

# HIV Infection and AIDS in China, 1985 through 1994

## ABSTRACT

**Objectives.** This paper analyzes data on the distribution of and risk factors for the acquired immunodeficiency syndrome (AIDS) and human immunodeficiency virus (HIV) infection in China.

**Methods.** Ten years of data on persons tested for HIV infection and AIDS and the proportion who tested positive were analyzed against the background of China's population count. The Chinese- and English-language literature on HIV and AIDS from 1985 through 1995 was also reviewed.

**Results.** Overall, more males than females had HIV infection. Intravenous drug use was the primary source of transmission, followed by heterosexual contacts. Only a small number of the persons tested were homosexual, but their proportion of HIV seropositivity ranked third to that of drug users; that of general hospital patients ranked fourth.

**Conclusions.** HIV infection and AIDS in China began as a highly regionalized and largely rural problem in Yunnan Province. However, HIV infection and AIDS have become an emerging urban problem. HIV seropositivity is low among several groups thought to have an elevated risk. (*Am J Public Health*. 1996;86:1116-1122)

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### Introduction

In 1985, four Chinese hemophiliac patients who underwent treatment with Factor VIII supplied by the US Armour Pharmaceutical Company tested positive for human immunodeficiency virus (HIV).<sup>1</sup> Just months earlier, a naturalized US citizen originally from Argentina became the first person in China with a documented case of the acquired immunodeficiency syndrome (AIDS).<sup>2</sup> In the following year a chef from New York City, also a naturalized US citizen visiting China to seek medical care, became the first Chinese person to be diagnosed with AIDS.<sup>1,3</sup> The government quickly adopted a policy in collaboration with the World Health Organization<sup>4</sup> and used enzyme-linked immunosorbent assay tests to screen subpopulations deemed most likely to have elevated risks of exposure to HIV:<sup>5</sup> drug users, foreigners staying 6 months or longer, Chinese persons returning from abroad, hotel service personnel, prostitutes in detention centers, consumers of imported blood products, contacts of persons who are HIV positive, and blood donors. Unlinked tests were also made of sera from selected clinics along the country's southern border.<sup>6</sup> Cases were confirmed by the Western blot test. This paper reports the emerging HIV infection and AIDS epidemic in China by age, sex, year of screening, categories of surveillance population, geographic distribution, modes of transmission, and occupation.

### Methods

Counts of HIV-positive and AIDS cases and number of persons tested for HIV and AIDS were obtained from the Ministry of Public Health. Denominator data are based on the 1990 Population

Census.<sup>7</sup> In addition, a search was made of the HIV and AIDS literature on MEDLINE and AIDSLINE (the National Library of Medicine's databases) from 1985 through the end of 1995 for articles published in scientific journals and conference abstracts. Only 69 Chinese- or English-language documents relevant to the epidemiology of HIV and AIDS were reviewed. To these we added selected magazine and newspaper reports published in Hong Kong and Mainland China. Excluded were publications that focused exclusively on the awareness of and health education about HIV and AIDS prevention methods,<sup>8-12</sup> etiology and pathology of the disease,<sup>13</sup> and results of clinical trials with traditional Chinese medicine.<sup>14</sup>

### Results

The infrastructure of the disease surveillance system in China has three components: a National Disease Reporting System for 35 notifiable communicable diseases that covers the entire population; 145 National Disease Surveil-

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lance Points with a coverage of about 1% of China's population in 30 provinces, autonomous regions, and municipalities; and several disease-specific surveillance systems including one for HIV infection and AIDS.<sup>15</sup> With the advent of computer technology, these disease surveillance systems became fully developed during the 1980s, just as the HIV-positive and AIDS cases emerged. At least 13 provinces have established HIV surveillance centers, and over 161 monitoring posts are operating in the inland provinces and regions. More than 200 laboratories now do screening tests, and 12 perform AIDS identification tests.<sup>16,17</sup> From a cumulative count of 4 202 104 persons tested for HIV infection between 1985 and December 31, 1994, exactly 1774 HIV-positive and AIDS cases were detected (Table 1).<sup>18</sup> Males exceeded females by a ratio of 10.8 to 1. Over 80% of all cases came primarily from two age groups: 20 through 29 years (51.7%) and 30 through 39 years (28.4%). Table 2 shows the number of HIV-positive and AIDS cases detected from the cumulative number of persons screened and the proportion of HIV seropositivity per million population by year; Table 3 shows the same data by categories of people under surveillance, arranged in descending order of the proportion of persons who tested positive for HIV per million population. It is evident that the surveillance populations have been expanded over the years to include varying numbers of homosexual persons, general hospital patients, labor-camp detainees, sailors, persons undergoing routine physical examinations, medical personnel, pregnant women, and others. The majority (97.3%) of the 4 202 104 persons tested were Chinese nationals, 1.5% were foreigners, and 1.1% were overseas Chinese. Of the 1774 HIV-positive and AIDS cases discovered so far, about 81.5% were Chinese nationals, 16.2% were foreigners, and 2.3% were overseas Chinese.

Yunnan has more than 80% of the caseload, followed by Beijing, Shanghai, Guangdong, and Fujian (Table 4). So far, no cases have been reported from Anhui, Gansu, Jilin, Neimenggu (Inner Mongolia), Ningxia, Qinghai, Shanxi, and Xinjiang, even though HIV testing was conducted in all 30 provinces, autonomous regions, and municipalities of China. According to the 1990 census, the country's total population was 1 130 510 638 persons. HIV infection and AIDS were reported in 22 provinces, autonomous

**TABLE 1—1990 Population Census<sup>a</sup> and Cumulative AIDS and HIV-Positive Cases,<sup>b</sup> by Age and Sex: People's Republic of China, 1985 through 1994**

| Age, y   | Male                         |                              | Female                       |                              | Both Sexes                   |                              |
|----------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|          | 1990 Population <sup>a</sup> | HIV+/AIDS Cases <sup>b</sup> | 1990 Population <sup>a</sup> | HIV+/AIDS Cases <sup>b</sup> | 1990 Population <sup>a</sup> | HIV+/AIDS Cases <sup>b</sup> |
| < 15     |                              | 10                           |                              | 1                            |                              | 11                           |
| 16-19    | 187 798 432 <sup>c</sup>     | 138                          | 174 365 893 <sup>c</sup>     | 15                           | 362 164 325 <sup>c</sup>     | 153                          |
| 20-29    | 98 361 750                   | 828                          | 93 868 582                   | 89                           | 192 230 312                  | 917                          |
| 30-39    | 75 290 535                   | 477                          | 69 922 864                   | 27                           | 554 394 637                  | 504                          |
| 40-49    | 50 141 565                   | 128                          | 45 303 308                   | 13                           | 95 444 873                   | 141                          |
| > 50     | 78 348 890                   | 40                           | 79 412 315                   | 5                            | 157 761 205                  | 45                           |
| Unknown  | ...                          | 3                            | ...                          | 0                            | ...                          | 3                            |
| All ages | 489 941 172                  | 1624                         | 462 872 942                  | 150                          | 952 814 114                  | 1774                         |

<sup>a</sup>Population totals are for the 22 provinces, autonomous regions, and municipalities where HIV-positive and AIDS cases have been reported, excluding the population count from Anhui, Gansu, Jilin, Neimenggu, Ningxia, Qinghai, Shanxi, and Xingjiang. Calculations were made by the authors from data published by the State Council and Population Census Office.<sup>6</sup>

<sup>b</sup>Case counts were obtained, with permission, from the Ministry of Public Health, People's Republic of China. Information on the number of persons tested was not presented by age and sex in the Ministry of Public Health's tabulations.

<sup>c</sup>Population counts are for persons aged 0-19 years. Further breakdown by age cannot be made because a detailed population census by age below 20 years was not published.

**TABLE 2—Number of AIDS Cases and Proportion of Persons Who Were HIV Positive<sup>a</sup> per Million Population, among Those Tested for HIV, by Year: People's Republic of China, 1985 through 1994**

| Year  | No. Persons Tested  | Total No. Cases |      | Chinese Nationals |      | Overseas Chinese |      | Foreign Nationals |      | Proportion HIV+ <sup>a</sup> per Million |
|-------|---------------------|-----------------|------|-------------------|------|------------------|------|-------------------|------|--|
|       |                     | HIV+            | AIDS | HIV+              | AIDS | HIV+             | AIDS | HIV+              | AIDS |  |
| 1985  | ... <sup>b</sup>    | 5               | 1    | 4                 | 0    | 0                | 0    | 1                 | 1    |  |
| 1986  | 10 181 <sup>b</sup> | 1               | 0    | 0                 | 0    | 0                | 0    | 1                 | 0    | 589.33                                   |
| 1987  | 27 776              | 9               | 2    | 0                 | 0    | 2                | 1    | 7                 | 1    | 324.02                                   |
| 1988  | 62 342              | 7               | 0    | 0                 | 0    | 0                | 0    | 7                 | 0    | 112.28                                   |
| 1989  | 91 982              | 171             | 0    | 148               | 0    | 0                | 0    | 23                | 0    | 1859.06                                  |
| 1990  | 309 718             | 299             | 2    | 257               | 2    | 2                | 0    | 40                | 0    | 965.39                                   |
| 1991  | 457 966             | 216             | 3    | 179               | 1    | 6                | 1    | 31                | 1    | 471.65                                   |
| 1992  | 831 561             | 261             | 5    | 206               | 5    | 7                | 0    | 48                | 0    | 313.89                                   |
| 1993  | 1 040 206           | 274             | 23   | 218               | 20   | 11               | 0    | 45                | 3    | 263.41                                   |
| 1994  | 1 370 372           | 531             | 29   | 433               | 26   | 13               | 0    | 85                | 3    | 387.39                                   |
| Total | 4 202 104           | 1774            | 65   | 1445              | 54   | 41               | 2    | 288               | 9    | 422.17                                   |

Source. Rearranged and calculated from data obtained, with permission, from the Ministry of Public Health, People's Republic of China.

<sup>a</sup>Includes count of confirmed AIDS cases.

<sup>b</sup>The number of persons tested for 1985 and 1986 was combined in the Ministry of Public Health's tabulations and cannot be disaggregated.

regions, and municipalities, which altogether had a population count of 952 814 114. Using the cumulative number of cases over the period as the numerator and the population in 1990 for the 22 provinces as an approximate mid-period denominator, one may estimate a crude case rate for AIDS and HIV infection of about 1.86 per million population (foreigners included) from 1985 through 1994.

Among cases of HIV infection and AIDS, the percentage who are intravenous drug users has declined proportionally (88% in 1990,<sup>4</sup> 83% in 1993,<sup>19</sup> and 73% in 1994<sup>20</sup>). However, the primary mode of HIV transmission is still intravenous drug use. Heterosexual contacts were responsible for 8.2% of the HIV transmissions, with 20 of the 145 cases occurring in foreigners (Table 5). Homosexual contacts were responsible for 0.4%.

**TABLE 3—Cumulative Count of Persons Tested for HIV, HIV-Positive and AIDS Cases,<sup>a</sup> and Proportion Who Were HIV Positive per Million Population, by Categories of Population under Surveillance: People's Republic of China, 1985 through 1994**

| Surveillance Population                    | No. Tested for HIV | HIV <sup>+</sup> Cases <sup>a</sup> | AIDS Cases <sup>a</sup> | Proportion HIV <sup>+</sup> per Million |
|--|--------------------|-------------------------------------|-------------------------|---|
| Drug users                                 | 67 966             | 1132                                | 34                      | 16 655.39                               |
| Contacts of HIV <sup>+</sup> persons       | 1 902              | 25                                  | ...                     | 13 144.06                               |
| Homosexual persons                         | 505                | 4                                   | 2                       | 7 920.79                                |
| General hospital or clinic patients        | 5 284              | 13                                  | 9                       | 2 460.26                                |
| Detainees in labor re-education camps      | 72 206             | 42                                  | ...                     | 581.67                                  |
| Users of blood products                    | 7 119              | 4                                   | ...                     | 561.88                                  |
| Returnees from abroad                      | 297 036            | 151                                 | 7                       | 508.36                                  |
| Residents along China's borders            | 18 385             | 9                                   | ...                     | 489.53                                  |
| Unlinked sera                              | 45 329             | 12                                  | ...                     | 264.73                                  |
| Prostitutes                                | 108 782            | 12                                  | 1                       | 110.31                                  |
| Pregnant women                             | 61 310             | 6                                   | ...                     | 97.86                                   |
| Clients of prostitutes                     | 64 491             | 5                                   | 1                       | 77.53                                   |
| Patients with sexually transmitted disease | 195 612            | 9                                   | ...                     | 46.01                                   |
| Sailors                                    | 58 603             | 2                                   | ...                     | 34.13                                   |
| Persons undergoing routine physical exams  | 647 873            | 13                                  | ...                     | 20.07                                   |
| Blood donors                               | 1 879 309          | 3                                   | ...                     | 1.60                                    |
| Hotel and recreational service workers     | 332 434            | 0                                   | ...                     | ...                                     |
| Medical personnel                          | 1 287              | 0                                   | ...                     | ...                                     |
| Tuberculosis patients                      | 977                | 0                                   | ...                     | ...                                     |
| Others                                     | 223 099            | 3                                   | ...                     | 12.87                                   |
| Overseas Chinese                           | 46 242             | 41                                  | 2                       | 886.64                                  |
| Foreigners <sup>b</sup>                    | 66 353             | 288                                 | 9                       | 4 340.42                                |
| Total                                      | 4 202 104          | 1774                                | 65                      | 422.17                                  |

Source. Rearranged and calculated from data obtained, with permission, from the Ministry of Public Health, People's Republic of China.

<sup>a</sup>AIDS cases are included in the count of HIV-positive cases.

<sup>b</sup>Referring to foreigners who resided in China 6 months or longer.

Five cases were in persons with hemophilia who were infected through use of blood products. Only one person was infected perinatally. In 18.4% of the 1774 cases, the mode of transmission was unknown.<sup>20</sup>

In 1990, more than 98% of the infected persons were Dai ethnic minorities in Yunnan.<sup>4</sup> Some 255 HIV-positive or AIDS cases were reported from 1986 to 1990 among these predominantly peasant minorities, which had a total population of 1 025 402 in 1990. We estimate that their case rate over 5 years was about 248.7 per million population, surpassed only by that of another minority group, the Jingpos, which had a cumulative count of 66 cases in the same period and a population of 119 276 in the 1990 census (or a case rate of approximately 553.3 per million population). Recent data showed that these non-Han villagers continue to be overrepresented among persons with AIDS or HIV infection and intravenous drug users.<sup>19</sup>

In terms of occupation (data not shown), the largest percentage of persons with AIDS or HIV infection were farmers (68.1%), followed by the unemployed (6.7%). Worker/laborers and business people (both government and self-employed) trailed behind (at 5% each).<sup>21</sup>

Unprotected sex is a persistent problem<sup>22</sup> and a common risk factor for sexually transmitted diseases in general and HIV infection in particular. The average annual incidence rate for sexually transmitted diseases between 1987 and 1990 was 778 per million population.<sup>23,24</sup> Perhaps partly because of increased rates of HIV testing among those considered to be at high risk for AIDS and partly because of a rising secular trend in sexually transmitted diseases,<sup>25</sup> the annual HIV-seropositive rate for patients with known sexually transmitted disease has increased dramatically since 1989 (from 47.3 to 94.1 in 1990, 98.4 in 1991, 246.1 in 1992, and 607.7 in 1993 per million population).<sup>26</sup>

Unascertainable is the number of drug users in China. Estimates range from 70 000<sup>27</sup> to 250 000.<sup>28,29</sup> Yunnan reportedly had 20 000<sup>30</sup>; this figure is clearly an underestimate because in Ruili, Longchuan, and Luxi counties alone, there were over 10 000 registered drug users,<sup>19</sup> 57% of whom began using drugs after 1988. A more realistic estimate of drug users for the entire province is about 100 000.<sup>31</sup> Intravenous drug users, fewer than 1% prior to 1987 and 14% in 1989, now comprise 29% to 36% of drug users.<sup>4,16</sup> About 15% of these intravenous drug users are estimated to be HIV infected.<sup>31</sup> A recent paper reported that the 1992 incidence of HIV infection among intravenous drug users was 81.8/100 person-years in Ruili, 44.6/100 person-years in Longchuan, and 5.1/100 person-years in Luxi<sup>32</sup>; by 1993, these rates were 85.7, 40.0, and 0, respectively.<sup>33</sup> Two-year follow-up results showed an overall HIV-seroconversion rate of 16%,<sup>34</sup> with 61.5% for Ruili, 9.1% for Longchuan, and 0% for Luxi.<sup>34</sup> By 1993, the corresponding rates were 40%, 12.2%, and 0%, respectively.<sup>33</sup> One study in Ruili reported the prevalence of hepatitis B infection among intravenous drug users as 68%.<sup>34</sup> Anti-hepatitis C virus antibody was also found in 92% of intravenous drug users.<sup>35</sup> About two thirds of intravenous drug users inject drugs daily.<sup>19</sup> Needle sharing and recycling are common; proper cleaning of needles is not practiced. Consistently, 10% of the wives of HIV-positive intravenous drug users tested HIV positive; all reported having had only vaginal intercourse and no condom or drug use.<sup>19</sup> AIDS awareness is low.<sup>36</sup>

## Discussion

Yunnan's socioeconomic life is linked to that in neighboring Myanmar, Laos, and Vietnam, partly through the Golden Triangle, which produces more than 20% of the world's opium supply used to process heroin.<sup>37</sup> Although drug trafficking is illegal, the private use of opium and other drugs is culturally accepted.<sup>19,38,39</sup> Despite numerous government clean-up and treatment efforts, substance abuse persists. Increased law enforcement pressures since 1988<sup>38</sup> appear to be associated inadvertently with more efficient distribution and consumption of drugs, as well as with the transition from opium smoking to heroin injection, thereby escalating the risk of HIV infection.<sup>40</sup> Yunnan, however, is not the only province known to have drug users. The existence of detoxification

**TABLE 4—1990 Population Census and Cumulative Number of AIDS and HIV-Positive Cases,<sup>b</sup> by Province, Autonomous Region, and Municipality Where Testing Occurred: People's Republic of China, 1985 through 1994**

| Province               | 1990 Total Population Census <sup>a</sup> | No. Persons Tested   | Total No. HIV+ Persons <sup>b</sup> | AIDS Cases <sup>b</sup> |                  |         | HIV+ Cases <sup>b</sup> |                  |         |
|------------------------|---|----------------------|-------------------------------------|-------------------------|------------------|---------|-------------------------|------------------|---------|
|                        |   |                      |                                     | Foreign Nationals       | Overseas Chinese | Chinese | Foreign Nationals       | Overseas Chinese | Chinese |
| Anhui                  | 56 181 005                                | 9 270                | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Beijing <sup>c,d</sup> | 10 819 414                                | 454 638 <sup>d</sup> | 82                                  | 5                       | 0                | 6       | 38                      | 1                | 32      |
| Fujian                 | 30 048 275                                | 263 349              | 24                                  | 0                       | 1                | 3       | 2                       | 6                | 12      |
| Gansu                  | 22 371 085                                | 5 238                | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Guangdong              | 62 829 741                                | 359 919              | 112                                 | 2                       | 1                | 2       | 23                      | 15               | 69      |
| Guangxi <sup>e</sup>   | 42 244 884                                | 342 584              | 9                                   | 0                       | 0                | 0       | 6                       | 1                | 2       |
| Guizhou                | 32 391 051                                | 19 800               | 2                                   | 0                       | 0                | 0       | 0                       | 1                | 1       |
| Hainan                 | 6 558 076                                 | 48 569               | 5                                   | 0                       | 0                | 0       | 2                       | 0                | 3       |
| Hebei                  | 61 082 755                                | 63 767               | 6                                   | 0                       | 0                | 1       | 1                       | 0                | 4       |
| Heilongjiang           | 35 215 932                                | 69 928               | 1                                   | 0                       | 0                | 0       | 1                       | 0                | 0       |
| Henan                  | 85 534 200                                | 20 666               | 10                                  | 0                       | 0                | 0       | 10                      | 0                | 0       |
| Hubei                  | 53 970 501                                | 69 609               | 2                                   | 0                       | 0                | 0       | 2                       | 0                | 0       |
| Hunan                  | 60 657 992                                | 41 504               | 3                                   | 0                       | 0                | 0       | 0                       | 0                | 3       |
| Jiangsu                | 67 056 812                                | 98 255               | 6                                   | 0                       | 0                | 0       | 2                       | 0                | 4       |
| Jiangxi                | 37 710 177                                | 10 812               | 2                                   | 0                       | 0                | 1       | 0                       | 0                | 1       |
| Jilin <sup>f</sup>     | 24 659 790                                | 148 014 <sup>f</sup> | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Liaoning               | 39 459 694                                | 291 200              | 3                                   | 0                       | 0                | 1       | 2                       | 0                | 0       |
| Neimenggu <sup>e</sup> | 21 456 518                                | 16 666               | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Ningxia <sup>e</sup>   | 4 655 445                                 | 1 909                | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Qinghai                | 4 459 952                                 | 10 574               | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Shaanxi                | 32 882 286                                | 165 613              | 1                                   | 0                       | 0                | 0       | 0                       | 0                | 1       |
| Shandong               | 84 392 104                                | 327 351              | 2                                   | 0                       | 0                | 0       | 2                       | 0                | 0       |
| Shanghai <sup>c</sup>  | 13 341 852                                | 796 429              | 50                                  | 1                       | 0                | 0       | 18                      | 10               | 21      |
| Shanxi                 | 28 758 846                                | 10 297               | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Sichuan                | 107 218 310                               | 52 378               | 9                                   | 0                       | 0                | 2       | 1                       | 2                | 4       |
| Tianjin <sup>c</sup>   | 8 785 427                                 | 138 455              | 3                                   | 0                       | 0                | 0       | 3                       | 0                | 0       |
| Xinjiang <sup>e</sup>  | 15 156 883                                | 30 186               | 0                                   | 0                       | 0                | 0       | 0                       | 0                | 0       |
| Xizang <sup>e</sup>    | 2 196 029                                 | 2 490                | 1                                   | 0                       | 0                | 0       | 1                       | 0                | 0       |
| Yunnan                 | 36 972 587                                | 225 907              | 1426                                | 1                       | 0                | 38      | 161                     | 0                | 1226    |
| Zhejiang               | 41 446 015                                | 106 727              | 15                                  | 0                       | 0                | 0       | 4                       | 3                | 8       |
| Total                  | 1 130 510 638                             | 4 202 104            | 1774                                | 9                       | 2                | 54      | 279                     | 39               | 1391    |

<sup>a</sup>Based on 1990 census data published by the State Council and Department of Population Statistics.<sup>6</sup>

<sup>b</sup>Case counts were obtained with permission from the Ministry of Public Health, People's Republic of China. Cases are classified by place where HIV testing occurred, not by place of residence. Counts of AIDS cases are included in the counts of HIV-positive cases.

<sup>c</sup>Classified as a municipality—an independent geopolitical unit characterized by high urban population density and advanced industrial and economic development that is directly under the administration of the central government and not the province in which the city is located.

<sup>d</sup>Includes testings conducted within the Chinese Academy of Medicine's Institute of Medical Sciences (n = 31 773 persons) and the Chinese Academy of Preventive Medicine's Institute of Virology (n = 7001) and Institute of Epidemiology (n = 2221), all located in Beijing. No HIV-positive or AIDS cases were found in these institutes.

<sup>e</sup>Classified as an autonomous region—a self-governed semi-independent geopolitical unit in which, historically, a large number of the inhabitants have been non-Han minorities.

<sup>f</sup>Includes testing conducted within the Institute of Changchun (n = 8990), located in Jilin. No HIV-positive cases were found.

centers in Guizhou, Sichuan, Guangdong, Guangxi, Sha'anxi, Gansu, and Inner Mongolia points up the presence of drug users in other parts of China.<sup>41</sup> Thus far, however, only one study of HIV risk behaviors among drug users outside of Yunnan has been published.<sup>31</sup> The study noted the absence of HIV infection despite the presence of risk behaviors. It is worth noting that China's northern and southwestern boundaries are exceedingly long and rugged territories dotted with market towns where, on a daily basis and with a pass instead of a passport, residents—mostly peasants and traders—cross selected international borders on foot, in carts, in converted tractors, or in

**TABLE 5—Cumulative Number and Percentage of HIV-Positive and AIDS Cases, by Categories of Transmission and Nationality: People's Republic of China, 1985 through 1994**

| Transmission Categories | Total No. (%) HIV/AIDS Cases | Chinese Nationals | Overseas Chinese | Foreign Nationals |
|-------------------------|------------------------------|-------------------|------------------|-------------------|
| Drug using              | 1290 (72.72)                 | 1171              | 0                | 119               |
| Heterosexual contact    | 145 (8.17)                   | 109               | 16               | 20                |
| Homosexual contact      | 7 (0.39)                     | 5                 | 0                | 2                 |
| Haemophilic             | 5 (0.28)                     | 4                 | 1                | 0                 |
| Perinatal               | 1 (0.06)                     | 0                 | 1                | 0                 |
| Unknown                 | 326 (18.38)                  | 156               | 23               | 147               |
| Total                   | 1774 (100.00)                | 1445              | 41               | 288               |

Source. Rearranged and calculated from data obtained, with permission, from the Ministry of Public Health, People's Republic of China.

cargo trucks. (Passport-bearing tourists are prohibited from traveling through these points.) More studies are clearly needed to ascertain the magnitude of HIV infection among drug users living outside of Ruili, Longchuan, and Luxi.

The epidemiologic distinctions between a rate, a number, and a proportion are important in assessing the magnitude of the HIV transmissions in China. First, only a small number of contacts of persons with HIV infection were tested in 10 years, but they had the second highest proportion of HIV seropositivity. Second, although the number of homosexual persons screened thus far is small and although homosexual persons are indeed a negligible proportion of all persons with HIV infection or AIDS, the proportion of homosexual persons who tested HIV positive is high, ranking third to the proportion of drug users. The known efficiency of male-to-female HIV transmission<sup>42</sup> and the likelihood of bisexual behaviors among homosexual persons put others, women in particular, at risk. For reasons as yet unclear, a high proportion of the general hospital or clinic patient population also tested HIV positive—an observation that could be attributed to possible misdiagnosis of HIV-positive cases, as reported recently in Guangzhou,<sup>43</sup> and/or to the continuing use of non-disposable needles, notwithstanding the official policy. Under these circumstances, when disposable needles are in short supply, extreme care in the handling and sterilization of nondisposable needles in health care settings is of paramount significance. Sampling variations and surveillance bias certainly exist. The number who were screened varied from 505 among homosexual persons to 1 879 309 among blood donors. These findings underline the challenge of identifying homosexual persons for testings. Since 1993, standard procedures for the screening of blood donors began to include HIV in addition to sexually transmitted diseases and hepatitis B virus. This may explain the large number of blood donors who were tested. The latter does not completely rule out contamination of the blood supply—despite rigorous screening efforts—as a possible explanation for the high proportion of HIV infection among hospital patients.

Beginning in 1994, the Ministry of Public Health improved its routine reporting of HIV and AIDS data. However, despite our inquiries, precise information was lacking on how the cumulative number of 4 202 104 persons was selected for

HIV testing. Breakdowns by age and sex of the persons tested were not available. For the 1994 reporting period alone (data not shown), the number of persons tested varied widely not only by the size of the surveillance population, but also by location. The numbers ranged from 861 in Jiangxi (2 persons tested positive for HIV, 1 of whom had AIDS), to 20 243 in Guangdong (38 HIV positive, 3 of whom had AIDS); 79 129 in Yunnan (435 HIV positive, 19 of whom had AIDS); 78 891 in Fujian (10 HIV positive, none of whom had AIDS); 122 973 in Guangxi (3 HIV positive, none of whom had AIDS); 260 233 in Shanghai (12 HIV positive, 1 of whom had AIDS); and 208 206 in Beijing (24 HIV positive, 4 of whom had AIDS).<sup>44</sup> Altogether, 531 persons who were HIV positive (29 of whom had AIDS) were detected out of 1 370 372 tested for the period. The persons tested in any given year or place definitely were not random samples of the general population. Rather, they were purposeful or convenience samples of persons who were believed to be at risk for possible exposure to HIV infection because of the nature of their occupation, lifestyle, or length of stay in China (in the case of foreigners) or abroad (in the case of returnees) and who happened to be within the reach of local surveillance centers and monitoring posts.

A clear description of the crisscrossing sociodemographic characteristics (instead of one-way tabulations of selected characteristics) of the population being targeted for testings is very much needed. No doubt the variations in the number of HIV-positive and AIDS cases reported from each location and the overall age distribution of persons with HIV infection or AIDS nationwide could be an artifact of differential baseline screening rates, referral bias, and surveillance vigilance. Nevertheless, the relative efficiency of the current nationwide surveillance strategies compared with that of population-based probability sample surveys in identifying a statistically rare event like HIV infection or AIDS is self-evident, even though some would argue that the yield of cases is too few to warrant the expenses involved in screening millions of individuals. A detailed standardization of the surveillance criteria and specific documentation of the reporting procedures employed in each location—as well as up-to-date denominator data in light of growing population shifts toward economically prosperous metropolitan areas (especially pronounced among the age groups most at risk for HIV infection)—would be useful to evalu-

ate the significance of the case count obtained from the Ministry of Public Health. Critical at this juncture is a careful evaluation of the policy for determining which segments of the population should be screened more than others and how the limited resources for testing the surveillance populations should be allocated.

In our literature search, we did not locate published reports of systematic repeat seroprevalence surveys of a sentinel population per se, although there were a few seroprevalence studies of homosexual persons, contacts of homosexual or HIV-positive persons,<sup>32,45,46</sup> and other subgroups. The ongoing cohort studies of intravenous drug users in Yunnan are useful in assessing the HIV-seroconversion rates, comorbidity factors, and mortality risks of the group most at risk for HIV infection and AIDS.<sup>28-31,47</sup> However, prospective probability sample surveys of high-risk women who were HIV negative, particularly the Dai and Jingpo minorities, have not been reported. Designing epidemiologic studies—observational or otherwise—of the ethnic minorities is a challenge, given their mobile peasant lifestyles, variety of indigenous languages, and the difficulty of characterizing a dynamic cohort. As the number of seropositive cases increases dramatically with time, information will be needed to assess the rapidity of male-to-female transmission given the mating and contraceptive practices, if any, of the populations under study. It would also be fruitful to develop and disseminate public media materials for disease prevention that are meaningful and comprehensible to largely illiterate, semiliterate, or minimally educated populations. These materials should be presented in the native languages of these populations, as well as in *putung-hua*—the national language. Except for the intravenous drug users in Yunnan reported thus far, HIV infection is expected to spread most commonly through heterosexual transmissions. Yet, published studies of couples, rather than individuals, in groups identified as having elevated risks of exposure to HIV (e.g., general hospital or clinic patients, labor-camp detainees, returnees, border residents, consumers of blood products) are sparse. Likewise, we did not uncover published epidemiologic studies of pediatric cases of HIV infection and AIDS (11 cases reported up to December 31, 1994) or of mother-to-child transmission of HIV infection ( $n = 1$ ). Such cases may remain relatively scarce in China for some time

under the current one-child family-planning policy, which is enforced more rigorously in urban than in rural areas. Nor did we find reports of systematic protocol-dictated or mandatory sexually transmitted disease testings in family or maternal and child health clinics, although sexually transmitted disease surveillance centers have drawn selected subjects from such health care settings for HIV testings. By cultural practice, the treatment of sexually transmitted diseases in China is relegated to dermatology units of hospitals. It would probably be best to expand treatment to other medical specialties.

As of this writing, a sentinel population consisting of four categories of individuals (drug users, prostitutes and their clients, sexually transmitted disease patients, and long-distance truck drivers) is being established by the Institute of Preventive Medicine at the Chinese Academy of Medicine with the intention of conducting repeated HIV testings to detect, record, and monitor sentinel events. Notwithstanding the limitations noted above, the statistics compiled by the Ministry of Public Health are the best estimates of the emerging epidemic of HIV infection and AIDS in China, where more than one fifth of the world's population resides. These statistics are informative of future trends. □

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## References

- Zeng Y, Wang BC, Shao YM, Zhao SD, Miao XQ. Isolation of human immunodeficiency virus from AIDS patient [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1988;9(3):135-137.
- Zeng M. Driving out the spectre of AIDS that has entered the country: current situation of AIDS in China [in Chinese]. *Ming Pao Yue Kan*. 1992;27(6):20-22.
- Zhang YY, Zhang KD, Zheng XM, et al. First case of AIDS diagnosed in China [in Chinese]. *Chung Hua I Hsueh Tsa Chih*. 1988;68(1):5-6.
- Dai ZC. AIDS prevention and control in China. *Chin Med J (Engl)*. 1991;104:795-798.
- Zhao SD, Cheng HH, Zhang JP, et al. AIDS surveillance in Yunnan province of China (1986-1990) [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1991;12(2):72-74.
- Zheng XW, Zhu D, Yang GH, Zhang GY. A report on AIDS surveillance from 1985 to 1988 in China [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1989;10(2):65-67.
- State Council and Department of Population Statistics, State Statistical Bureau, Population Census Office. *Tabulation on the 1990 Population Census of the People's Republic of China, Vol I* [in Chinese]. Beijing, People's Republic of China: Zhongguo Tongji Chubanshe; 1993.
- He J. Health education for AIDS prevention in colleges and universities in China. *Int Conference AIDS*. 1994;10:343.
- He J, Lu Z, Wang J. The study on AIDS knowledge, attitudes of high school students in Beijing. *Int Conference AIDS*. 1993;9:725.
- Li VC, Cole B. Chinese health professionals' attitudes towards AIDS care. *Int Conference AIDS*. 1994;10:366.
- Cheng HH, Xia MS, Tian CQ, et al. Survey on knowledge and attitudes on AIDS among administrative and medical staff and policemen [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1991;12(2):75-78.
- Yan D, Zhang L, Liu G. Health propaganda on AIDS in Sichuan. *Int Conference AIDS*. 1994;10:344.
- Shao YM, Wang B, Zeng Y, Hell W, Wolf H. Variation and shift of HIV-1 env found in IDUs of Dehong epidemic-area in China. *Int Conference AIDS*. 1994;10:22.
- Peng L, He J. Traditional Chinese medicine and treatment of AIDS. *Int Conference AIDS*. 1990;6:317.
- Chunming C. Disease surveillance in China. *MMWR*. 1992;41(suppl):111-122.
- Cui L. China strives against VD and AIDS. *Beijing Rev*. 1994;37(2):30-31.
- Zhongguo Weisheng Nianjian Bianji Weiyuan Hui [Commission on China's Public Health Yearbook]. *Zhongguo Weisheng Nianjian, 1993* [in Chinese]. Beijing, People's Republic of China: Renmin Weisheng Chubanshe; 1993.
- Ministry of Public Health. *Tabulations of our Country's Screening of High Risk Groups and Their HIV Seropositive Rate (May 30, 1985-94)* [in Chinese]. Beijing, People's Republic of China: Ministry of Public Health; 1994.
- Zheng X, Tian C, Choi KH, et al. Injecting drug use and HIV infection in southwest China. *AIDS*. 1994;8:1141-1147.
- Ministry of Public Health. *Tabulations of HIV Seropositive Prevalence by Mode of Transmission, China (May 30, 1985-94)* [in Chinese]. Beijing, People's Republic of China: Ministry of Public Health; 1994.
- Ministry of Public Health. *Tabulations of HIV Seropositive Prevalence by Occupational Categories in China (May 30, 1985-93)* [in Chinese]. Beijing, People's Republic of China: Ministry of Public Health; 1993.
- Choi KH, Tian C, Zheng X, et al. Are STD patients at risk for HIV infection in China? *Int Conference AIDS*. 1994;10:286.
- Shao C, Liang G. STD epidemiologic analysis at national surveillance spots in the period 1987-1990. *Chin Med Sci J*. 1992;7(1):40-43.
- National STD Surveillance Cooperative Group. STD epidemiologic analysis in 16 cities during the period 1987-1990 [in Chinese]. *Chung Kuo I Hsueh Ko Hsueh Yuan Hsueh Pao*. 1993;15(1):6-11.
- Xinhua S, Junhua N, Qili G. AIDS and HIV infection in China. *AIDS*. 1994;8(suppl 2):S55-S59.
- Ministry of Public Health. *Tabulation of HIV Seropositive Prevalence among Specified High Risk Groups (May 30, 1985-93)* [in Chinese]. Beijing, People's Republic of China: Ministry of Public Health; 1993.
- Qiu RZ. The trend of the spread of HIV infection in Mainland China [in Chinese]. *Ming Pao Yue Kan*. 1992;27(6):17-19.
- Litner B. A piece of the action. *Far Eastern Econ Rev*. 1994;157(51):27.
- State Council Research Office. *Beware of AIDS: For the Survival of the Chinese Nation* [in Chinese]. Beijing, People's Republic of China: Xinhua Chubanshe; 1993.
- Yao J. Yunnan: China's anti-drug outpost. *Beijing Rev*. 1991;34(34):20-25.
- Zheng X, Tian C, Zhang G, et al. HIV risk behaviors but absence of infection among drug users in detoxification centers outside Yunnan province, China. *AIDS*. 1995;9:959-963.
- Zheng XW, Zhang JP, Tian CQ, et al. Cohort study of HIV infection among drug users in Ruili, Longchuan, and Luxi of Yunnan Province, China [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1993;14(1):3-5.
- Zheng XW, Zhang JP, Qu SQ. Cohort study of HIV infection among drug users in Ruili and other counties in Yunnan Province, China. *Int Conference AIDS*. 1994;10:26.
- Zheng XW, Zhang JP, Tian CQ, et al. Cohort study of HIV infection among drug users in Ruili, Longchuan, and Luxi of Yunnan Province, China. *Biomed Environ Sci*. 1993;6:348-351.
- Cheng H, Jia MH, Zhang JP, et al. Epidemiologic studies on HCV and HBV infections among intravenous drug users in the area with high HIV infection [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1993;14(5):275-278.
- Liao SS, Sun G, Wang R, Zhang K, Zhang J, Pan S. AIDS awareness among Dai minority villagers in Ruili, Yunnan. *Int Conference AIDS*. 1994;10:59.
- Naik TN, Sarkar S, Singh HL, Bhunia SC, Singh YJ, Pal SC. Intravenous drug users—a new high-risk group for HIV in India. *AIDS*. 1991;5:117-118. Letter.
- Gil VE. An ethnography of HIV/AIDS and sexuality in the People's Republic of China. *J Sex Res*. 1991;28:521-537.
- Poshyachinda V. Drug injecting and HIV infection among the population of drug abusers in Asia. *Bull Narc*. 1993;45(1):77-90.



40. Des Jarlais DC, Friedman SR, Choopanya K, et al. International epidemiology of HIV and AIDS among injecting drug users. *AIDS*. 1992;6:1053-1068. Editorial.
41. *A Country Report in the China, Hong Kong and Macao Conference on the Control of Narcotic Drugs and Reduction of Demand* [in Chinese]. Beijing, People's Republic of China: Ministry of Public Health; 1992. [Cited in Zheng et al.<sup>31</sup>]
42. Nicolosi A, Correa Leite ML, Musicco M, Arici C, Gavazzeni G, Lazzarin A. The efficiency of male-to-female and female-to-male sexual transmission of the human immunodeficiency virus: a study of 730 stable couples. *Epidemiology*. 1994;5:570-575.
43. Xu H. The first report of 2 imported AIDS cases in Guangzhou [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1993;14(2):99-101.
44. Ministry of Public Health. *1994 Summary Tabulation of Nationwide AIDS and HIV Seropositivity Testings* [in Chinese]. Beijing, People's Republic of China: Ministry of Public Health; 1994.
45. Zhang JP, Chen HH, Zhao XD, et al. An epidemiology study on AIDS in Ruili County of Yunnan Province [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1991;12(1):9-11.
46. Yang XZ, Wan YH, Li DQ. HIV infection survey of homosexual men in the Beijing area [in Chinese]. *Aizibing Jianbao*. 1992;1:1-2. [AIDS newsletter published in China, now discontinued.]
47. Duan YJ, Zheng XW, Zhen CH, et al. Investigation of mortality among HIV-infected intravenous drug users in Ruili region of Yunnan Province [in Chinese]. *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*. 1995;16(2):71-73.

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The International DermatoEpidemiology Association invites abstract submissions for its second annual scientific meeting to be held on March 20, 1997. The meeting will take place in San Francisco, California, prior to the annual conference of the American Academy of Dermatology. The meeting is intended to be an international forum for the presentation and discussion of ongoing investigation in epidemiology and health services research in skin diseases.

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