6.19)	14,393 (6.05)
Married or living a with partner	33,040 (59.25)	38,800 (59.32)	34,382 (59.36)	34,510 (58.85)	140,732 (59.20)
Divorced or widowed	19,406 (34.80)	22,381 (34.22)	19,778 (34.15)	20,284 (34.59)	81,849 (34.43)
Unknown	172 (0.31)	208 (0.32)	152 (0.26)	218 (0.37)	750 (0.32)
Occupation					
Farmer	37,002 (66.36)	44,414 (67.91)	39,179 (67.64)	38,638 (65.89)	159,233 (66.98)
Other	18,759 (46.05)	20,990 (44.13)	18,740 (44.86)	20,002 (47.19)	78,491 (45.51)
Education					
Primary school and Illiterate	34,917 (62.62)	41,585 (63.58)	36,774 (63.49)	36,245 (61.81)	149,521 (62.90)
Junior school	14,761 (26.47)	17,086 (26.12)	15,440 (26.66)	16,258 (27.73)	63,545 (26.73)
High school and above	6,083 (10.91)	6,733 (10.29)	5,705 (9.85)	6,137 (10.47)	24,658 (10.37)
Transmission route					
Heterosexual	50,847 (91.19)	60,011 (91.75)	53,068 (91.62)	52,981 (90.35)	216,907 (91.24)
Homosexual	3,881 (6.96)	4,262 (6.52)	3,876 (6.69)	4,675 (7.97)	16,694 (7.02)
Injecting Drugs	344 (0.62)	251 (0.38)	179 (0.31)	169 (0.29)	943 (0.40)
Other	689 (1.24)	880 (1.35)	796 (1.37)	815 (1.39)	3,180 (1.34)
Regional division*					
Northeast China	1,232 (2.21)	1,294 (1.98)	1,040 (1.80)	1,240 (2.11)	4,806 (2.02)
North China	1,526 (2.74)	1,641 (2.51)	1,487 (2.57)	1,800 (3.07)	6,454 (2.71)
East China	5,250 (9.42)	5,945 (9.09)	5,604 (9.68)	6,323 (10.78)	23,122 (9.73)
Southern China	8,077 (14.49)	9,756 (14.92)	9,644 (16.65)	10,581 (18.04)	38,058 (16.01)
Central China	8,491 (15.23)	9,107 (13.92)	8,448 (14.59)	9,186 (15.67)	35,232 (14.82)
Northwest China	2,257 (4.05)	2,395 (3.66)	1,997 (3.45)	2,207 (3.76)	8,856 (3.73)
Southwest China	28,928 (51.88)	35,266 (53.92)	29,699 (51.28)	27,303 (46.56)	121,196 (50.98)

Note. * Northeast China: Heilongjiang, Jilin, Liaoning; North China: Beijing, Tianjin, Shanxi, Hebei, and Inner Mongolia; East China: Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Shandong, and Fujian; Southern China: Guangdong, Guangxi Zhuang Autonomous Region, and Hainan; Central China: Henan, Hubei, and Hunan; Northwest China: Shaanxi, Gansu, Qinghai, Ningxia Hui Autonomous Region, and Xinjiang Uygur Autonomous Region; Southwest China: Chongqing, Sichuan, Guizhou, Yunnan, and Tibet Autonomous Region.

participants had intercourse with commercial sexual partners in the past six months. Among them, 47.1% reported consistent condom use^[5]. These transactions frequently occurred in substandard

establishments, such as small hotels, rented houses, or teahouses^[6], which typically lacked proper sanitation, thereby increasing the risk of HIV transmission. Additionally, this population tended to

Table 2. Analysis of HIV/AIDS patients aged ≥ 50 years with heterosexual transmission (n, %)

Characteristics	MHC	CHC	NMNCCHC	Unknown	χ^2	P
Sex						
Male	5,161 (3.38)	91,174 (59.67)	51,004 (33.38)	5,462 (3.57)	60,834.971	< 0.001
Female	18,073 (28.19)	5,348 (8.34)	38,843 (60.59)	1,842 (2.87)		
Age group (years)						
50–59	11,958 (12.60)	36,247 (38.18)	43560 (45.89)	3,162 (3.33)	2,886.586	< 0.001
60+	11,276 (9.24)	60,275 (49.41)	46287 (37.95)	4,142 (3.40)		

Table 3. Modes of infection in newly reported PLWHA aged ≥ 50 years and infected through heterosexual contact in China, 2018–2021

Characteristics		2018	2019	2020	2021	Z	P
		n = 50,847	n = 60,011	n = 53,068	n = 52,981		
MHC	N (%)	5,713 (11.24)	6,354 (10.59)	5,846 (11.02)	5,321 (10.04)	26.39	< 0.01
	Sex ratio	0.27	0.29	0.30	0.30	–	
CHC	N (%)	23,037 (45.31)	27,060 (45.09)	23,765 (44.78)	22,660 (42.77)	67.71	< 0.01
	Sex ratio	16.64	17.98	17.49	16.02	–	
NMNCCHC	N (%)	20,316 (39.96)	24,356 (40.59)	22,104 (41.65)	23,071 (43.55)	153.05	< 0.01
	Sex ratio	1.38	1.30	1.27	1.30	–	
Unknown	N (%)	1,781 (3.50)	2,241 (3.73)	1,353 (2.55)	1,929 (3.64)	5.32	0.02
	Sex ratio	3.22	2.98	3.11	2.65	–	

Table 4. Spatial clustering analysis of HIV/AIDS cases in people aged 50 and above on the Poisson model, 2018–2021

Location of the case clusters	Time frame	Relative risk	Log likelihood ratio	P value
Yunnan (16 cities), Guizhou (9 cities), Sichuan (17 cities), Chongqing, Guangxi (13 cities), Hunan (1 city)*	2018/1/1 to 2019/12/31	5.47	56195.29	< 0.001
Jingdezhen in Jiangxi	2018/1/1 to 2019/12/31	3.33	201.78	< 0.001
Huangshi in Hubei	2018/1/1 to 2019/12/31	1.69	35.21	< 0.001
Yinchun in Jiangxi	2018/1/1 to 2018/12/31	1.24	5.08	< 0.001

Note. * The first clustering area includes: Yunnan (Kunming, Qujing, Yuxi, Baoshan, Zhaotong, Lijiang, Puer, Lincang, Chuxiong Yi Autonomous Prefecture, Honghe Hani and Yi Autonomous Prefecture, Wenshan Zhuang and Miao Autonomous Prefecture, Dai Autonomous Prefecture of Xishuangbanna/Sipsongpanna, Dali Bai Autonomous Prefecture, Dehong Dai and Jingpo Autonomous Prefecture, Nujiang Lisu Autonomous Prefecture, Diqing Tibetan Autonomous Prefecture), Guizhou (Guiyang, Liupanshui, Zunyi, Anshun, Tongren, Qianxinan Buyi and Miao Autonomous Prefecture, Bijie, Qiandongnan Miao and Dong Autonomous Prefecture, Qiannan Buyi and Miao Autonomous Prefecture), Sichuan (Chengdu, Zigong, Panzhihua, Luzhou, Deyang, Mianyang, Suining, Neijiang, Leshan, Nanchong, Menshan, Yibin, Guangan, Yaan, Ziyang, Ganzi Tibetan Autonomous Prefecture, Liangshan Yi Autonomous Prefecture), Chongqing, Guangxi (Nanning, Liuzhou, Guilin, Wuzhou, Beihai, Fangchenggang, Qinzhou, Guigang, Yulin, Baise, Hechi, Laibin, Chongzuo), and Hunan (Huaihua).

have limited education. Their knowledge and awareness of protective measures against sexually transmitted diseases and extended exposure periods were inadequate. The condom usage rate was also low. Due to these factors, this population was especially vulnerable to infection with HIV^[7]. Consequently, HIV prevention initiatives, targeting men aged ≥ 50 years, should focus on commercial sexual interaction.

Although CHC was the primary mode of transmission for male HIV patients, aged ≥ 50 years, there was an increasing trend of infections from NMNCHC. One study documented an increasing rate of HIV infection among people with non-commercial, casual sex partners^[8]. In the present study, those, infected *via* NMNCHC transmission, accounted for approximately 40% of all patients. This proportion was similar to the trend of newly identified cases of HIV, transmitted *via* NMNCHC, in 2018 based on a previous study^[9]. Some older adults engage with inconsistent or temporary partners to address their loneliness or seek stimulation, thereby increasing their risk for HIV infection. However, for females aged ≥ 50 years, the rate of transmission *via* MHC and NMNCHC, was significant. Identifying intervention targets for transient non-commercial sexual behaviors is challenging, and there is no established preventive or curative approach for this group. The difference in the proportions of CHC in elderly male and female cases was influenced by physiological and psychological factors. The sexual needs of women gradually decline with menopause, while those of men are more stable. Studies have shown that men still have sexual needs even at the age of 70 years^[10]. Consequently, older men are more likely to seek sexual activities, compared to women. From a psychological perspective, older men are more likely to actively seek sexual partners and more willing to express their sexual needs. In addition, older men are more likely to engage in CHC.

This study revealed that the proportion of newly reported heterosexual HIV/AIDS infections due to CHC decreased, while HIV/AIDS infections due to NMNCHC slightly increased from 2018 to 2021. This was possibly related to the implementation of the 13th Five-Year Plan and the Plan to Curb the Spread of HIV/AIDS (2019–2022)^[11] as well as the advancements in HIV/AIDS prevention and control^[2]. The number of elderly men, infected through sexual contact with a commercial partner, exceeded that of women by more than 17-fold, suggesting the presence of super-spreaders in the elderly HIV

cohort. Based on this, a small number of commercial sex workers may have infected multiple clients. In a transmission network study in Guangxi Province, the largest cluster contained two female sex workers and 18 elderly male clients with an average degree of 18^[12]. Men typically preferred younger commercial partners. Clients, aged ≥ 50 years, often seek sex workers, aged approximately 40 years. Screening should be broadened for high-risk groups, including sex workers and their clients. The adoption of voluntary AIDS counseling and testing services should be encouraged to facilitate the early detection of infection sources, treatment standardization, and minimization of transmission risk.

HIV/AIDS cases are primarily concentrated in southwestern China. Local spatial autocorrelation analysis showed that the high-high clustering areas were mainly distributed in the southwestern and central-southern provinces, such as Guangxi, Guizhou, Hunan, Yunnan, Sichuan, and Guangdong. Spatial analysis also identified infection hotspots, including the Guangxi, Yunnan, and Sichuan provinces, as well as the Chongqing municipality. Compared to the eastern regions, the economies of Guangxi and Sichuan are poorer. Moreover, the increased rate of immigration facilitates the easier spread of disease^[7]. In addition, health education and publicity in southwest China are insufficient. Presumably, elderly people lack awareness and knowledge of HIV prevention and control. Individuals in this age group seldom consult healthcare professionals, regarding sexually transmitted infections and HIV/AIDS^[13]. Due to the stigma, HIV-positive individuals above 50 years of age are often reticent to avail of AIDS-related services^[14]. This reluctance likely emanates from an insufficient comprehension of the societal, familial, and individual ramifications, associated with HIV/AIDS, thereby creating an environment, conducive to viral transmission. For these people, it is essential to use easily comprehensible health education methods and to implement specific interventions to prevent heterosexual transmission.

LIMITATIONS

First, this study utilized HIV/AIDS case report data for a macro-level analysis. However, due to monitoring data constraints, a comprehensive analysis of the behavioral attributes of PLWHA, aged ≥ 50 years, was not conducted. Second, the diagnosis of HIV/AIDS is often delayed due to its unique characteristics, resulting in a number of HIV-infected

individuals, remaining undiagnosed for several years after infection^[4]. Some cases of HIV/AIDS have not been reported in the CRIMS. Finally, the transmission routes of some elderly HIV/AIDS patients were misreported^[15]. However, the mode of infection was accurately reported in most cases. An epidemiological investigation, following the report, and a subsequent follow-up period will determine the mode of infection. The CDC verifies the quality of the data every year, and the CRIMS reflects the trends in HIV/AIDS cases.

CONCLUSION

From 2018 to 2021, the reported cases of HIV/AIDS among patients, aged ≥ 50 years, in China were predominantly attributed to heterosexual transmission. Infection was primarily caused by CHC and NMNCHC, and a slight increase in the number of NMNCHC cases was observed. Distinct sex ratios were observed in various age groups, depending on the transmission method. The spatial analysis indicated spatial clustering, and high-high clustering areas were mainly distributed in the southwestern and central-southern provinces. Expanding HIV testing, treatment, and holistic behavioral interventions for vulnerable groups and major regions, including the southwestern and central-southern provinces, is recommended to enhance the efficacy of case detection.

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REFERENCES

1. Nyirenda M, Newell ML, Mugisha J, et al. Health, wellbeing, and disability among older people infected or affected by HIV in Uganda and South Africa. *Glob Health Act*, 2013; 6, 19201.
2. He N. Research progress in the epidemiology of HIV/AIDS in China. *China CDC Wkly*, 2021; 3, 1022–30.
3. Han MJ. Analysis of epidemic situation of AIDS in China and prospect of prevention and treatment. *Chin J AIDS STD*, 2023; 29, 247–50. (In Chinese)
4. Zhang XY, Huang T, Feng YB, et al. Characteristics of the HIV/AIDS epidemic in women aged 15–49 Years from 2005 to 2012 in China. *Biomed Environ Sci*, 2015; 28, 701–8.
5. Wu P, Dong WM, Rou KM, et al. HIV-positive clients of female sex workers in Hunan Province, China: a mixed methods study assessing sexual relationships and risk behavior by type of partner. *BMC Public Health*, 2019; 19, 1129.
6. Fu HP. Investigation and analysis of 173 elderly AIDS carriers and patients. *Chin J Health Lab Technol*, 2022; 32, 1879–82. (In Chinese)
7. Xing JN, Li YG, Tang WM, et al. HIV/AIDS epidemic among older adults in China during 2005–2012: results from trend and spatial analysis. *Clin Infect Dis*, 2014; 59, e53–60.
8. Dong ZL, Ma LY, Cai C, et al. Demographic features of identified PLWHA infected through commercial and nonmarital noncommercial heterosexual contact in China from 2015 to 2018: a retrospective cross-sectional study. *BMC Infect Dis*, 2021; 21, 71.
9. Dong ZL, Pan XH, Cai C, et al. Spatial analysis of people living with HIV/AIDS transmitted through commercial heterosexual contact or non-marital non-commercial heterosexual contact — China, 2018. *China CDC Wkly*, 2021; 3, 316–9.
10. Zhao TN, Zeng YR, Li WR, et al. A meta-analysis of prevalence and influencing factors of late detection of HIV infections/AIDS cases in China. *Occup Health*, 2023; 39, 1682–85, 1690 (In Chinese)
11. National Administration of Disease Prevention and Control. China shows major progress on HIV/AIDS in 2019. *Chin J AIDS STD*, 2019, 1205. (In Chinese)
12. Chen X, Qin CW, Chen RF, et al. Epidemiological profile and molecular genetic characterization of HIV-1 among female sex workers and elderly male clients in Guangxi, China. *Emerg Microbes Infect*, 2021; 10, 384–95.
13. Zhang TQ, Miao Y, Li LG, et al. Awareness of HIV/AIDS and its routes of transmission as well as access to health knowledge among rural residents in Western China: a cross-sectional study. *BMC Public Health*, 2019; 19, 1630.
14. Rueda S, Mitra S, Chen SY, et al. Examining the associations between HIV-related stigma and health outcomes in people living with HIV/AIDS: a series of meta-analyses. *BMJ Open*, 2016; 6, e011453.
15. Fu HC, Jiang Y, Shen XF, et al. Verification investigations of pre-diagnosis high-risk behaviors among male HIV-infected individuals aged of pre-diagnosable areas of China. *Chin J AIDS STD*, 2023; 29, 539–43 (In Chinese)