

# COMBATING HIV/AIDS IN MAINLAND CHINA: AN EPIDEMIOLOGICAL REVIEW OF PREVENTION AND CONTROL MEASURES

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**Abstract.** Two decades have already passed since the first HIV/AIDS case was described in 1981. Cumulatively, over 20 million people have unfortunately lost their lives, and more than 40 million people are now living with HIV, and most of them are from developing countries. China, as the biggest developing country, has an impact on the epidemic of HIV/AIDS. From the first case of AIDS diagnosed in Mainland China in 1985, the epidemic has spread at an alarming rate. The feature of HIV/AIDS spread in Mainland China concerns its geographical characteristics that can be described as occurring in three phases. According to data from World Health Organization (WHO), it was estimated that about 840,000 people are living with HIV/AIDS in China, and 80,000 of them have already developed AIDS. WHO warned that, if there were no effective preventive measures adopted, that the number of HIV/AIDS infected cases would reach 10 million in China by 2010. In this study, we described the current situation of the epidemic of HIV/AIDS, as well as an historic review. The development of policy-making and the control measures are also highlighted. The experience from China described in this study would hopefully be for more public awareness of this crisis that is threatening all the citizenry of China.

## INTRODUCTION

Two decades have already passed since the first HIV/AIDS case was described in 1981. Cumulative, over 20 million people have unfortunately lost their lives, and more than 40 million people are now living with HIV around the world. Most people who face the prospect of sickness, destitution, and premature death are living in the developing countries (UNAIDS, 2004). China, as the largest developing country (Table 1), has the largest population (total 1.3 billion population) and the fourth biggest area in the world has a significant impact on the HIV/AIDS epidemic. From the first case of AIDS diagnosed in Mainland China in 1985, the epidemic spread at an alarming rate (Zeng *et al*, 1988). The number of

annual reported HIV infected cases increased steadily at an average rate of 30% every year, from 1995 to 2000. The number of reported HIV infections in 2001 was almost twice the cumulative number of previous years (China Ministry of Health and UN Theme Group, 2003; Chinese Center for Disease Control and Prevention, 2003). According to data from World Health Organization (WHO), it was estimated that there are about 840,000 people are living with HIV/AIDS in China, and 80,000 of them have already developed AIDS. The feature of HIV/AIDS spread in Mainland China concerns its geographical characteristics that can be described as occurring in three phases (China Ministry of Health and UN Theme Group, 2003; Wang, 1998). The accelerating increasing of HIV infected cases has been obvious, although the prevalence rate is still low, at less than 0.1% of the population. WHO has warned that the number of HIV/AIDS infected cases in China would reach 10 million by 2010 if there were no effective preventive measures adopted (China UN Theme Group on

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HIV/AIDS, 2001). If a pandemic of HIV/AIDS occurs in Mainland China, which has over 1/5 of the world's population, it will not only damage the national economy of China but also it can be an economic disaster for the rest of the world. The Chinese government has already been aware of this potential threat. Actions towards the prevention of HIV have been undertaken in all sectors, including the formulation of new policies and the enhancement of political commitment. As a representative of the Chinese government, Premier Wen Jiabao has promised to give higher priority to social welfare, rather than just to economic growth (Watts, 2004).

## METHODS

### Parameters

The historic and current status of HIV/AIDS epidemic is reviewed, respectively. Prevention and control measures are described and evaluated by the categories of policy-making, surveillance system, investment in prevention and control of HIV/AIDS, treatment of HIV/AIDS, and advocacy and action for prevention and control of HIV/AIDS.

### Data source

All reviewed references are derived from government databases that are posted on the internet and the electrical database, Entrez PubMed, from the years of 1995 to 2003. Government databases are derived from the State Council, China Center for Diseases Control and Prevention (CCDC), Ministry of Health, and the National Bureau of Statistics.

## RESULTS

### Historic review of the epidemic of HIV/AIDS in China

The experience of HIV/AIDS in Mainland China has been quite unique, and can be described in terms of three phases (Table 2). During the Introduction Phase (1985-1988), some cases were detected in the coastal cities. Most of the reported HIV infections were foreigners or overseas Chinese. There were four HIV+ hemophiliacs in Zhejiang Province infected through imported blood factor VIII. During the Spreading

Phase (1989-1994), 146 cases of HIV infections were reported among intravenous drug users (IDUs) in Ruili, Yunnan Province, which signaled the beginning of this phase. The majority of the reported cases during this phase was among IDUs (Zhang and Ma, 2002; China Ministry of Health and UN Theme Group, 1997). During the Expansion Phase (1995-present), HIV infected cases dramatically increased among IDUs and commercial plasma donors (Wu *et al*, 1995). The epidemic of HIV/AIDS had already spread beyond the Yunnan Province. In Sichuan in 1995, in Xinjiang in 1996, and in Guangxi in 1997, first cases of drug-related HIV infections were reported, respectively (China Ministry of Health and UN Theme Group, 1997). By the year 1998, there were HIV/AIDS infected cases reported from all 31 provinces, autonomous regions, and municipalities (Zhang and Ma, 2002). According to data based on national sentinel surveillance, HIV/AIDS is obviously spreading in Mainland China (Fig 1). From 1985, the annual HIV infected cases and AIDS cases have increased steadily. However, the situation has deteriorated dramatically from 1995. The number of annual reported HIV infected cases was 1,567 in 1995, and it reached a peak of 9,732 cases in 2002. Similarly, only 52 AIDS cases were reported in 1995, but the number of annual reported AIDS cases reached 1,028 in 2002 (China Ministry of Health and UN Theme Group, 2003). The number of annual HIV infections and AIDS cases in 2002 were 5 times and 15 times the cumulative number from 1985 to 1994, respectively. Clearly, all the data have illustrated that the number of HIV/AIDS case had rapidly increased during the last decade (UNAIDS, 2002).

### Current situation of HIV/AIDS epidemic in China

China Ministry of Health and WHO estimated that 1,000,000 people are living with HIV/AIDS in China (Table 3). The number of males and females among the HIV/AIDS cases is about 610,000 and 220,000, respectively, or a ratio of 4:1. The prevalence rate among males and females is <0.12% and <0.03%, respectively. The relatively high incidence rates of AIDS among the age 15-49 have been acknowledged.

There are five patterns of transmission detected in China, namely, intravenous drug users

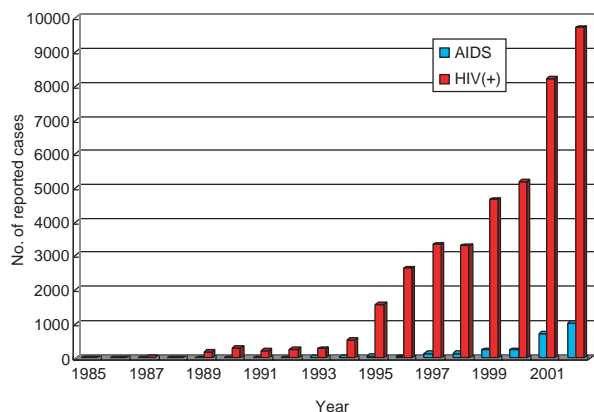
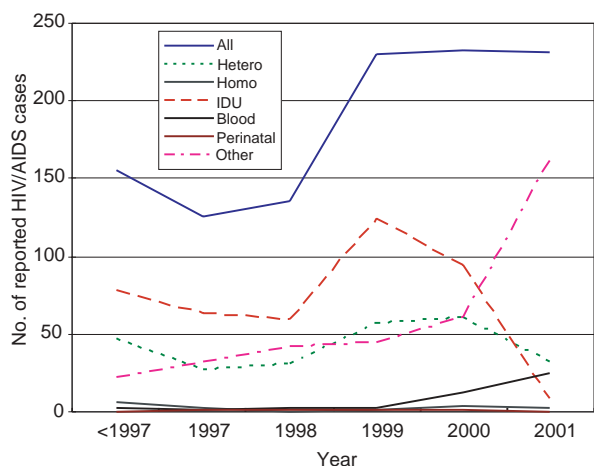


Fig 1—Annual reported HIV/AIDS cases in China.

Derived from: China Ministry of Health



Hetero=heterosexual; Homo=homosexual contacts between men; IDU=intravenous drug user; Blood=blood and blood products; Perinatal=vertical transmission during pregnancy, bit hot breastfeeding; Other=not specified/unknown

Fig 2—Reported AIDS cases by mode of transmission.

Derived from: China Ministry of Health.

(IDUs), commercial plasma donors, heterosexual transmission, mother-to-child transmission (MTCT), and homosexual transmission (China Ministry of Health and UN Theme Group, 1997; Wu *et al*, 2004). There were 900,000 registered drug users in China in 2001. However, it was estimated that the real number of drug abusers would have been several times higher. Data from the sentinel surveillance show that about 30%

Table 1  
Indicators for Mainland China.

Indicators	2002
Surface area (km <sup>2</sup> )	9.6 million
Population, total	1.3 billion
Population growth (annual %)	0.7
Life expectancy (years)	70.7
Fertility rate (births per woman)	1.9
Infant mortality rate (per 1,000 live births)	30.0
Under 5 mortality rate (per 1,000 children)	38.0
GNI, Atlas method (current US\$)	1.2 trillion
GNI per capita Atlas method (current US\$)	960.0

Derived from: World Bank Group

Table 2  
Three phases of HIV/AIDS epidemic in China.

Phase	Year	Region
Introduction phase	1985-1988	Coastal cities
Spreading phase	1989-1994	Yunnan, Sichuan, Xinjiang
Expansion phase	1995-Present	Entire of the country

of IDUs share needles (Zhang and Ma, 2002). The number of the reported AIDS cases among IDUs was 428 by 2001, the proportion of AIDS cases due to intravenous drug use among the described transmission routes was 38.5% (Fig 2). Furthermore, the HIV epidemic among IDUs has increased rapidly, especially in southern Yunnan, Xinjiang, Guangxi, and Sichuan provinces. Geographical data strongly suggested that the epidemic among IDUs has already spread over all 31 provinces, autonomous regions, and municipalities (Table 4).

From late 1980s until the early 1990s, a large number of small-scale plasma collection stations were set up in rural areas by blood companies, some of which were operated by the local health officials (He, 2000; Wu *et al*, 2004). Blood from donors was mixed together, the plasma extracted, and the pooled blood was re-

injected into the donors. Almost 1 million people, mostly poor farmers, were documented to have donated plasma throughout the 1990s. HIV infection among commercial plasma donors was initially detected in Henan Province. There were more serious problems reported later from Shanxi, Shaanxi, Hebei, Gansu, and Hubei Provinces (USEST, 2001). Data from a survey of 1,517 former commercial plasma donors indicated a rate of 12.5% HIV-positive among them (Wu *et al*, 2001).

China's commercial sex industries have dramatically expanded during the past two decades, including more than 3 million sex workers. The average usage rate of condoms among them was reported to be only 30% (China Ministry of Health and UN Theme Group, 1997). The national HIV sentinel surveillance indicated that the HIV prevalence rate among sex workers had increased from 0.02% in 1995 to 10.9% in 2002 (China Ministry of Health and National Center for AIDS/STD Control and Prevention, 2000) (Fig 3). Low usage of condoms and lack of knowledge about HIV/AIDS had made sex workers vulnerable, and, as a consequence, they can provide the bridge to spread HIV/AIDS to the general population (Kaufman and Jing, 2002).

Since the first case of mother-to-child transmission (MTCT) was reported in 1995, MTCT has increased steadily. The proportion of MTCT has increased from 0.1% in 1997 to 0.4% in 2002

(Table 3). In Yunnan and Xinjiang, the HIV prevalence among pregnant women in certain areas has reached 1.3% and 1.2%, respectively, similar to the levels of prevalence in several neighboring countries (China Ministry of Health and UN Theme Group, 2003).

It has been estimated that 0.5% of married urban Chinese and 2.3% in rural areas engage in homosexual activities (China Ministry of Health and UN Theme Group, 1997). Other investigations have shown that 80% of gay men in China were married, and less than 10% reported regular condom use with their homosexual partners or spouses (Zhang, 2001). Men who have sex

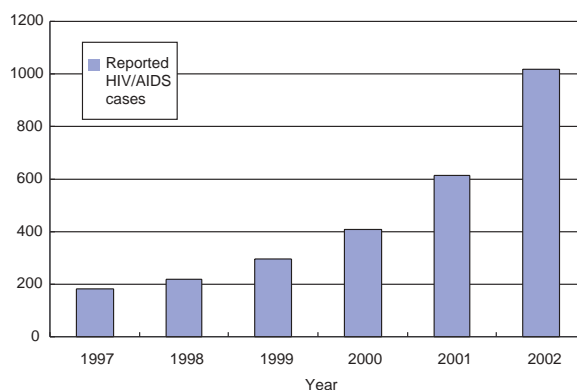


Fig 3—Reported HIV infections through heterosexual transmission.

Derived from: China Ministry of Health.

Table 3  
Estimated HIV/AIDS data for China.

Variable	By 1997	By 1999	By 2001	By 2002
Estimated total HIV/AIDS <sup>a</sup>	300,000	500,000	850,000	1,000,000
Reported total AIDS cases	3,343	4,677	8,219	9,732
Male/Female ratio <sup>b</sup>	5:1	5:1	4:1	4:1
Estimated total adult HIV/AIDS	289,500	479,000	815,000	960,000
Adult HIV prevalence	<0.03%	<0.05%	<0.08%	<0.10%
Male HIV prevalence	<0.04%	<0.06%	<0.10%	<0.12%
Female HIV prevalence	<0.008%	<0.01%	<0.03%	<0.03%
MTCT No. (%) <sup>c</sup>	4(0.1)	3(0.1)	32(0.4)	41(0.4)

Derived from: China Ministry of Health; <sup>a</sup> Past estimates are from China Ministry of Health; <sup>b</sup>Data from China HIV/AIDS Case Report; <sup>c</sup> MTCT: Mother-to-child-transmission, proportion of reported HIV/AIDS cases

Table 4

Region and year of first reported case among IDUs.

Year	Provinces
1989	Yunnan
1995	Sichuan, Xinjiang
1996	Guangdong, Guangxi, Beijing, Shanghai, Guizhou
1997	Inner Mongolia, Liaoning, Zhejiang, Gansu, Chongqing
1998	Hunan, Qinghai, Jiangsu, Tianjin, Shanxi, Fujian, Jiangxi
1999	Hebei, Shandong, Hubei, Hainan, Ningxia
2000	Shaanxi
2001	Tibet, Heilongjiang, Henan
2002	Jilin, Anhui

Derived from: China Ministry of Health

with men (MSM) have been the only risk group that has not been successfully recruited for HIV surveillance in mainland China.

A brief summary of the epidemic HIV/AIDS (China Ministry of Health and UN Theme Group, 2003) suggests a low prevalence nationally, but high prevalence clusters that continue to increase at a rapid rate. The HIV epidemic has not been effectively controlled among high-risk populations and has started to spread to the general population. It appears that some regions in China are entering a period where the number of HIV infections and related deaths are escalating. HIV risk factors widely exist, therefore, there is a great danger of the epidemic becoming more widespread. In areas with a serious HIV epidemic, HIV/AIDS has brought about varying degrees of social and economic impact, including however severe social and economic burdens.

#### Enhanced political recognition and policy-making (Table 5)

The Chinese government had ignored HIV/AIDS since its beginning, but the dramatic increase in HIV infection cases forced the government to change its attitude toward HIV/AIDS. The Chinese government signed the Paris Declaration in 1994 and the Declaration of Commitment

Table 5

The development of Policy-making in China.

Year	Contents
1988	Regulations Concerning the Monitoring and Control of AIDS
1989	The Law of Infectious Diseases Prevention and Control
1991	Methods of implementation of the law of Infectious Diseases Prevention and Control
1995	Suggestions for Enhancing the Prevention and Control of HIV/AIDS
1997	The Law of Blood Donation
1997	The Responsibilities of Ministries and Departments of State in AIDS Control and Prevention
1998	The Principles for STD/AIDS Education and Prevention Messages
1998	China's Medium- and Long-Term Program for the Prevention and Control of AIDS (1998-2010)
2001	China Plan of Action for Containment and Control of HIV/AIDS (2001-2005)

on HIV/AIDS in 2001. Being aware of the crisis, the first action taken by the policy-makers was to prepare the Regulations Concerning the Monitoring and Control of AIDS, first promulgated in 1988. Subsequently, the Law of Infectious Diseases Prevention and Control, and Methods of Implementation of the Law of Infections Diseases Prevention and Control were distributed in 1989 and 1991, respectively. In 1995, China Ministry of Health (CMH) distributed the document Suggestion for Enhancing the Prevention and Control of HIV/AIDS, which stated "prevention first, public health education as a major means." The Law of Blood Donation was issued to control HIV spread among commercial blood and plasma donators in 1997. In the same year, Responsibilities of Ministries and Departments of State in AIDS Control and Prevention was published, which indicated that the government had realized that controlling HIV/AIDS needs a comprehensive network. The State Council issued China's Medium- and Long- Term Program for HIV/AIDS Prevention and Control (1998-2010)

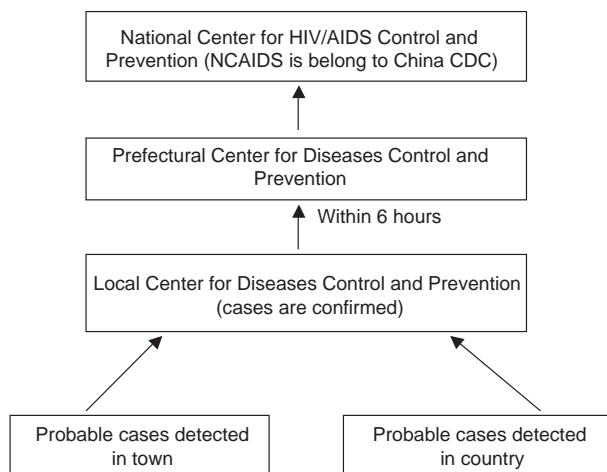


Fig 4—HIV/AIDS case reporting processes.

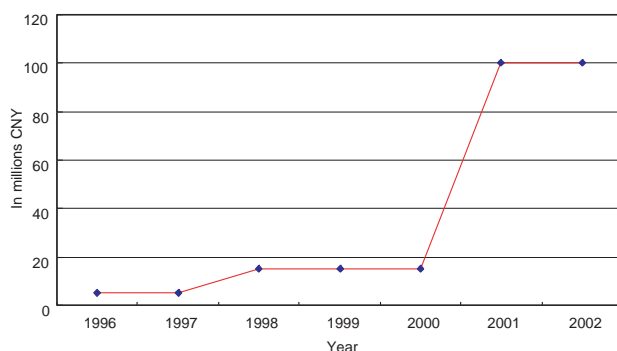


Fig 5—Investment on HIV/AIDS prevention and control by the central government.

Derived from: China Ministry of Health

in 1998 and China Plan of Action for Containment and Control of HIV/AIDS (2001-2005) in 2001. Condom promotion, methadone maintenance, and needle social marketing for IDUs were highlighted for the first time as effective control measures for HIV/AIDS.

#### HIV/AIDS surveillance system

HIV/AIDS surveillance started in 1986. By 2002, the established national sentinel surveillance sites numbered 158, which covered the whole country. Behavioral surveillance (BS) was conducted, first, in several provinces, and then 22 provinces followed, targeting high-risk groups, vulnerable groups, and the general public in 1999 (Fig 4).

The framework of the HIV/AIDS surveillance system in China could be summarized as including the following: a national diseases reporting program for 35 notifiable communicable diseases, which covers the entire population; 145 national diseases surveillance points covering 1% of China's population in 31 provinces, autonomous region, and municipalities; and several disease-specific surveillance systems, including one for HIV infection and AIDS. Additionally, 42 national HIV/AIDS sentinel surveillance points have been established in 23 provinces since 1995 (Zhang and Ma, 2002).

#### Increasing investment on HIV/AIDS prevention and control

The Ministry of Finance established a special fund for HIV/AIDS prevention and control in 1996. The first contribution was 5 million CNY, which then increased annually to 15 million CNY, between 1998 and 2000. Since 2001 it has reached 100 million CNY (Fig 5).

In 2001, the State Development and Reform Commission (SDRC) transferred 1.25 billion CNY from national bonds, combined with 1 billion CNY from local governments, to improve the basic construction of and equipment for blood banks in mid-west China. There were some special activities worthy of highlighting at the local prefecture level. Henan Province allocated the largest investment for HIV/AIDS in 2001 and 2002, with 14 million CNY each year. Guangdong Province has allocated a total of 10 million CNY for HIV/AIDS since 2002 (China Ministry of Health and UN Theme Group, 2003).

#### Treatment of HIV infection and AIDS

The recommended treatment regime is the "cocktail" therapy, which consists of a combination of Efavirenz, Indinavir, Ritonavir+Lopinavir, d4T+ddl, d4T+3TC, AZT+3TC, and AZT+ddT. The treatment regime of replacement utilizes Abacavir, Nevirapine, Saquinavir. The above-mentioned regimes constitute the majority of prescriptions for HIV treatment in China (Pang, 2003).

A study (Yang *et al*, 2003) indicated that the outpatient and inpatient medical costs were 13,729 CNY and 4,745 CNY for asymptomatic HIV infections, and 15,053 CNY and 22,242 CNY

for AIDS patients per person per year, respectively, in Beijing. Health services and treatment are still expensive in China. Fortunately, four kinds of anti-retroviral (AVR) drugs (AZT, d4T, DDI, NVP) make up two kinds of combination regimes that are produced by two domestic drug companies. Drug costs will be reduced to about 3,500 to 4,000 CNY per year per patient. Moreover, in 2003, the Chinese government declared it will provide free AVR drugs to AIDS patients with low income in cities and to farmers in rural areas (China Ministry of Health and UN Theme Group, 2003).

#### Actions on HIV/AIDS prevention and control

Health education was one of the most effective measures to increase public awareness of the emergence of HIV/AIDS that has been advocated by the central government. Since 1996, different ministries, as well as the All-China Federation of Trade Unions, have conducted training courses for their staff. The Ministry of Railways has printed HIV/AIDS prevention information on the back of the train tickets. In 2002, the Youth League, jointly with the Ministry of Education and the Ministry of Health, organized the "Red Ribbon Action," an offer of services in rural areas during the summer holidays of college students (China Ministry of Health and UN Theme Group, 2003). Currently, national AIDS awareness raising campaigns are well conducted. World AIDS Day has evolved into a regular, continuous activity in many regions every year. Activities, including conferences, entertainment, interviews with professionals, on-site consultations, hotlines, distribution of educational materials and activity reports, and access to web site also have been undertaken.

Many projects on HIV/AIDS control and prevention have been promoted, including interventions for special groups that include high-risk and vulnerable groups. In 2000, a pilot study of education for HIV/AIDS among secondary school students was initiated in Yunnan Province (Li and Li, 2000). Wuhan and Jingjiang Provinces began, in 2001, projects to promote 100% condom use with support from WHO, followed by Hunan and Hainan Provinces. A project of social marketing of syringes and needles was con-

ducted in Guangxi and Guangdong Provinces in 2002. The Ministry of Health and China CDC, jointly with United Nations Children's Fund (UNICEF), conducted a program on the prevention of MTCT in Henan Province. China Cares (Comprehensive AIDS RESponse) was launched in 2003 offering free anti-HIV drugs to infected plasma donors in Henan and other provinces (Cohen, 2004). International agencies and non-governmental organizations (NGOs) are playing important roles in prevention and control of HIV/AIDS in cooperation with the Chinese government. Countries, including Australia, the United Kingdom, the United States, Germany, Japan, Luxembourg, and South Korean, as well as other countries, also provide technical assistance to China (China Ministry of Health and UN Theme Group, 2003).

#### DISCUSSION

China has demonstrated considerable achievement in the control of HIV/AIDS. The policy-making, investment, and other actions have suggested that the Chinese government is resolute in fighting this emergency. Strong political commitment plays a very important role in controlling HIV/AIDS in China. At the central level, there is a State Council Coordination Mechanism on AIDS/STD. However, more participation from higher authorities, collaboration between the various sectors, and coordination of resources are still urgently needed. At local level, control of HIV/AIDS has not been highly effective due to a weak organizational structure, lack of supervision, and insufficient numbers and low technical ability of professional staff (Ruxrungtham *et al*, 2004).

Information sharing can be recommended as the most valuable potential assistance to promote understanding and responses to HIV/AIDS. However, currently this is still not very well developed, and there are problems such as the following: no overall plan for information management; no adequate networking, techniques, or mechanisms for sufficient information collection; and no horizontal exchange or integration between programs.

There are still too many people who are not

aware of HIV/AIDS, and there is still discrimination against people who are living with HIV/AIDS. More enhancement of health education for the high-risk groups and Information, Education and Communication (IEC) activities are in urgent need at present, as well as the assessment of such pilot projects (Yan and Zai, 2002; Zhang and Wang, 2002).

There will be a long way to go to eradicate the burden of HIV/AIDS in the world. The work on HIV/AIDS prevention and control requires continuous and systemic efforts. The experience from China as is described in this study will hopefully create more public awareness of this crisis that is threatening all human beings. Furthermore, governments are invited to draw on these successful experiences in order to keep the losses due to HIV/AIDS as low as possible.

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