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HIV among plasma donors and other high-risk groups in Henan, China

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Abstract

Objective—To describe the characteristics and changes of HIV/AIDS epidemic in different areas and high-risk populations in Henan, China.

Methods—Serological surveys were conducted among former plasma donors (FPDs), female sex workers (FSWs), drug users (DUs), sexually transmitted disease clinic attendees (STDCAs), men who have sex with men (MSM) and long-distance truck drivers (LDTDs) in different areas of Henan Province. Data originated from the sentinel surveillance surveys conducted between 2004 and 2006, a special epidemiological study of HIV among former plasma donors in 2004, and the HIV/AIDS case reporting system were analyzed.

Results—By December 2006, a total of 35,232 HIV cases had been reported from 159 counties in Henan. HIV prevalence among FPDs was 8.6% (range: 0.09%–13.0%). Sentinel surveillance data collected between 2004 and 2006 indicated HIV prevalence from 0% to 0.80% in FSWs; 0% to 0.86% in DUs; 0% to 1.39% in STDCAs; 0% to 1.35% in LDTDs; and 0.88% to 2.67% in MSM.

Conclusions—HIV/AIDS epidemic in Henan is primarily centered among FPDs infected prior to 1996. Sexual transmission of HIV is increasing among other risk groups. Condom use and HIV testing and counseling need to be promoted to stop the spread of HIV.

Keywords

HIV/AIDS; Epidemiology; Case reporting; Sentinel surveillance; Former plasma donors

INTRODUCTION

Human immunodeficiency virus type 1 (HIV-1) has spread rapidly in China since 1995.[1, 2] By the end of 2007, there were an estimated 700,000 people living with HIV nationwide.[3] Henan province, located in central eastern China (Figure 1), is one of the worst affected provinces in terms of HIV/AIDS. Henan's first HIV/AIDS cases were identified in ten foreign students from Zimbabwe in 1989. In early 1995, the first local HIV cases were reported after an HIV outbreak among plasma donors. Around the same time, HIV also began to spread via sexual and vertical transmission.[4, 5]

HIV infection through plasma donation has been reported in China and other developing countries.[6–8] Between 1990 and 1994, thousands of small commercial plasma collection

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centres were established in rural areas of China. Plasma donors were paid to donate blood, the plasma removed with the red blood cells re-infused into donors to prevent anaemia. Frequency of plasma donation, combined with the reuse of tubing and the mixing of plasma from multiple donors during collection and the subsequent re-infusion of mixed red blood cells, led to thousands of HIV infections among plasma donors in China, particularly in Henan province.

The spread of HIV via plasma donation was interrupted in 1996 with the introduction and enforcement of laws banning the commercial collection of blood and blood products. At the same time, the government of Henan strengthened the management of blood supplies, effectively containing the transmission of HIV via blood collection, donation and transfusion.[9] Since 1998, 100% of blood used in clinical settings in Henan has come from voluntary donors[10].

In 1995, two national sentinel surveillance sites were established in Henan that focused on sexually transmitted disease clinic attendees (STDCAs) and female sex workers (FSWs). Since then, coverage has expanded to 46 sentinel surveillance sites in 2006. These sites currently monitor drug users (DUs), men who have sex with men (MSM), long distance truck drivers (LDTDs), pregnant women, and hospital outpatients who have blood samples collected for reasons other than HIV testing.

Since 1995, various surveys[4, 5, 11–13] have been conducted among former plasma donors (FPDs) to measure the prevalence of HIV infection among FPDs and their children. These initial studies found the HIV prevalence rates ranged from 9.1% to 17.0% among FPDs and 2.1% among FPDs' non-donor spouses, and the rate of vertical transmission ranged from 28.9% to 38.4%. These initial surveys were limited in their ability to reflect the true HIV prevalence among FPDs in Henan because most FPD spouses and/or main sexual partners were not tested, and because participants in these surveys were not randomly sampled nor were the survey locations representative of the FPD population.

To gain a more accurate understanding of the HIV burden among FPDs, the Henan provincial government introduced a new HIV testing policy in 2004 designed to actively seek out certain groups believed to be at high risk of HIV infection.[14] From June to August of 2004, an HIV testing campaign was conducted among FPDs, the spouses of all HIV-positive FPDs, and their children. Between 2004 and 2006, a substantial body of data was generated describing HIV infection in different populations in Henan. In this paper, we present and discuss the results of HIV survey among FPDs and of HIV sentinel surveillance from 5 high-risk populations: FSWs, STDCAs, DUs, MSM and LDTDs.

METHODS

Data came from 3 different sources in Henan: HIV sentinel surveillance; a special survey of HIV among FPDs; and the HIV/AIDS case reporting system. All data were collected between 2004 and 2006.

Sentinel Surveillance

Sentinel surveillance surveys to assess HIV prevalence among high-risk populations, including FSWs, STDCAs, DUs and LDTDs, were undertaken twice in 2004; since 2005, these surveys have been conducted annually. Data collection followed China's national HIV sentinel surveillance protocol. This protocol specifies when surveys are to be conducted (annually over the two month period from April 1 to May 31); sampling methods (cluster sampling method); and sample size (sampling is done until a sample size of 400 is reached; if a sample size of 400 is unobtainable, a sample of 250 is attempted and the sampling period extended by one month as necessary to recruit more respondents.)

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Respondents are interviewed anonymously using a standardized questionnaire to collect basic demographic and behavioral information. Respondents are also screened for HIV antibody by enzyme-linked immunosorbent assay (ELISA). Samples that test positive are retested by ELISA. All sentinel surveillance data are entered into a database created using EpiData 3.1 software (The EpiData Association, Odense, Denmark).

Special Survey of FPDs

A special HIV testing campaign among FPDs was conducted throughout Henan in 2004 to assess the HIV situation among FPDs and to link HIV-positive FPDs and their family members to government services. It is believed that almost all known FPDs were enrolled in the campaign, with the exceptions of those who denied having sold plasma in the 1990s, those who had left the province permanently, and those who had migrated out of the province temporarily.

FPDs participating in the campaign were tested for HIV, and a questionnaire was administered to collect demographic and risk behavior information; information on health status and health services utilization; and information about the HIV status of the respondents' spouse/sex partner and children. All new HIV/AIDS cases identified through the testing campaign were entered into the national HIV/AIDS case reporting system.

HIV/AIDS Case Reporting System

All newly identified HIV/AIDS cases in China undergo confirmatory HIV testing via Western Blot, and these cases are then entered into the national HIV/AIDS case reporting system. Information collected in the national case reporting system on newly identified cases includes demographic information (name, PRC ID number, age, gender, marital status, area of residence, and occupation); disease status (HIV or AIDS); risk behavior information (injecting drug use, experience of heterosexual or homosexual sex, plasma donation, blood transfusion/ received blood products, surgical history, mother HIV-positive, spouse/sexual partner HIV-positive, occupational exposure to HIV); and laboratory test results and test dates.

The national HIV/AIDS case reporting system requires public health professionals to follow up each reported HIV case every 6 months until the onset of AIDS, after which patients are visited every 3 months. Medical professionals from the county CDC conduct patient follow-up either via a phone call or face-to-face interview. Data collected during follow-up include demographic information and clinical information (disease status, $CD4^+$ T lymphocyte test results, ART status, and whether or not any clinical symptoms of AIDS have presented in the interval since the last medical follow-up).

The complete database of all Henan provincial HIV/AIDS patients up to December 31, 2006 in the national HIV/AIDS case reporting system was downloaded from the Comprehensive Response Management Information System (CRMIS) of the China Information System for Disease Control and Prevention website on January 1, 2007.

HIV Testing

Serum samples were screened by HIV rapid testing (Dainabot Company Limited, Japan) or ELISA (bioMérieux, France). If a sample screened HIV-positive, confirmatory testing was done using a Western blot assay (Genelabs Diagnostics Pte Ltd., Singapore).

Data Analysis

Data were analyzed using Visual FoxPro 7.0 (Visual FoxPro 7.0 for windows; Microsoft, Redmond, WA, USA) and SPSS 13.0 (SPSS 13.0 for windows; SPSS Inc., Chicago, IL, USA). HIV infection was the outcome variable. For categorical exposure variables, data were

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analyzed as frequency and percent. The Pearson's chi-square test and Fisher's exact test were used to evaluate differences of proportions and prevalence among different years.

RESULTS

Sentinel Surveillance

HIV prevalence by risk groups and sites is presented in Table 1. HIV prevalence among female sex workers (FSWs), sexually transmitted disease clinic attendees (STDCAs), drug users (DUs), and long distance truck drivers (LDTDs) was low and remained low throughout the surveillance period. There is only one sentinel surveillance site in Henan monitoring HIV among men who have sex with men (MSM), and it was established in 2005 in the provincial capital, Zhengzhou City. HIV prevalence among MSM surveyed rose from 0.88% in 2005 to 2.67% in 2006; however, this change was not statistically significant ($P = 0.415$).

Special Survey of FPDs

During the HIV testing campaign among FPDs, 280,307 FPDs were identified and invited to participate in the survey; 269,246 subjects (96.1%) participated and were tested for HIV; and 23,157 were confirmed HIV-positive (8.6%). Among those who tested HIV-positive, 12,159 sero-discordant couples were identified. Of all HIV infections among FPDs, 35.9% came from Zhumadian prefecture, where HIV prevalence among FPDs was 10.9%. HIV prevalence among FPDs across Henan's 18 prefectures ranged from 0.09% to 13.0%. In 5 prefectures, the prevalence was more than 10%; in 2 prefectures it was between 5–10%, while in 6 prefectures, it was between 1–5%. The remaining 5 prefectures' HIV prevalence rate among FPDs was less than 1%.

National HIV/AIDS Case Reporting System

The national HIV/AIDS case report system covers all HIV/AIDS cases which have tested HIV-positive with confirmatory tests. From the start of the HIV epidemic through the end of 2006, 35,232 cases covering all 18 prefectures of Henan were reported via the case reporting system. In Henan, eight prefectures reported more than 1,000 cases: Zhumadian, Zhoukou, Nanyang, Shangqiu, Kaifeng, Xinyang, Luohe and Zhengzhou. Of the total cases, 92.4% were residents of these 8 prefectures. The lowest HIV burden was found in the prefectures of Sanmenxia, Hebi, Jiyuan and Puyang; each of these prefectures reported no more than 100 cases and together accounted for just 0.7% of all cases. Among the 35,232 cases reported, 7,107 (20.2%) had died and 21,828 (61.7%) were AIDS patients. Among those with AIDS, 15,386 (70.5%) were receiving ART.

The demographic characteristics of HIV-positive individuals in the case reporting system are presented in Table 2. The majority of those infected were married (77.5%), between the ages of 30–49 (~70%), working as farmers (90.8%), and had a primary school education or were illiterate (58.4%).

Modes of transmission are presented in Table 3. Most reported cases were infected through paid plasma donation in the 1990s, but this route of transmission fell from 85.6% in 2004 to 38.4% in 2006. Sexual transmission increased from 4.8% in 2004 to 22.4% in 2006 (χ^2=6124.3, $P < 0.001$). Mother to child transmission (MTCT) also increased somewhat, rising from 2.9% in 2004 to 4.3% in 2005, but falling to 3.9% in 2006.

By the end of 2006, there were 1,030 HIV-positive children in Henan who were infected via MTCT, accounting for 2.9% of the total HIV/AIDS cases in Henan. Of the total MTCT cases, 199 (19.3%) were under 5 years of age. The reported number of MTCT cases identified between

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2004 and 2006 decreased from 601 in 2004 to 197 in 2005, and further decreased to 152 in 2006.

DISCUSSION

Understanding of the HIV epidemic in Henan, especially among FPDs, has improved in recent years as sentinel surveillance efforts have been stepped up and special surveys have been conducted.[11, 15, 16] The HIV epidemic among FPDs is believed to have started in the mid-1990s.[4, 6, 11–13, 17, 18] Henan was the worst affected province in China, and PLWHA in Henan are mainly FPDs who sold plasma and/or blood before 1996. Results from the HIV testing campaign in 2004 indicated that the average prevalence of HIV infection among FPDs in Henan was 8.6%; however, the prevalence in different prefectures ranged widely from 0.09% to 13.0%. Yan et al.[12] and Zheng et al.[11] also reported high HIV prevalence rates of 9.1% and 17.0% among FPDs in 2 different unspecified counties in 1999 and 2000, respectively, though these studies drew on smaller sample sizes and did not specify the study location.

In Henan, it is most likely that recently reported cases of HIV/AIDS among FPDs and people who received contaminated blood transfusions/blood products do not represent new infections, but rather the detection of those who were infected in the 1990s. This is suggested by the sizeable proportion of HIV cases who have already progressed to AIDS, and the proportion of reported, cumulative HIV cases who have died.

Public awareness of the routes of HIV transmission and of the benefits of HIV counseling and testing have improved in Henan,[19] resulting in more people getting tested for HIV. Many people who contracted HIV/AIDS via transfusions and blood products have been detected in recent years through HIV voluntary counseling and testing (VCT) services.[19, 20]

Although most HIV-infected individuals in Henan province are FPDs, the case reporting system shows that after more than 10 years, HIV is now spreading via sexual transmission and MTCT. Li et al[21] and Wang et al[5] have confirmed this finding. The proportion of FPDs among total reported cases is decreasing, and the proportion of cases infected via sexual transmission appears to be on the rise.

Sentinel surveillance results indicate that HIV prevalence among DUs, STDCAs, and LDTDs remains low, though high-risk behaviors, such as low rates of condom use, having multiple sexual partners or having extramarital sexual partners, are common among these groups.[22] HIV prevalence may be increasing among MSM in Henan.[9] Sentinel surveillance indicated that HIV prevalence among MSM was 2.7% in Zhengzhou in 2006, similar to rates in 2006 observed in Harbin (2.2%)[23] in north-eastern China, but lower than HIV prevalence among MSM in Beijing (5.9%)[24]. Self-reported condom use rates among MSM are low; when asked if they had used a condom in the during anal intercourse with a man in the past 6 months, only 27.9% of MSM reported that they had.[22] This low rate of condom use, while higher than Zeng et al's survey in Shenzhen (22.7%)[25] and lower than Zhang et al's survey in 6 large cities of mainland China (32.5%)[26] confirms that condom use among MSM is not common practice in China. Other researchers have found that MSM in Zhengzhou had an average of 5 multiple male sexual partners and 78.6% reported having had insertive and/or receptive anal intercourse in the previous 6 months[22]. Yang et al [27] investigated 1,000 MSM in an unspecified Chinese city, and in the past 6 months, 43.6% of them had 3 or more male sexual partners and 53.6% had unprotected anal intercourse with men. In addition, some MSM in Zhengzhou report having concurrent male sexual partners as well as female sexual partners.[22] The conditions exist for the rapid transmission of HIV in this high-risk group if effective interventions are not implemented.

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Those infected via sexual transmission include the spouses/sexual partners of HIV-infected individuals, FSWs, clients of FSWs and MSM. Through the end of 2006, there were 2,795 cumulative cases infected via heterosexual HIV transmission. Henan has monitored almost all identified sero-discordant couples and HIV-positive reproductive aged women to prevent new infections via sexual transmission and MTCT.

In October 2001, prevention of MTCT (PMTCT) of HIV was initiated in 2 counties of Henan with high HIV prevalence. In 2003, this was expanded to 31 counties in 10 prefectures. After the "Four Frees and One Care" policy was announced in 2005, PMTCT was expanded to all prefectures in Henan.

In order to efficiently use limited resources, PMTCT services are differentiated in Henan depending on the HIV prevalence rate. In the 31 high prevalence counties, all HIV-positive women aged from 20 to 49 are provided with counseling and condoms on a monthly basis. In addition, all pregnant women who are unaware of their HIV status are given a free HIV test as part of routine prenatal care. HIV-positive pregnant women are offered free or subsidized PMTCT services. In low prevalence counties, all known HIV-positive women aged 20 to 49 also receive monthly counseling and condoms; however free HIV testing services are not offered. HIV antibody screening is standard practice for hospital deliveries across Henan, and if a delivering mother tests HIV-positive, PMTCT services are offered as quickly possible. PMTCT services in Henan include free abortion services should the woman decide to terminate the pregnancy. If she chooses to proceed with the pregnancy, free services will be obtained, which include follow-up during pregnancy and delivery; antiretroviral drugs for mother and child; alternative infant feeding formula for 18 months; and HIV antibody screening for infants aged 18 months.

The case reporting system shows that of the total MTCT cases, only 199 (19.3%) children were under 5 years of age. This suggests that the majority of MTCT infections took place before 2002. Furthermore, studies[28, 29] carried out in Henan confirmed that multiple prevention methods are successful and can effectively decrease the HIV MTCT transmission rate.

In addition to expanding HIV VCT services, the government in Henan has also taken actions to prevent the further spread of HIV via sexual transmission and MTCT. These measures include providing free condoms and HIV testing services for discordant couples; using multiple methods to interrupt MTCT; carrying out behavioral intervention programs among high-risk populations (e.g., 100% condom use programs for FSWs; HIV testing and behavioral interventions targeting MSM; and methadone maintenance treatment (MMT) for drug users); and large-scale HIV/AIDS education programs.

CONCLUSIONS

The HIV/AIDS epidemic in Henan is still primarily centered among FPDs infected prior to 1996 and is much lower than originally thought. Transmission between discordant couples and from infected FPD mother to child will have a limited widespread HIV role. Although HIV prevalence remains low among groups such as FSWs and drug users, rates of high-risk sexual behaviors are high. More attention must be paid to MSM in particular; surveillance data indicate rising HIV prevalence among MSM in Henan and high levels of risky sexual behaviors. HIV surveillance, VCT and intervention programs should be further strengthened to stop the additional spread of HIV among MSM and other vulnerable groups in Henan.

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Figure 1.
Geographic position of Henan in China, and Henan's 18 prefectures

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Table 1

HIV sentinel surveillance by risk groups and sites in Henan, 2004–2006

Risk groups and Sites	2004 Round 1			2004 Round 2			2005			2006		
	n	HIV+	%	n	HIV+	%	n	HIV+	%	N	HIV+	%
FSW												
Erqi district	251	2	0.80	…*	…	…	250	0	0	450	0	0
Kaifeng	252	0	0	222	0	0	257	0	0	405	0	0
Xinxiang	231	1	0.43	255	0	0	236	0	0	487	0	0
Xinyang	250	0	0	251	0	0	260	0	0	260	0	0
Anyang	…Δ	…	…	…Δ	…	…	270	0	0	527	0	0
Hebi	…Δ	…	…	…Δ	…	…	250	0	0	285	0	0
Wolong district	…Δ	…	…	…Δ	…	…	360	0	0	307	0	0
Shangqiu	…Δ	…	…	…Δ	…	…	274	0	0	276	0	0
Yuanyang county	…Δ	…	…	…Δ	…	…	250	0	0	240	0	0
Queshan county	…Δ	…	…	…Δ	…	…	128	1	0.78	276	0	0
Jiaozuo	…Δ	…	…	…Δ	…	…	…Δ	…	…	404	0	0
Luohe	…Δ	…	…	…Δ	…	…	…Δ	…	…	221	0	0
Puyang	…Δ	…	…	…Δ	…	…	…Δ	…	…	442	0	0
Sanmenxia	…Δ	…	…	…Δ	…	…	…Δ	…	…	313	1	0.32
Zhumadian	…Δ	…	…	…Δ	…	…	…Δ	…	…	237	1	0.42
Total	984	3	0.30	728	0	0	2,535	1	0.04	5,130	2	0.04
STD clinic attendees												
Jinshui district	250	3	1.20	202	1	0.50	327	0	0	400	2	0.50
Guancheng district	250	0	0	252	0	0	250	0	0	…*	…	…
Pingdingshan	188	0	0	183	0	0	252	0	0	…*	…	…
Puyang	255	0	0	253	0	0	277	0	0	207	0	0
Kaifeng	…Δ	…	…	…Δ	…	…	257	0	0	252	0	0
Luoyang	…Δ	…	…	…Δ	…	…	333	0	0	140	0	0

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Risk groups and Sites	2004 Round 1			2004 Round 2			2005			2006		
	n	HIV+	%	n	HIV+	%	n	HIV+	%	N	HIV+	%
Xihua county	…[Δ]	…	…	…[Δ]	…	…	257	0	0	237	0	0
Xuchang	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	191	0	0
Anyang	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	258	2	0.78
Xinxiang	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	…[*]	…	…
Jiaozuo	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	216	0	0
Luohe	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	273	0	0
Zhoukou	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	106	0	0
Nanyang	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	124	1	0.81
Jiyuan	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	287	4	1.39
Total	943	3	0.32	890	1	0.11	1,953	0	0	2,691	9	0.33
DUs												
Xuchang	282	0	0	256	1	0.39	342	0	0	336	1	0.30
Lingbao county	…[*]	…	…	…[*]	…	…	…[*]	…	…	191	0	0
Zhengzhou	251	0	0	232	0	0	250	2	0.80	250	1	0.40
Pingdingshan	205	0	0	156	0	0	254	0	0	…[*]	…	…
Jiaozuo	268	1	0.37	290	0	0	263	0	0	288	1	0.35
Luoyang	260	1	0.38	232	2	0.86	133	0	0	…[*]	…	…
Zhumadian	…[Δ]	…	…	…[Δ]	…	…	…[Δ]	…	…	119	0	0
Total	1,266	2	0.16	1,166	3	0.26	1,242	2	0.16	1,184	3	0.25
LDTD[#]												
Zhoukou	450	1	0.22	…	…	…	391	1	0.26	414	0	0
Zhenping county	265	0	0	…	…	…	263	0	0	252	0	0
Yuanyang county	222	3	1.35	…	…	…	245	1	0.41	250	0	0
Jiyuan	252	0	0	…	…	…	350	0	0	400	0	0
Total	1,189	4	0.34	…	…	…	1,249	2	0.16	1,316	0	0
MSM												
Zhengzhou	…[Δ]	…	…	…[Δ]	…	…	113	1	0.88	187	5	2.67

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[*] Data were not displayed and analyzed because the sample sizes were less than 100.

[Δ] Data were not displayed because they were not sentinel surveillance sites in those years.

[#] According to the guidelines, the LDTD sites conducted only one round of surveillance in 2004.

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Table 2

Demographic characteristics of reported HIV/AIDS cases in Henan, 2004 to 2006

	2004		2005		2006		Cumulative Total	
	n	%	n	%	n	%	n	%
Total	20,376		4,593		3,935		35,232	
Gender								
Male	11,008	54.0	2,540	55.3	2,098	53.3	18,983	53.9
Female	9,368	46.0	2,053	44.7	1,837	46.7	16,249	46.1
Age Group								
0–9	483	2.4	147	3.2	107	2.7	751	2.1
10–19	335	1.6	180	3.9	171	4.3	876	2.5
20–29	722	3.5	361	7.9	287	7.3	1,359	3.9
30–39	7,733	38.0	1,893	41.2	1,450	36.8	12,354	35.1
40–49	6,947	34.1	1,190	25.9	1,110	28.2	11,795	33.5
50–59	3,562	17.5	612	13.3	614	15.6	6,589	18.7
60–69	551	2.7	210	4.6	196	5.0	1,359	3.9
Unknown	43	0.2	0	0.0	0	0.0	149	0.4
Marital status								
Married	16,099	79.0	3,315	72.2	2,939	74.7	27,315	77.5
Never-married	1,675	8.2	630	13.7	485	12.3	3,289	9.3
Others	2,579	12.7	615	13.4	471	12.0	4,470	12.7
Unknown	23	0.1	33	0.7	40	1.0	158	0.4
Occupation								
Farmer	19,255	94.5	3,846	83.7	3,168	80.5	32,001	90.8
Student	524	2.6	205	4.5	178	4.5	1,055	3.0
Worker	141	0.7	158	3.4	188	4.8	660	1.9
Others	411	2.0	286	6.2	329	8.4	1,368	3.9
Unknown	45	0.2	98	2.1	72	1.8	148	0.4
Education level								
Illiterate	3,110	15.3	499	10.9	441	11.2	5,147	14.6

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	2004		2005		2006		Cumulative Total	
	n	%	n	%	n	%	n	%
Primary	9,491	46.6	1,741	37.9	1,467	37.3	15,439	43.8
Secondary	7,157	35.1	1,673	36.4	1,395	35.5	12,332	35.0
High	362	1.8	193	4.2	204	5.2	939	2.7
College or over	49	0.2	26	0.6	33	0.8	126	0.4
Unknown	207	1.0	461	10.0	395	10.0	1,249	3.5

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Table 3

Changes in patterns of HIV transmission routes among reported HIV/AIDS cases in Henan, China, 2004–2006

Transmission	2004		2005		2006		Cumulative Cases	
	n	%	n	%	n	%	n	%
FPD	17,441	85.6	2,265	49.3	1,512	38.4	26,528	75.3
Blood transfusion/blood products	1,223	6.0	1,087	23.7	951	24.2	3,934	11.2
Sex	973	4.8	816	17.8	883	22.4	2,807	8.0
heterosexual	973	4.8	812	17.7	875	22.2	2,795	7.9
homosexual	0	0	4	0.1	8	0.2	12	0.0
IDU	6	0.0	21	0.5	12	0.3	48	0.1
Mother to child	601	2.9	197	4.3	152	3.9	1,030	2.9
Unknown	132	0.6	207	4.5	425	10.8	885	2.5
Total	20,376	100	4,593	100	3,935	100	35,232	100