

## Preplanned Studies

## Epidemiological Characteristics of Newly Diagnosed Cases of HIV through Injection Drug Use — China, 2012–2019

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### Summary

#### What is already known about this topic?

The annual rates of newly diagnosed cases of human immunodeficiency virus (HIV) are increasing in China, yet the annual number of newly diagnosed cases of HIV infected through injection drug use (IDU) is decreasing.

#### What is added by this report?

Newly diagnosed cases of HIV infected through IDU in China from 2012 to 2019 show decreases year over year, but the risk of new infections through injecting drugs still exists.

#### What are the implications for public health practice?

This study highlighted that new HIV infections through IDU continue to be at a low level. However, individuals that are newly diagnosed as HIV-positive through IDU need to have their baseline CD4 T+ lymphocytes (CD4) cell counts monitored and have their sources of infections traced.

The human immunodeficiency virus (HIV) epidemic in China remains interspersed nationwide but is highly concentrated in some regions and in some high-risk populations (1). The rate of newly diagnosed cases of HIV have rapidly increased, and HIV is still been a major public health challenge in China (2). From 2012 to 2019, a total of 942,705 cases of HIV in individuals aged 15 years or above were newly diagnosed and recorded in the Chinese HIV/AIDS Comprehensive Response Information Management System (CRIMS), and the number of newly diagnosed HIV infections increased year over year. Of them, 42,242 HIV cases were infected via injection drug use (IDU) and the annual number of newly diagnosed HIV infections via IDU decreased. The variables in the analysis of the CRIMS database included demographic characteristics (gender, date of birth, current address code, nationality, marital status, education level, occupation, etc.), infection route, source of sample, date of diagnosis, date of verification, and baseline

CD4 T+ lymphocytes (CD4) cell counts. Age was calculated by the difference between the date of diagnosis and the date of birth. CD4 cell count was a major indicator of HIV infection disease progression. Baseline CD4 cell counts were greater than or equal to 500 cells/mm<sup>3</sup>, which meant that the HIV infection time was less than two years (less than two years (3) and was designated as the standard of new infection. Data processing and analyses were conducted using SAS software (version 9.4; SAS Institute; Cary, NC).

From January 1, 2012 to December 31, 2019, there were 42,242 newly diagnosed cases of HIV in individuals aged 15 years and above who were infected via IDU, accounting for 4.5% of the total newly diagnosed cases of HIV in this period, and the proportion showed decreases year over year ( $\chi^2=12780.98, p<0.001$ ) (Table 1).

Of the 42,242 newly diagnosed cases of HIV infected via IDU during 2012–2019, 85.5% of individuals were males, 61.1% had at most a primary school education or were illiterate, 40.6% were married and living with partners, 60.3% were of non-Han ethnicities, 50.2% were farmers, and 46.3% were diagnosed from detention centers. The major age group was 25–44 years old, accounting for 76% of newly diagnosed cases of HIV infected via IDU (Table 2). For educational levels based on age groups,

TABLE 1. Number and proportion of newly diagnosed cases of HIV infected via injection drug use (IDU) — China, 2012–2019.

Year of diagnosis	Newly diagnosed case of HIV*	Newly diagnosed cases HIV infected via IDU*	Proportion (%)
2012	81,567	8,242	10.1
2013	89,236	6,952	7.8
2014	102,649	6,213	6.1
2015	114,656	5,010	4.4
2016	123,809	4,987	4.0
2017	133,713	4,585	3.4
2018	146,772	4,423	3.0
2019	150,303	1,830	1.2
Total	942,705	42,242	4.5

\* Individuals aged 15 years and over.

TABLE 2. Demographic characteristics of newly diagnosed cases of HIV infected via injection drug use — China, 2012–2019.

Characteristics	2012	2013	2014	2015	2016	2017	2018	2019	Total
Gender									
Male	7,101(86.2)	5,976(86.0)	5,350(86.1)	4,245(84.7)	4,253(85.3)	3,813(83.2)	3,818(86.3)	1,545(84.4)	36,101(85.5)
Female	1,141(13.8)	976(14.0)	863(13.9)	765(15.3)	734(14.7)	772(16.8)	605(13.7)	285(15.6)	6,141(14.5)
Age group (years)									
15–24	978(11.9)	856(12.3)	687(11.1)	495(9.9)	437(8.8)	399(8.7)	361(8.2)	107(5.8)	4,320(10.2)
25–34	3,429(41.6)	2,888(41.5)	2,596(41.8)	2,019(40.3)	2,040(40.9)	1,736(37.9)	1,619(36.6)	566(30.9)	16,893(40.0)
35–44	3,089(37.5)	2,520(36.2)	2,242(36.1)	1,803(36.0)	1,738(34.9)	1,599(34.9)	1,591(36.0)	636(34.8)	15,218(36.0)
45–54	647(7.9)	602(8.7)	601(9.7)	618(12.3)	700(14.0)	751(16.4)	720(16.3)	415(22.7)	5,054(12.0)
55–	99(1.2)	86(1.2)	87(1.4)	75(1.5)	72(1.4)	100(2.2)	132(3.0)	106(5.8)	757(1.8)
Marital status									
Married, or living with partner	3,192(38.7)	2,578(37.1)	2,338(37.6)	1,904(38.0)	2,106(42.2)	2,179(47.5)	2,184(49.4)	660(36.1)	17,141(40.6)
Single	3,340(40.5)	2,859(41.1)	2,497(40.2)	1,930(38.5)	1,815(36.4)	1,420(31.0)	1,306(29.5)	685(37.4)	15,852(37.5)
Divorced, or widowed	1,390(16.9)	1,323(19.0)	1,178(19.0)	1,070(21.4)	941(18.9)	901(19.7)	792(17.9)	471(25.7)	8,066(19.1)
Unknown	320(3.9)	192(2.8)	200(3.2)	106(2.1)	125(2.5)	85(1.9)	141(3.2)	14(0.8)	1,183(2.8)
Education									
College and above	84(1.0)	60(0.9)	68(1.1)	86(1.7)	74(1.5)	80(1.7)	89(2.0)	83(4.5)	624(1.5)
High school or technical secondary school	516(6.3)	433(6.2)	431(6.9)	294(5.9)	293(5.9)	285(6.2)	234(5.3)	155(8.5)	2,641(6.3)
Junior high school	2,968(36.0)	2,330(33.5)	1,892(30.5)	1,668(33.3)	1,462(29.3)	1,223(26.7)	998(22.6)	641(35.0)	13,182(31.2)
Primary school	2,983(36.2)	2,472(35.6)	2,349(37.8)	1,684(33.6)	1,705(34.2)	1,462(31.9)	1,545(34.9)	579(31.6)	14,779(35.0)
Illiterate	1,691(20.5)	1,657(23.8)	1,473(23.7)	1,278(25.5)	1,453(29.1)	1,535(33.5)	1,557(35.2)	372(20.3)	11,016(26.1)
Ethnicity									
Han	3,623(44.0)	2,758(39.7)	2,451(39.4)	2,128(42.5)	1,942(38.9)	1,619(35.3)	1,373(31.0)	885(48.4)	16,779(39.7)
Other	4,619(56.0)	4,194(60.3)	3,762(60.6)	2,882(57.5)	3,045(61.1)	2,966(64.7)	3,050(69.0)	945(51.6)	25,463(60.3)
Occupation									
Farmer or rural laborer	3,570(43.3)	3,530(50.8)	2,954(47.5)	2,413(48.2)	2,567(51.5)	2,500(54.5)	2,763(62.5)	907(49.6)	21,204(50.2)
Housekeeping service or unemployment	2,596(31.5)	2,156(31.0)	2,138(34.4)	1,597(31.9)	1,468(29.4)	1,207(26.3)	989(22.4)	562(30.7)	12,713(30.1)
Other	1,648(20.0)	772(11.1)	749(12.1)	692(13.8)	659(13.2)	734(16.0)	565(12.8)	315(17.2)	6,134(14.5)
Unknown	428(5.2)	494(7.1)	372(6.0)	308(6.1)	293(5.9)	144(3.1)	106(2.4)	46(2.5)	2,191(5.2)
Site of diagnosis									
Voluntary counseling and testing centers	1,414(17.2)	1,175(16.9)	879(14.1)	647(12.9)	794(15.9)	641(14.0)	318(7.2)	226(12.3)	6,094(14.4)
Hospital	2,187(26.5)	1,935(27.8)	1,749(28.2)	1,399(27.9)	1,451(29.1)	1,316(28.7)	720(16.3)	516(28.2)	11,273(26.7)
Detention center	3,853(46.7)	3,271(47.1)	2,990(48.1)	2,408(48.1)	2,438(48.9)	2,081(45.4)	1,661(37.6)	850(46.4)	19,552(46.3)
Other	637(7.7)	421(6.1)	531(8.5)	503(10.0)	271(5.4)	517(11.3)	1,680(38.0)	228(12.5)	4,788(11.3)

67.8% and 68.5% of individuals aged 15–24 years and 25–34 years had education levels below primary school, respectively.

Of the newly diagnosed cases of HIV infected through IDU in 2012–2019, 28.0% of individuals had baseline CD4 cell counts greater than or equal to 500 cells/mm<sup>3</sup>, but this figure decreased year over year from 2012 to 2019 ( $\chi^2=186.60$ ,  $p<0.001$ ) (Figure 1). During the same period, 17.8% of the newly diagnosed cases of HIV infected not through IDU had baseline CD4 cell counts greater than or equal to 500 cells/mm<sup>3</sup>.

## DISCUSSION

In the past 30 years, the main mode of transmission of HIV in China has changed drastically as the primary route of transmission has changed from IDU to sexual transmission. The prevention and control of the HIV epidemic in drug users has achieved great successes as the annual incidence of HIV among drug users participating in methadone maintenance treatment (MMT) has reached zero and HIV prevalence of among drug users has decreased year over year, which suggests that the control of the HIV epidemic among drug users has been largely successful (4). During the study period of 2012–2019, only 4.5% of newly diagnosed cases of HIV were infected via IDU, and this proportion dropped from 10.1% in 2012 to 1.2% in 2019. During this same period, the results of sentinel surveillance of drug users in China also

showed decreases in the HIV antibody positive rate (5). In 2012, the HIV antibody positive rate in the sentinel surveillance of drug users was 3.9% (6), and it was 2.4% in 2019 (7).

The main demographic characteristics of newly diagnosed cases of HIV infected via IDU indicated that most individuals were males, had low levels of education, were of non-Han ethnicity, and were farmers. The results indicating that the educational level of not completing primary school in individuals aged 15–24 years (67.8%) and 25–34 years (68.5%) indicated that HIV prevention efforts for these populations were likely difficult and that traditional methods to disseminate health knowledge or provide health information may prove suboptimal for these populations.

During 2012–2019, the annual number of newly diagnosed cases of HIV infected via IDU was decreasing year over year, but 28.0% of individuals had baseline CD4 cell counts greater than or equal to 500 cells/mm<sup>3</sup>, which indicated that these individuals may have been infected within the past two years and that HIV transmission via IDU has not been completely eliminated and that the risk of transmission still exists. MMT has played an important role in reducing the incidence of HIV among injection drug users (8), and the incidence of HIV among outpatients of MMT clinics in China decreased from 0.2/100 person-years in 2012 to 0.02/100 person-years in 2019. However, newly diagnosed cases of HIV infected via IDU with the first CD4 cell counts exceeding

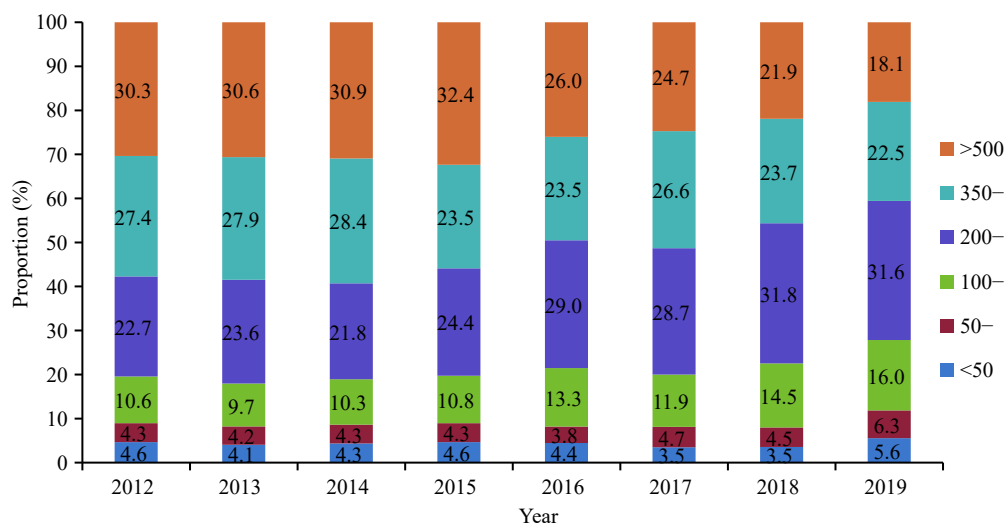


FIGURE 1. Proportion of baseline CD4 cell counts in newly diagnosed cases of HIV infected via injection drug use (IDU) — China, 2012–2019.

500 cells/mm<sup>3</sup> were mainly from the detention centers, which indicated that these individuals were possibly arrested and diagnosed in the detention centers due to drug abuse.

This study was subject to some limitations. First, the analysis was based on newly diagnosed cases of HIV infected via IDU and was likely influenced by the scope of HIV testing and by recording methodology. Second, determining the true sources of infection for the cases was unlikely to be definitive. Further case tracing and molecular transmission network analysis can help determine these sources of infection with greater certainty and better inform targeted interventions to reduce the risk of HIV transmission via IDU.

**Conflict of Interests:** The authors declare no competing interests.

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## REFERENCES

1. Wu ZY. New situation and challenge of HIV/AIDS prevention in China. *Chin J Public Health* 2011;27(12):1505 – 7. <http://dx.doi.org/10.11847/zgggws2011-27-12-01>. (In Chinese).
2. Zhang YW, Cai C, Wang XF, Li YF, Tang HL, Ma JQ. Preplanned studies: disproportionate increase of new diagnosis of HIV/AIDS infection by sex and age — China, 2007–2018. *China CDC Wkly* 2020; 2(5):69 – 74. <http://dx.doi.org/10.46234/ccdcw2020.020>.
3. Fauci AS, Pantaleo G, Stanley S, Weissman D. Immunopathogenic mechanisms of HIV infection. *Ann Intern Med* 1996;124(7):654 – 63. <http://dx.doi.org/10.7326/0003-4819-124-7-199604010-00006>.
4. Wu ZY. HIV/AIDS prevention strategy with Chinese characteristics. *Chin J Dis Control Prev* 2019;23(8):885 – 9. <http://dx.doi.org/10.16462/j.cnki.zbjbkz.2019.08.001>. (In Chinese).
5. Ge L, Li DM, Li PL, Qu SQ, Chen FF, Lyu F. Preplanned studies: HIV and HCV infection status among drug users-China, 2010-2018. *China CDC Wkly* 2020;2(7):109 – 12. <http://dx.doi.org/10.46234/ccdcw2020.031>.
6. Ge L, Cui Y, Wang L, Li DM, Guo W, Ding ZW, et al. Study on the characteristics of serology and sexual behavior among drug users at the HIV sentinel surveillance sites in 2012. *Chin J Epidemiol* 2014;35(2):121 – 3. <http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2014.02.004>. (In Chinese).
7. National Center for AIDS/STD Control and Prevention, China CDC. National HIV/syphilis/HCV sentinel surveillance report in 2019. Beijing; 2020.
8. Duan S, Yang YC, Han J, Yang SS, Yang YB, Long YC, et al. Study on incidence of HIV infection among heroin addicts receiving methadone maintenance treatment in Dehong prefecture, Yunnan province. *Chin J Epidemiol* 2011;32(12):1227 – 31. <http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2011.12.011>. (In Chinese).