Infectious disease and AIDS Control in China, past experiences and future challenges

Yiming Shao

National Center for AIDS/STD Prevention and Control
Chinese Center for Disease Control and Prevention

China's Health Policy from 1950s – 1970s, when it was considered as social and economic issues

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Four Guiding Principles of China's Health Policy:

- Health care focus on laboring people (workers, farmers, and soldiers)
- Prevention first
- Health work integrated with mass and community campaigns
- Combining Traditional and Western Medicine

National Patriotic Health Campaign in the 1950s

Called by Chairman Mao, Chaired by Premier Chou En-Lai, participate by virtually all people and reach every corners of China's territory

In six months in 1958:

Implement simple hygiene practice:

Do not spit; Wash hands before eating and after toilet; Drink only boiled water

Cleaning environments:(only 6 months)

Built 1.3 million wells and 4.9 million toilets; eliminated 15 million tons of rubbish, 280,000 kilometers of drains and

Eliminate the bad fours :

44 million rats, more than 200 kg mosquitoes, flies and fleas, 210 million sparrows

The Right Policy Resulted in:

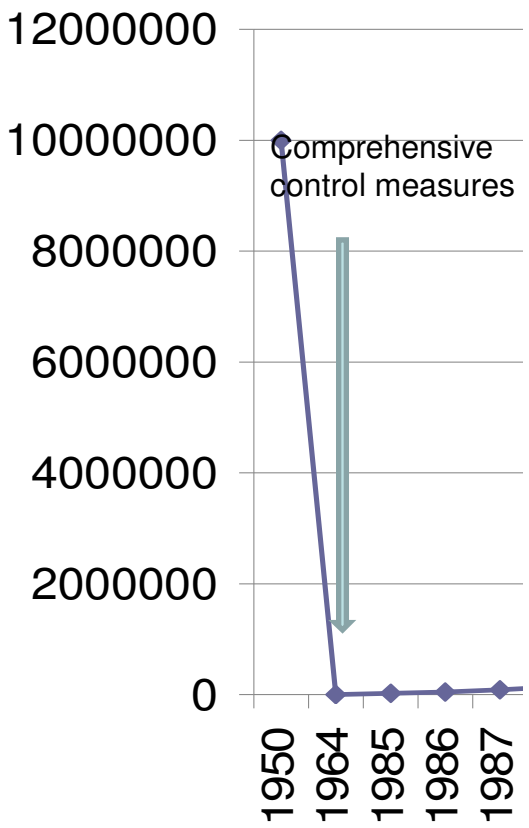
Rapid control of major infectious diseases

Greatly protect the work force at urban and rural

Doubling life expectancy (from 35 years in 1950s to over 70 years in 1980s) in China

Having a positive impact on WHO to lunched in1978 “Primary Health Care for All in 2000”, in Alma-Ata

The evolution of reported STD cases in China



STD Eradication Campaign

Shut down all brothels
Re-education of prostitutes
Free treatment for all STD patients
Provide jobs and arrange family for former prostitutes

Experiences:

Good inter-ministry and inter-sector coordination

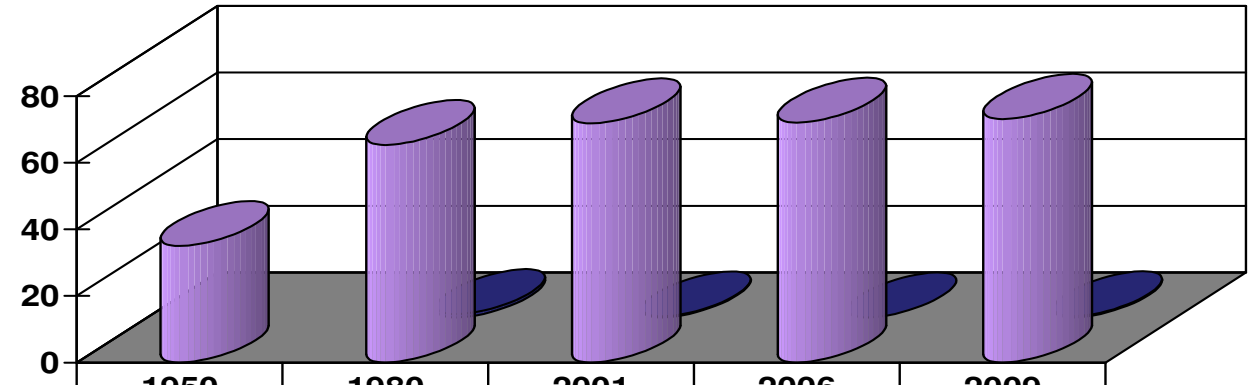
Targeting the disease, not patient (against discrimination)

Combination of suppression and divert

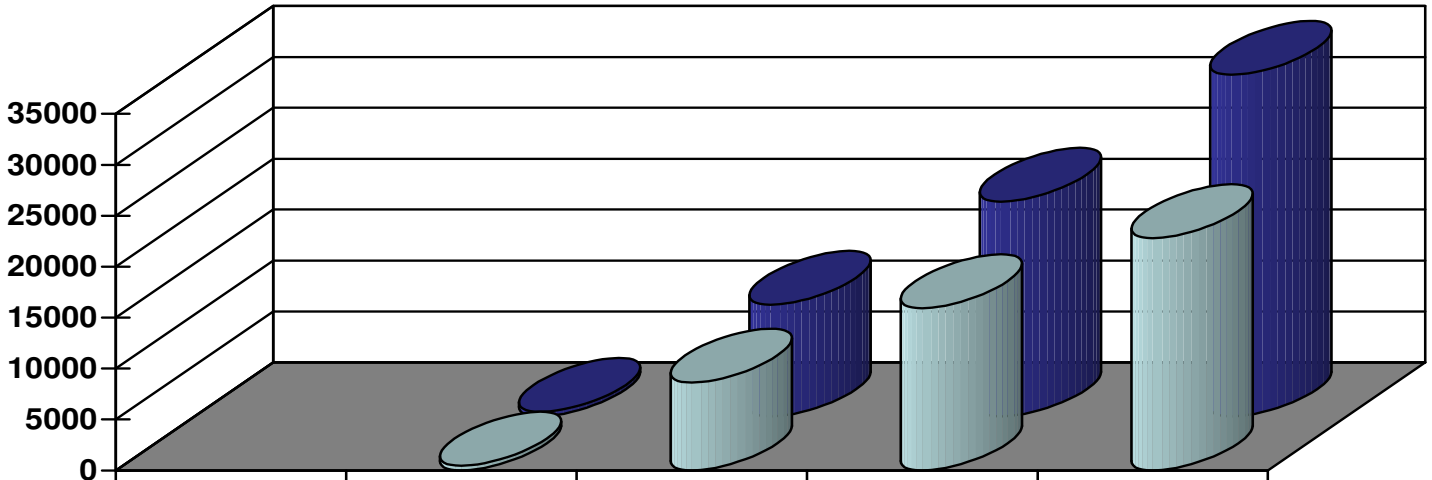
When health was considered as a medical issue in China (1980s-1990s)

- Less political commitment and put health sector in the commercial market
- Steady decline in financial support for health
- Public health system suffered the most in a “support yourself” market economy
- Emerging and remerging infectious diseases increased and spread rapidly
- National emergency response capabilities decreased greatly

The growth of mean lifespan and GDP

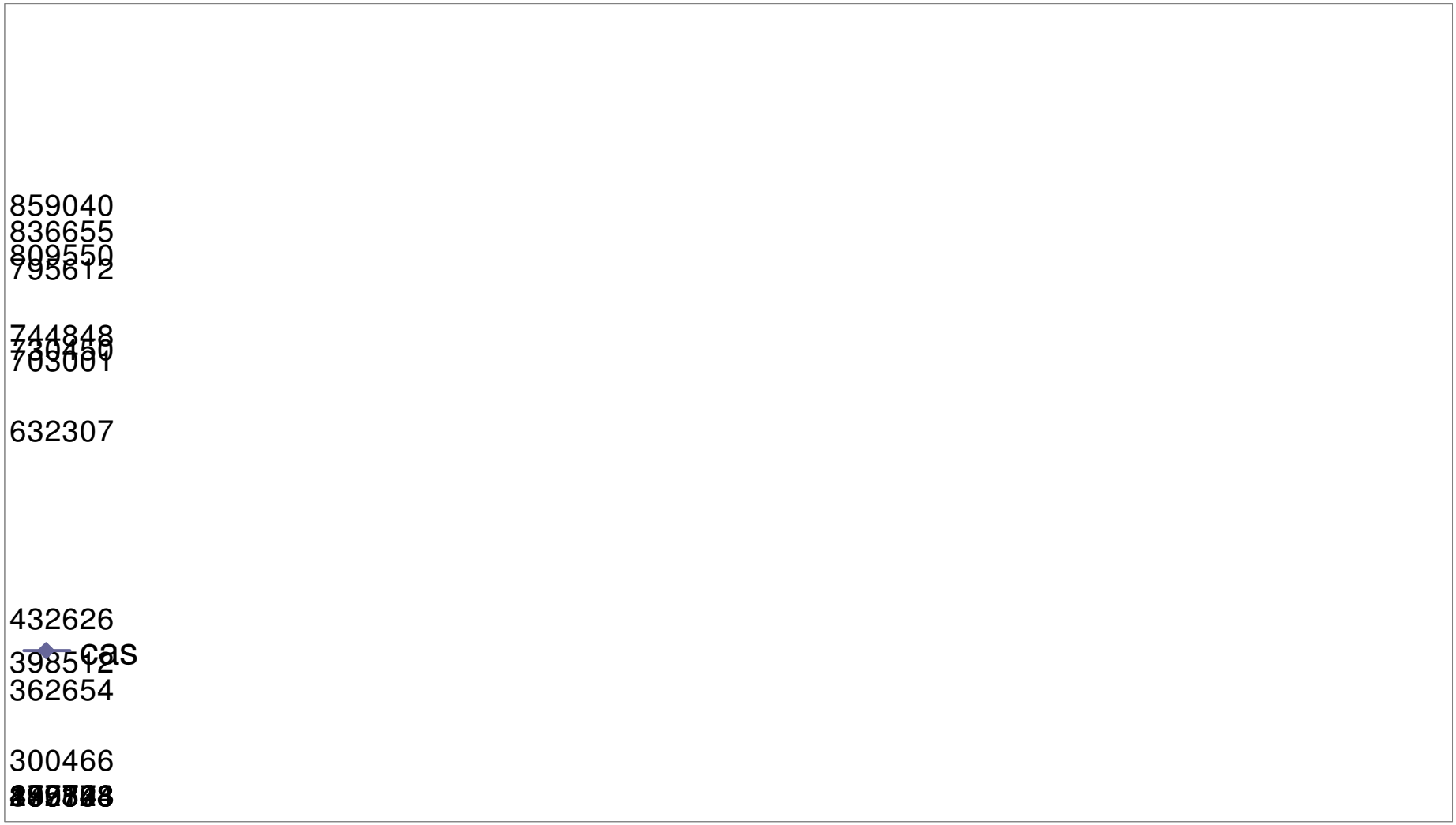


	1950	1980	2001	2006	2009
Average life expectancy(Age)	35	65.3	71.8	72	73.1
Annual growth of average life expectancy(Age)		1.01	0.31	0.04	0.37

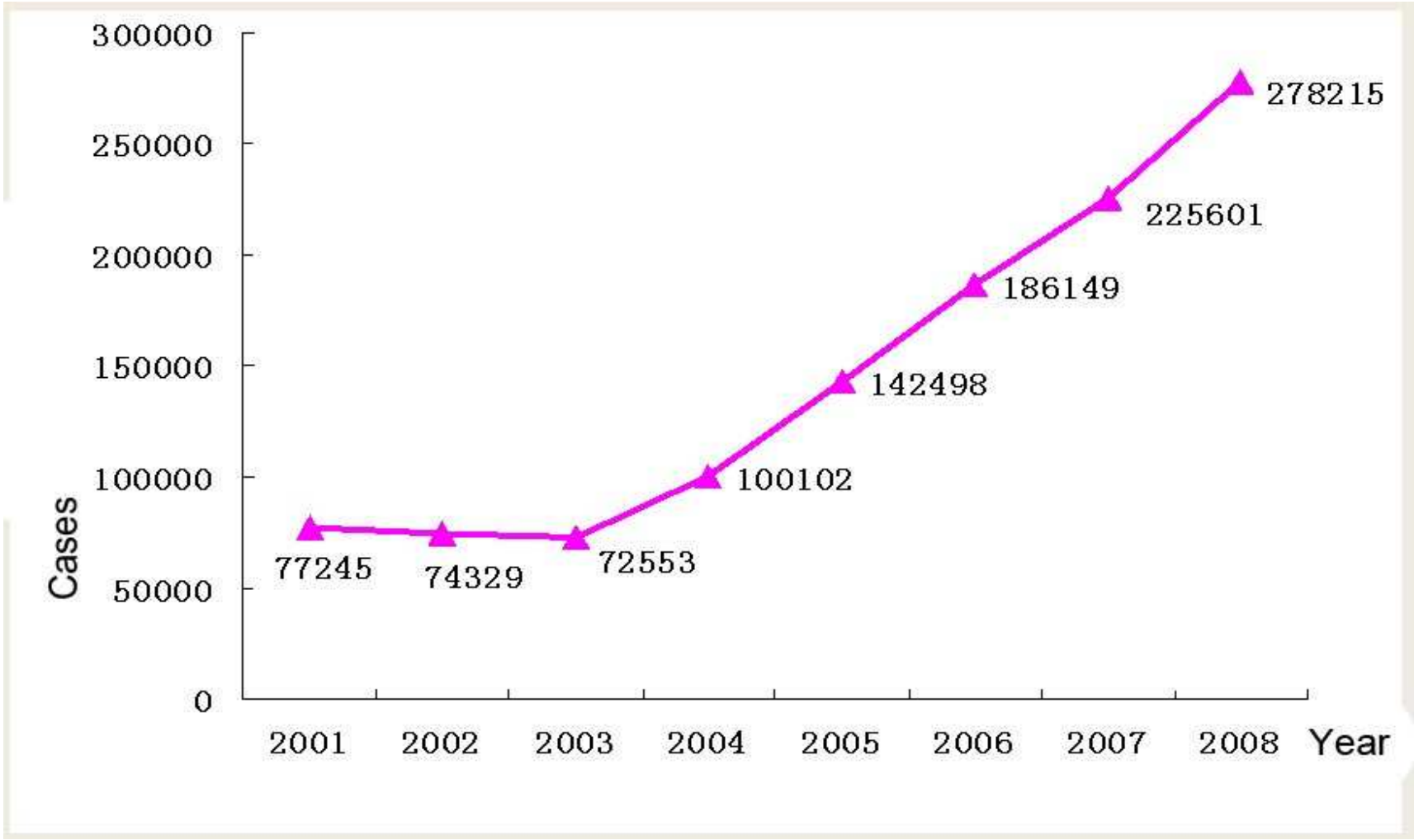


	1950	1980	2001	2006	2009
GDP per capital（Yuan）		463	8622	15931	22800
GDP（Billion Yuan）		454.56	10965.52	21087.1	33535.3

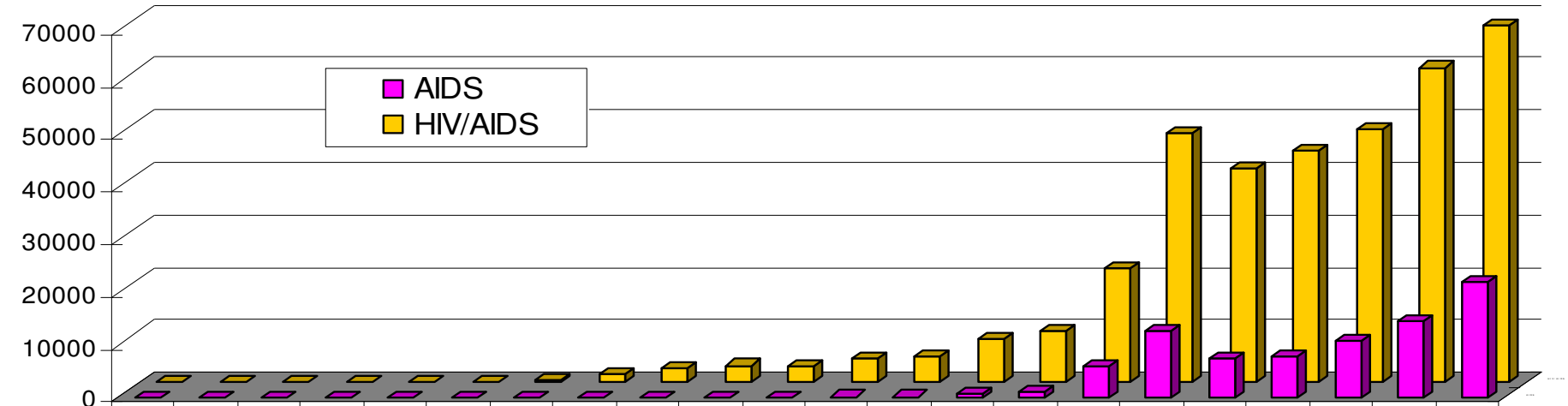
Annual Reported STDs in China



Annual Reported Syphilis Cases in China (2001-2008)

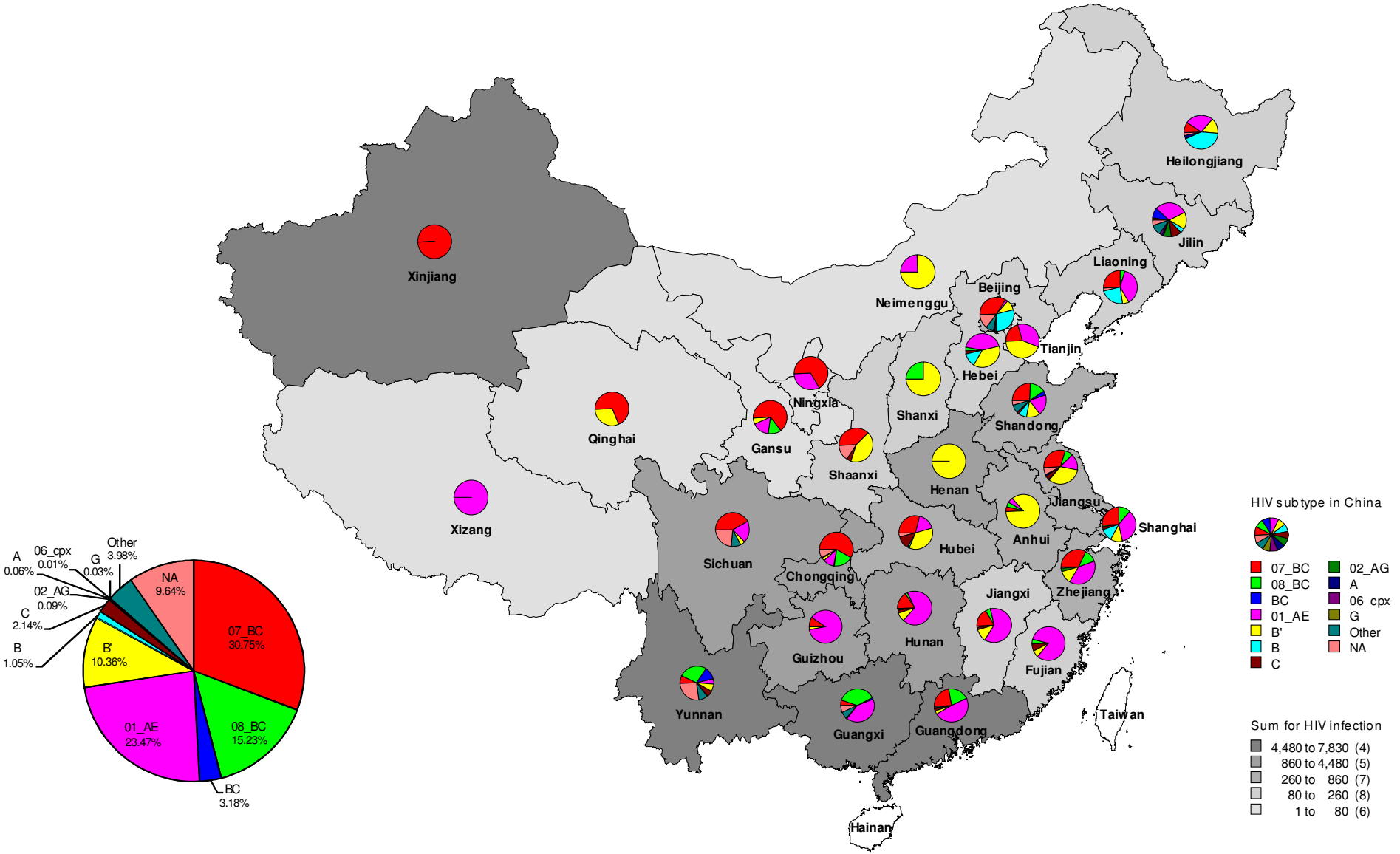


Annual Report on HIV positive and AIDS cases (1985 - 2009)



	85-88	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AIDS	3	0	2	3	5	23	29	52	33	126	136	230	233	714	1088	6120	12652	7550	7909	10837	14509	22056
HIV/AIDS	22	171	299	216	261	274	531	1567	2649	3343	3306	4677	5201	8219	9732	21691	47606	40711	44070	48397	60081	68249

Genetic subtype distribution in HIV infected people reported in 2006



Breakthrough in National AIDS Control Policy after SARS ----- “Four Frees and One Care”

Free ART to AIDS patients

Free voluntary counseling and testing

Free PMTCT in pregnant women

Free education to AIDS orphans

Financial assistance and social support to HIV/AIDS patients

Increased investment in health and AIDS Control (National AIDS budget rose from 20 million RMB in 1998 to 1.3 Billion RMB in 2005)

Nationwide condom promotion, needle exchange, and methadone substitution programs

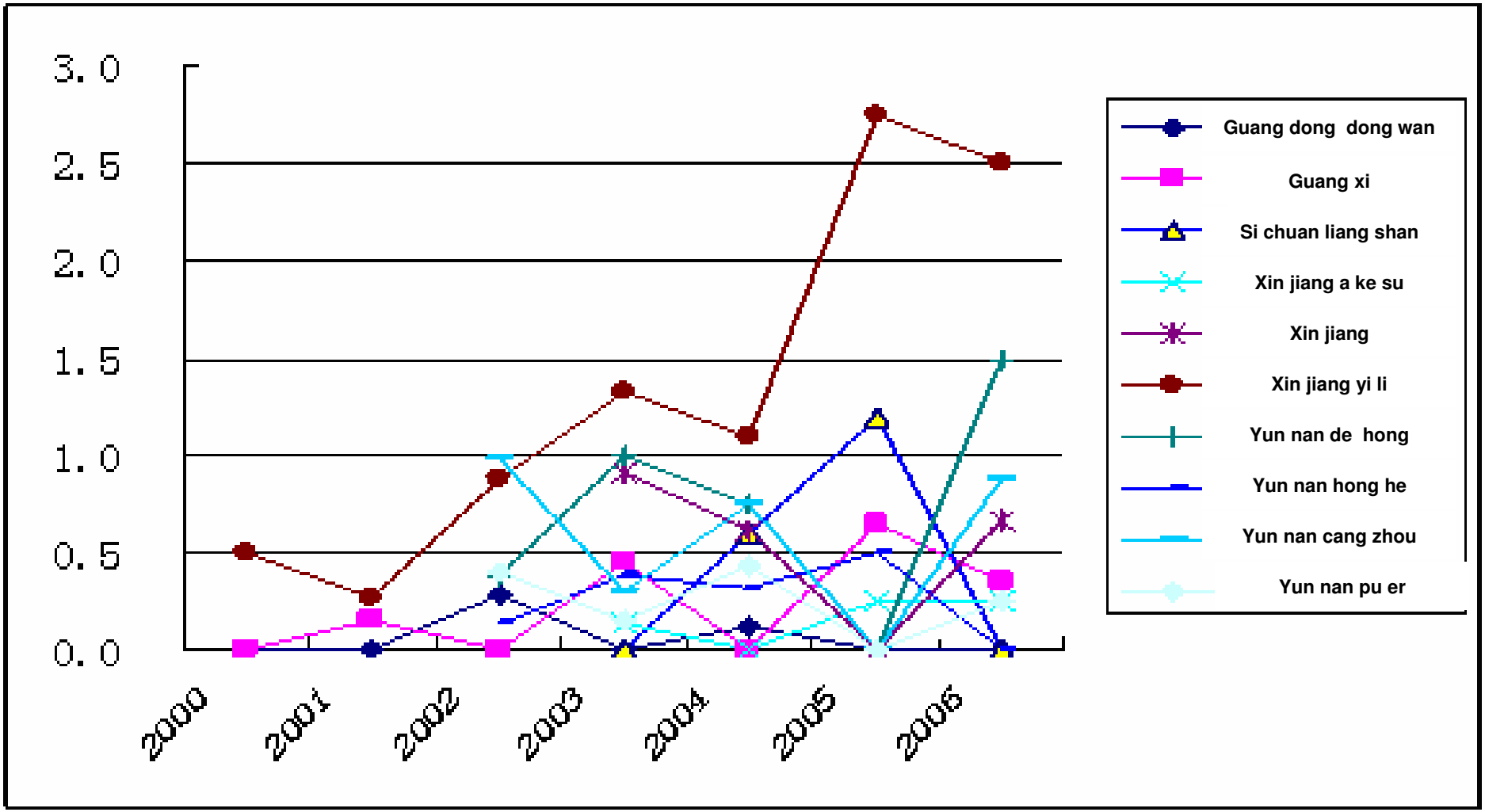
HIV and Syphilis Incidence in a 6-Month Follow-up Study of Female Sex Workers in Sichuan (2005)

	HIV (%)	Syphilis (%)
Prevalence	0.6	15.7
Incidence	1.0	6.2

Note:

Nearly 10% of FSWs reported using drugs.

Partial Sentinel Surveillance Data of Pregnant Women (2000-2006)



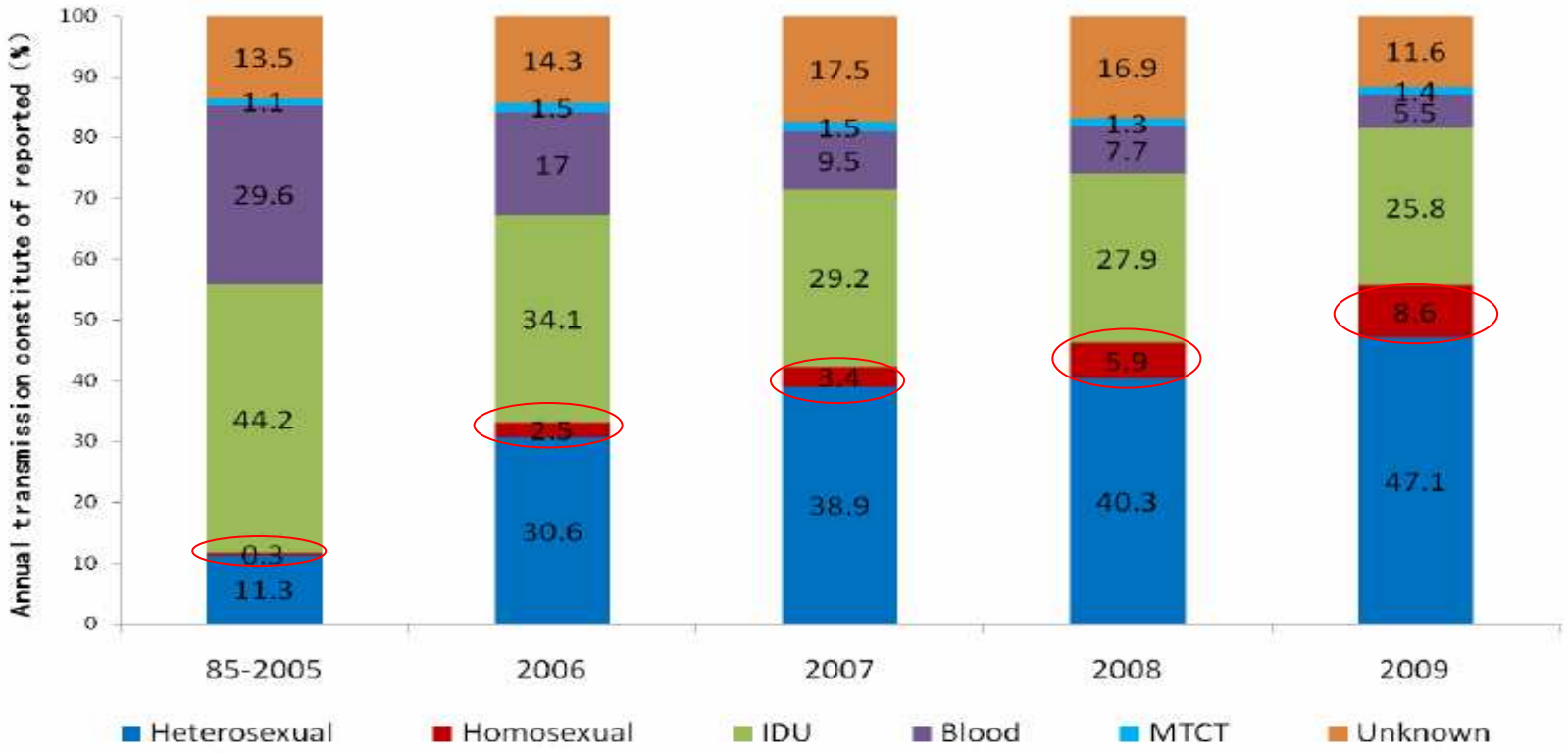
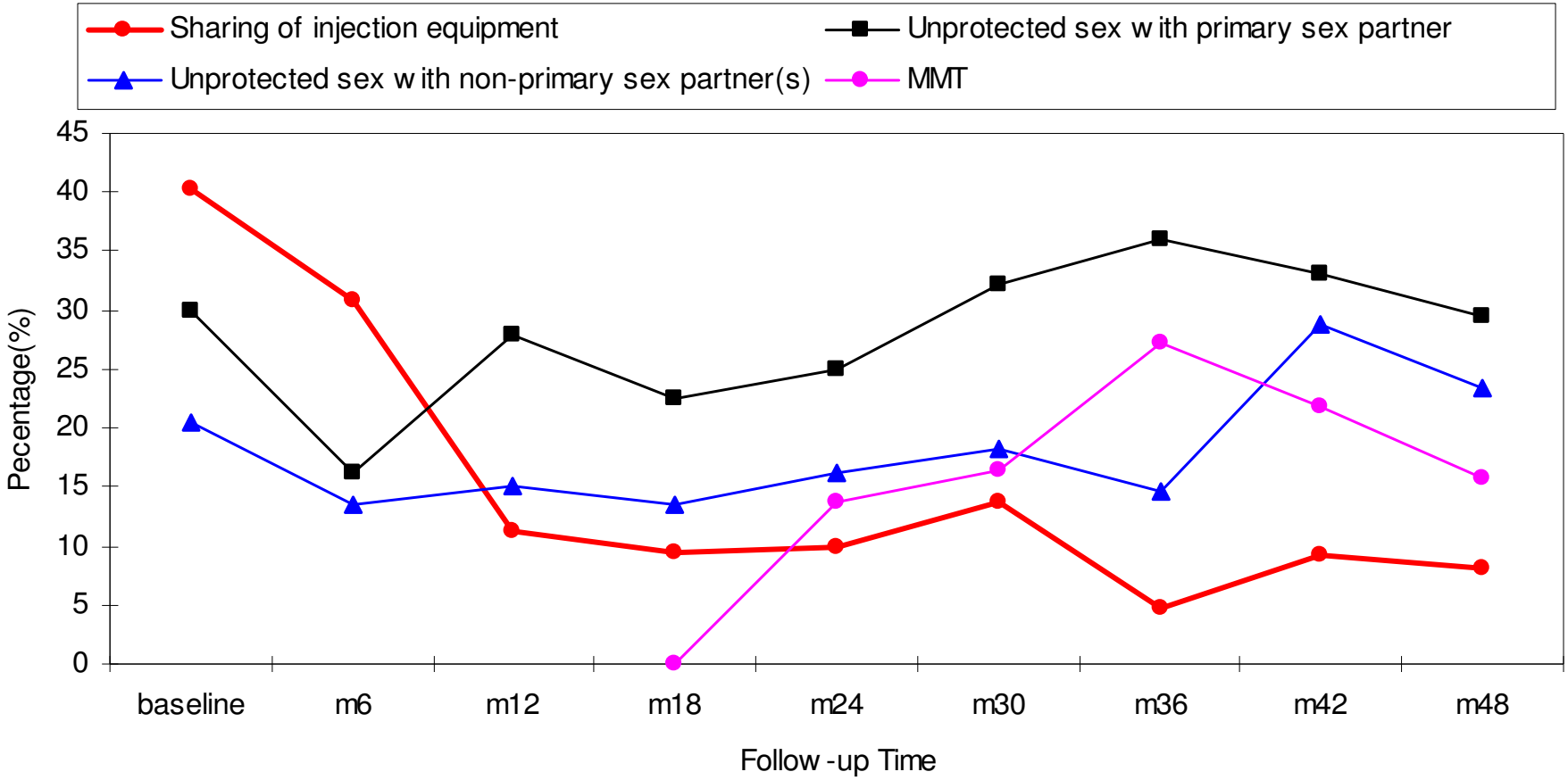


Figure 3. Annual transmission breakdowns of reported HIV/AIDS cases in China, 1985-2009

Both homosexual and heterosexual transmission of HIV increased gradually over time. The proportion of reported cases resulting from homosexual transmission increased as follows: 2.5% (2006), 3.4% (2007), 5.9% (2008) and 8.6% (2009); heterosexual transmission also increased: 30.6% (2006), 38.9% (2007), 40.3% (2008) and 47.1% (2009) (Figure 3).

Of the estimated 48,000 new HIV infections that took place in 2009, heterosexual transmission accounted for 42.2% and homosexual transmission 32.5%. This is a significant increase compared with the 2007 estimates, where 12.2% were infected through homosexual transmission. Homosexual transmission has, therefore, become a very significant mode of transmission for new HIV infections in 2009.

Changes of High Risk Bahaviros at 48-month Follow-up Study among IDUs in Sichuan, China (2002.11-2006.12)



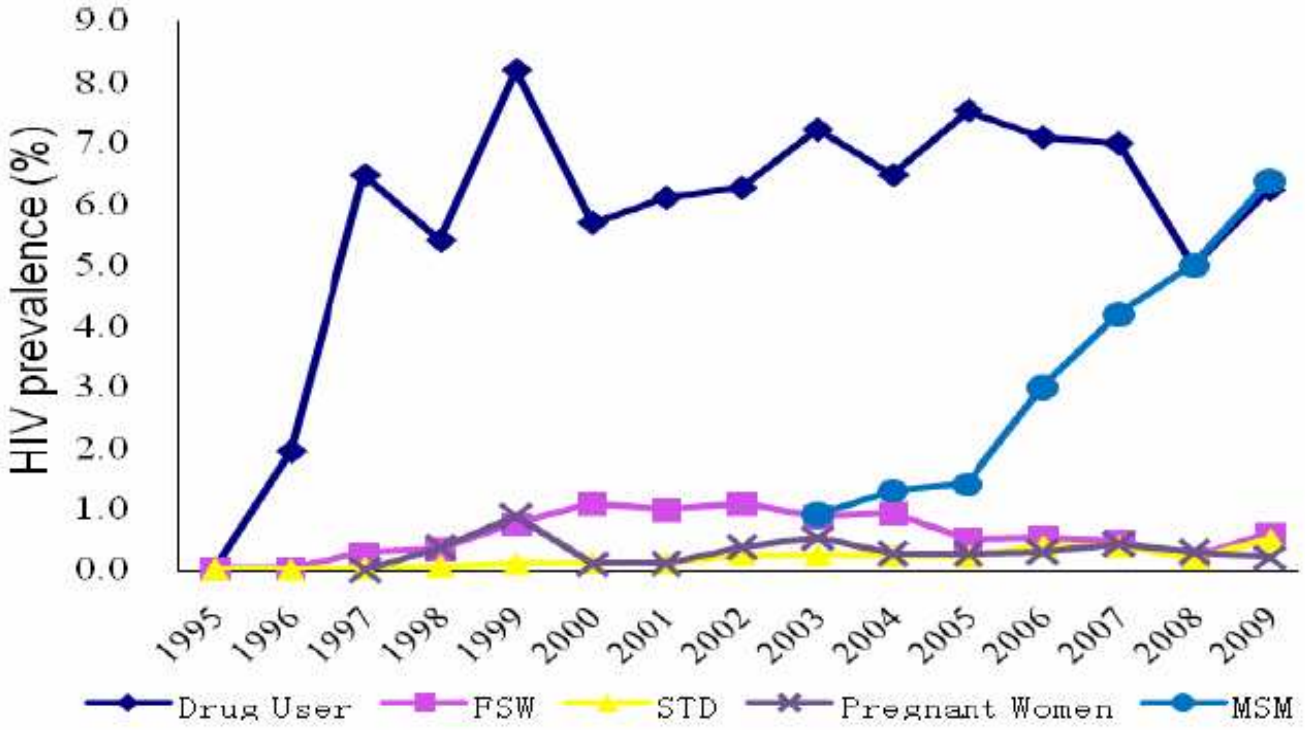


Figure 1 HIV sentinel surveillance data on IDUs, FSW, STD clinic attendants, pregnant women and MSM, 1995-2009.

Data from sentinel surveillance indicate a leveling out in HIV prevalence among IDU, female sex worker, STI clinic patients and pregnant women. However, HIV prevalence among MSM has increased significantly since 2005 .

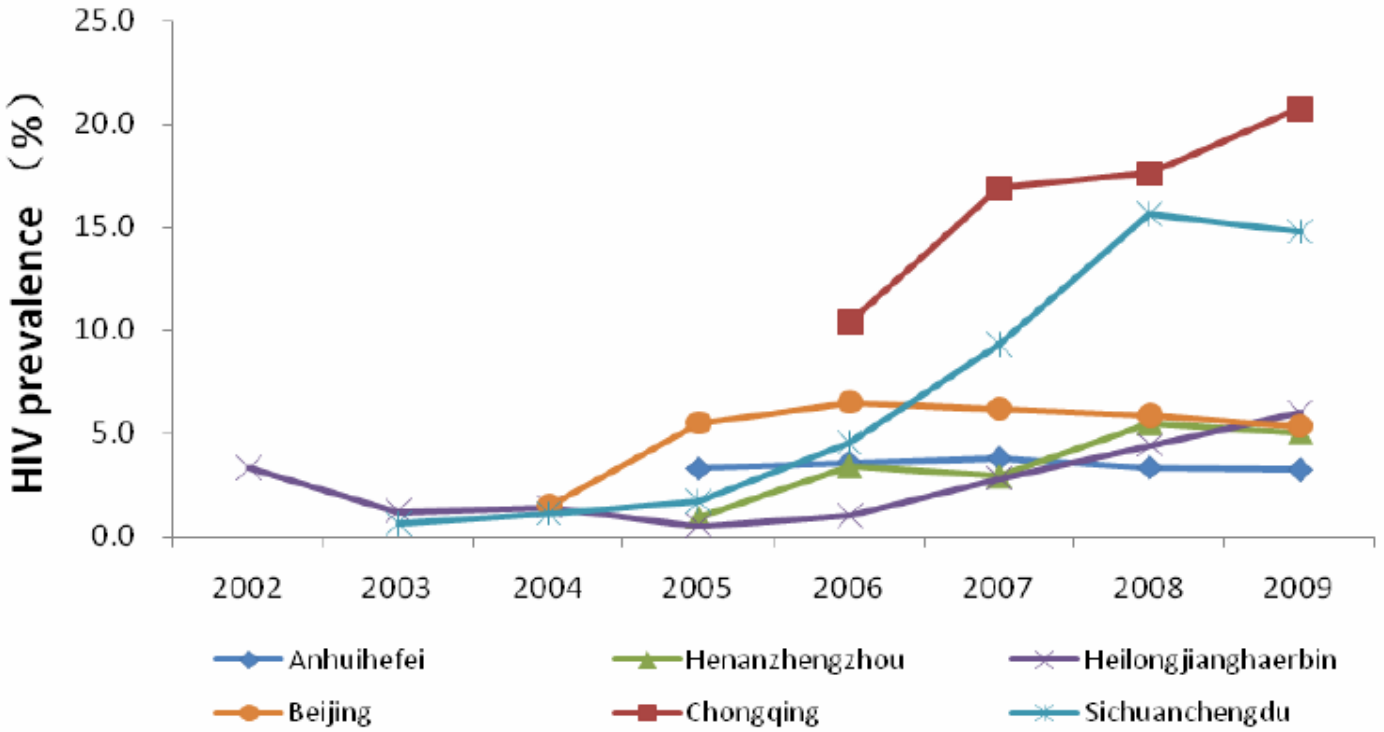


Figure 2. HIV prevalence among MSM from the national HIV sentinel surveillance program in China, 2002-2009

Over the past years, sentinel surveillance results have shown that the rate of positive HIV antibody test results among MSM populations has been consistently greater than 1%, and is increasing year by year, becoming one of the most important drivers of the AIDS epidemic (Figure 2). Results of a survey of MSM populations in 61 cities carried out in 2008-2009 showed that the HIV prevalence among MSM populations in large and medium cities had reached an average of 5%. In the main cities of the Southwest, such as Guiyang, Chongqing, Kunming and Chengdu, the HIV prevalence among MSM populations was greater than 10%, demonstrating the high speed of transmission among this population.

The rapid increase of detected HIV cases in senior population

The number of HIV(P)	2005y	2006y	2007y	2008y	2009y
Total	36375	44070	48397	60081	68249
≥60y	944	1287	2115	3291	4924
Proportion□ ≥60y/Total□□% □	**2.6**	**2.9**	**4.4**	**5.5**	**7.2**

Challenges of HIV Prevention and Control in China

Community involvement and participation is still insufficient. Lack of a two “People’s War” both in the health system and the whole society.

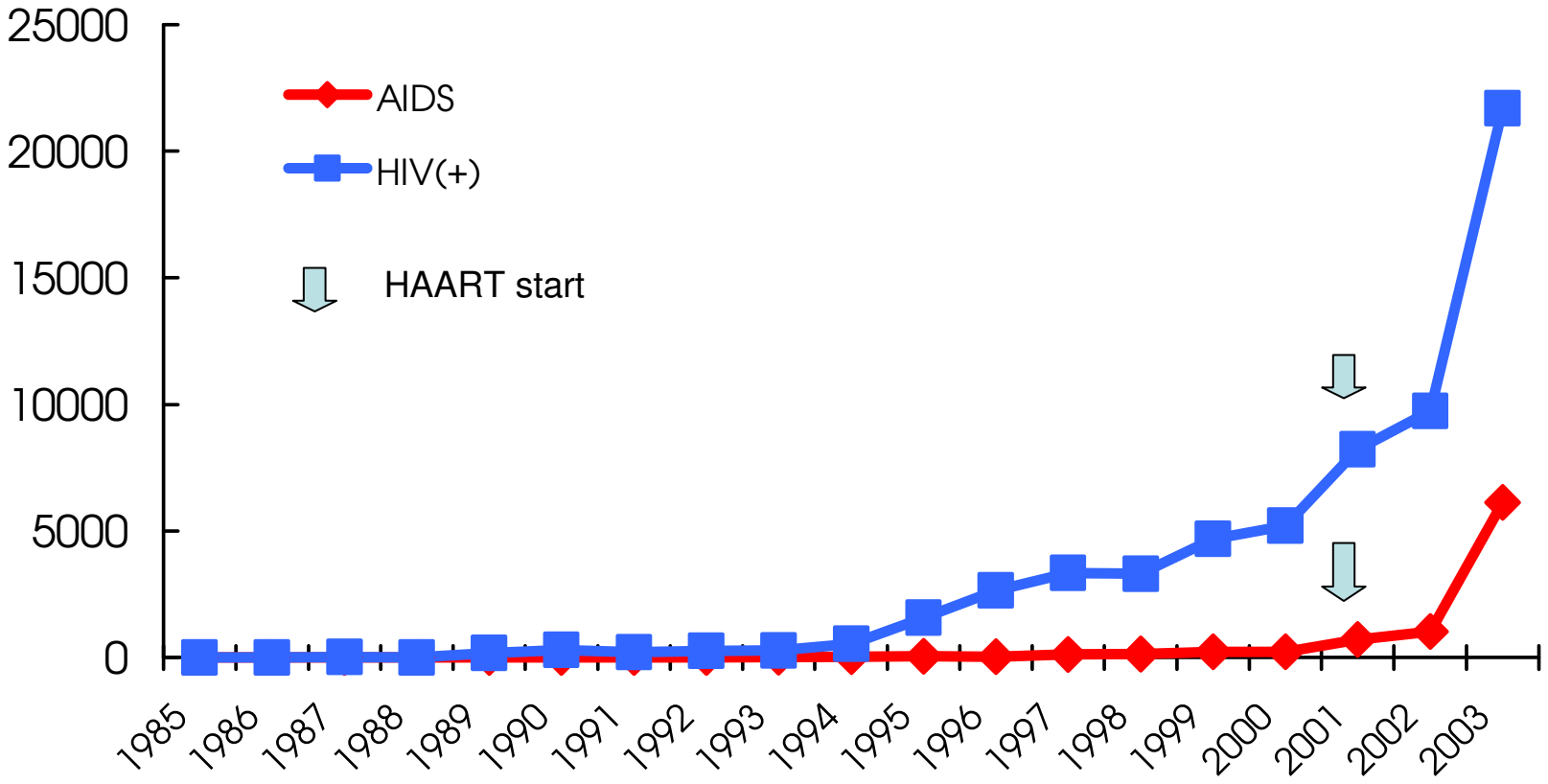
Nationwide public education of HIV/AIDS has been very uneven.

AIDS intervention coverage of high risk populations is only 20-30%.

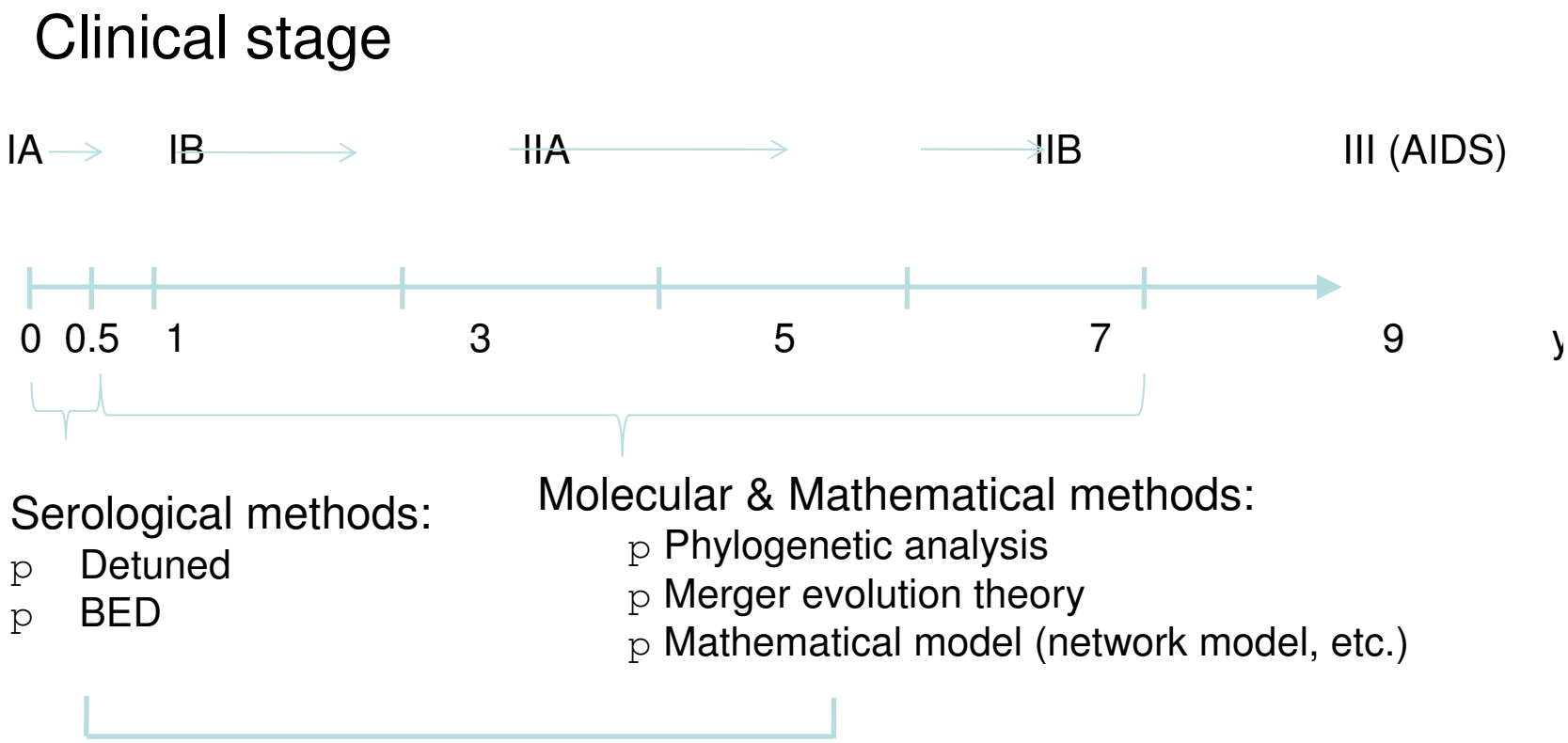
Most of the treatments with first-line ART drugs fail. The second-line drug supply is insufficient and its sustainability is also poor.

New strategy research on AIDS prevention and control is rarely, if ever, used.

Develop novel technology to better predict the epidemic and timely evaluate efficacy of control measures



Determination of HIV infection time



Traditional diagnostic methods can not effective determine the time of HIV infection. New methodology and research are urgently needed.

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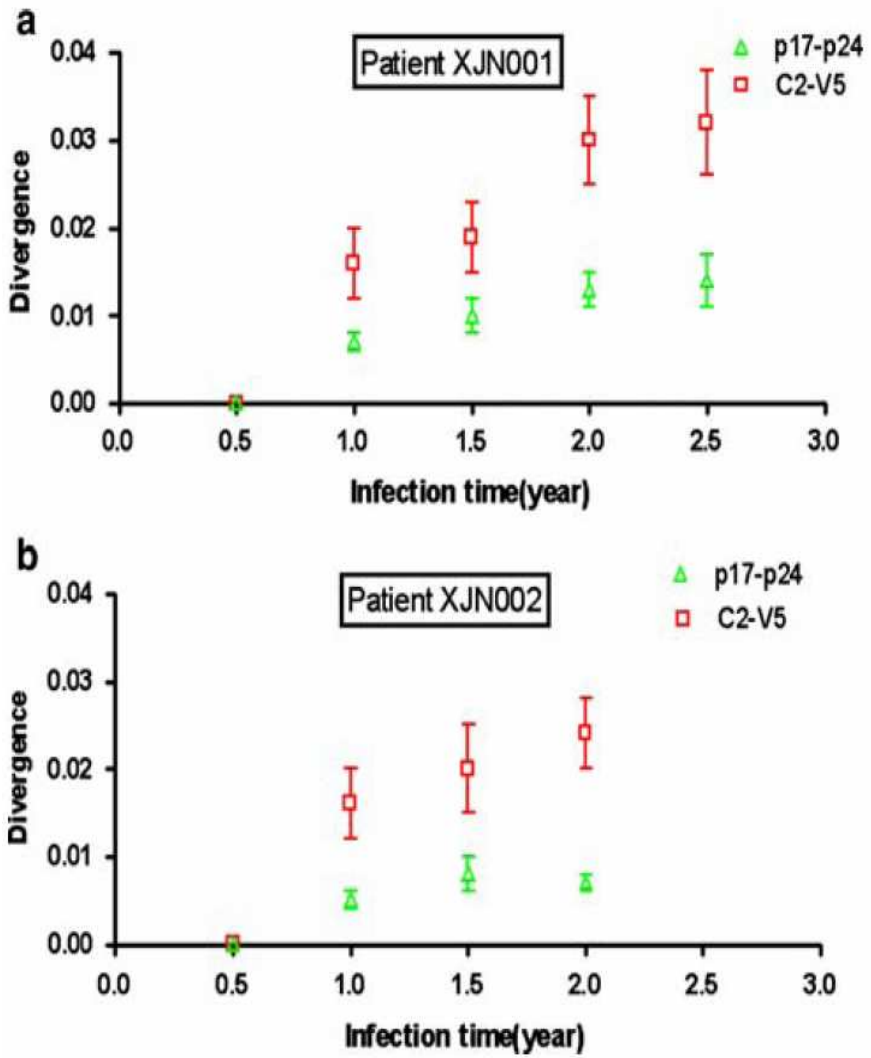

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Arch Virol, 2008, 153: 1233-40

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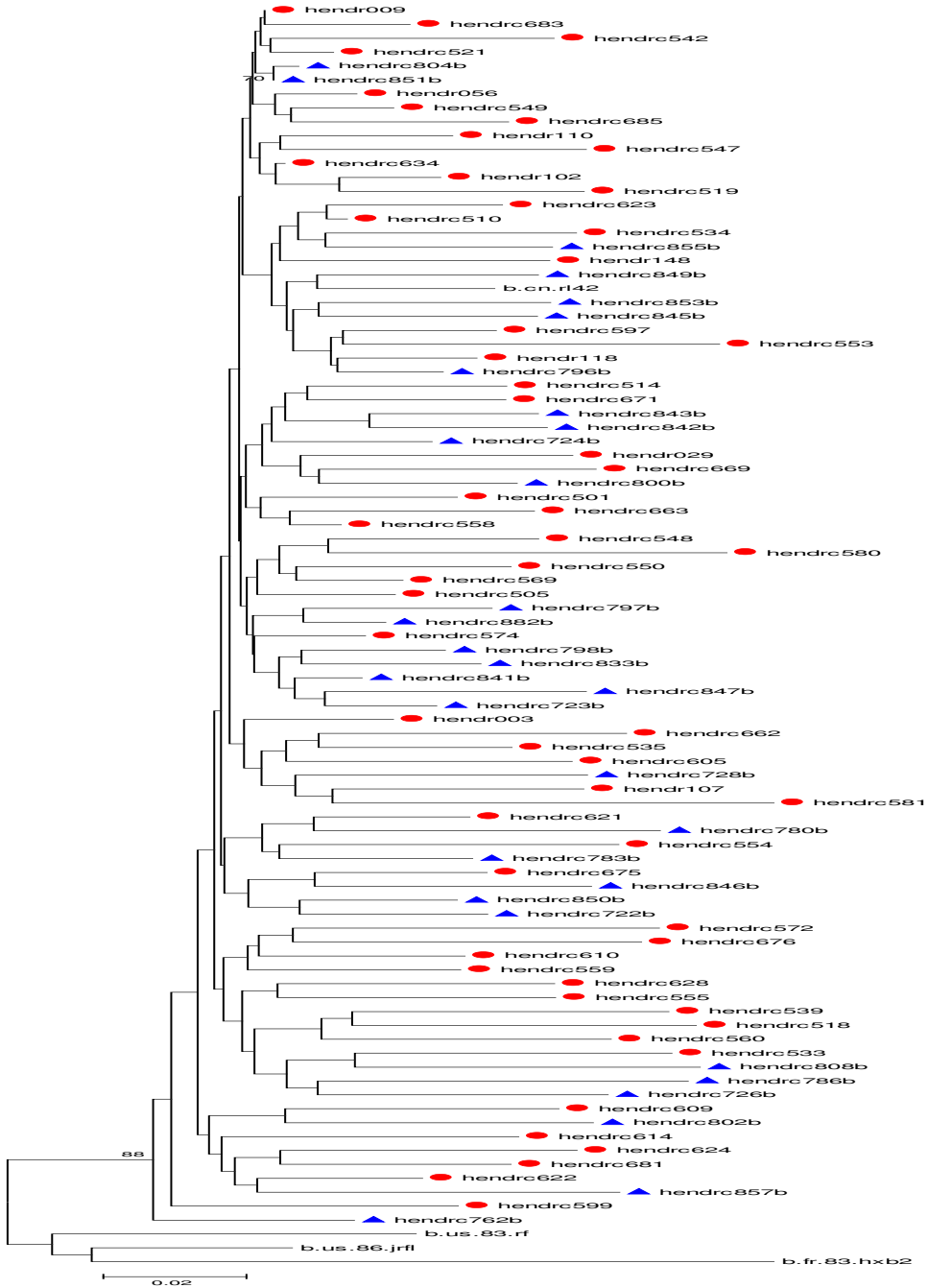
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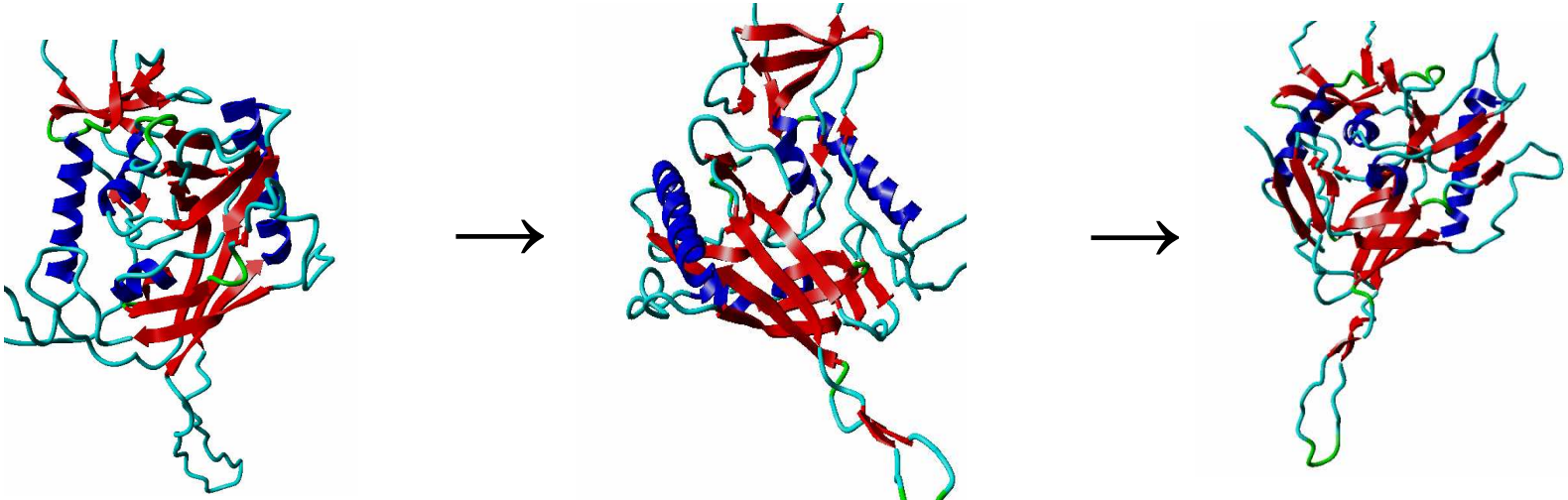
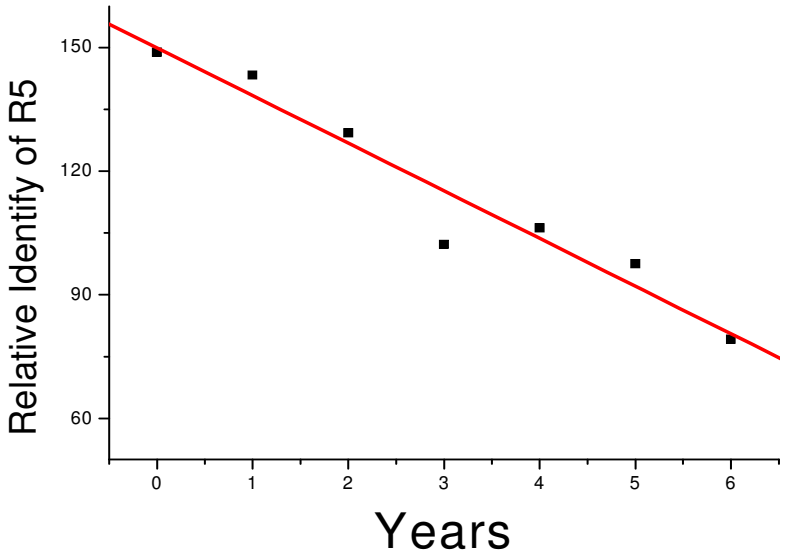




X=149.9-11.6*Y
X:binding afinity
Y: infection time
:R=0.969
P<0.0003

ARV Treatment and Care in China

(by 30 Sept 2008)

First line medication on adult:

cumulative 53,330 cases on ART

currently 42,870 are on ARV (80.4%)

Overall mortality decreased from 27.3 to 4.6 death per 100 person-years

Cumulative 1144 children on ART and 1056 remain;

Second line medication under piloting in less than 3000

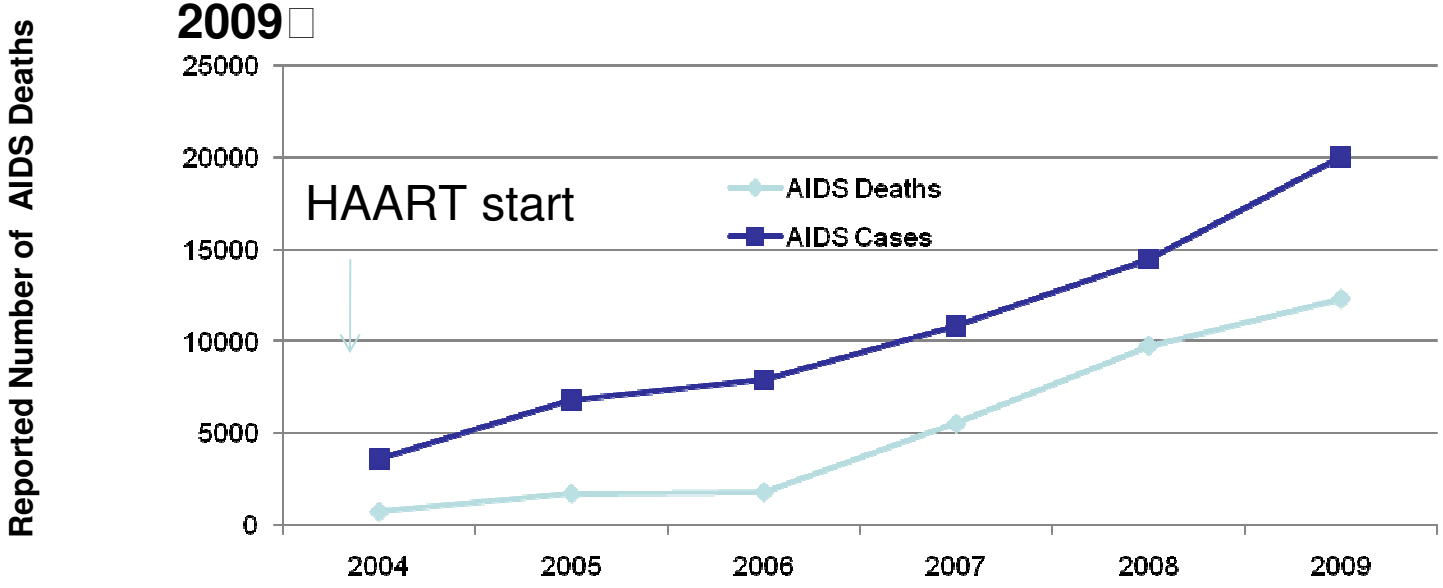
Lab monitoring:

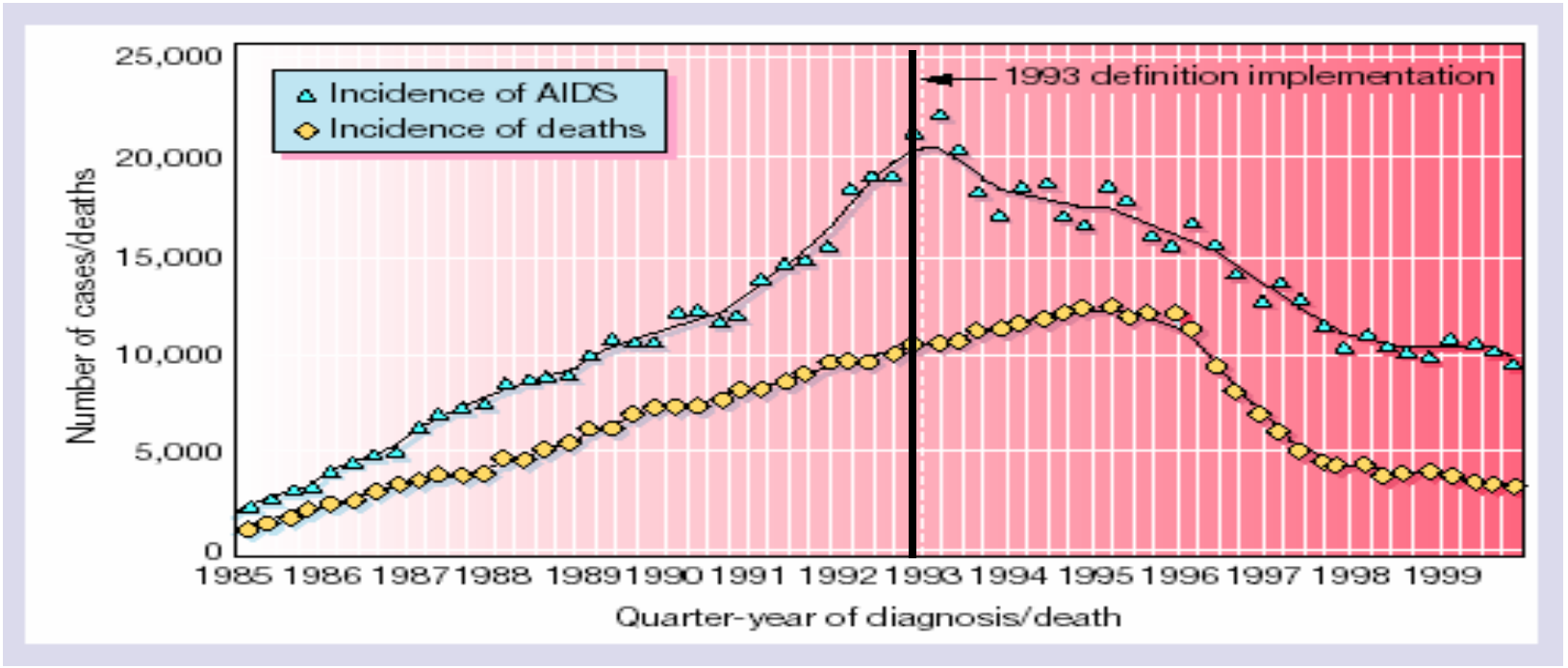
CD4 count quarterly, since 2005

Viral load test once a year, since 2008

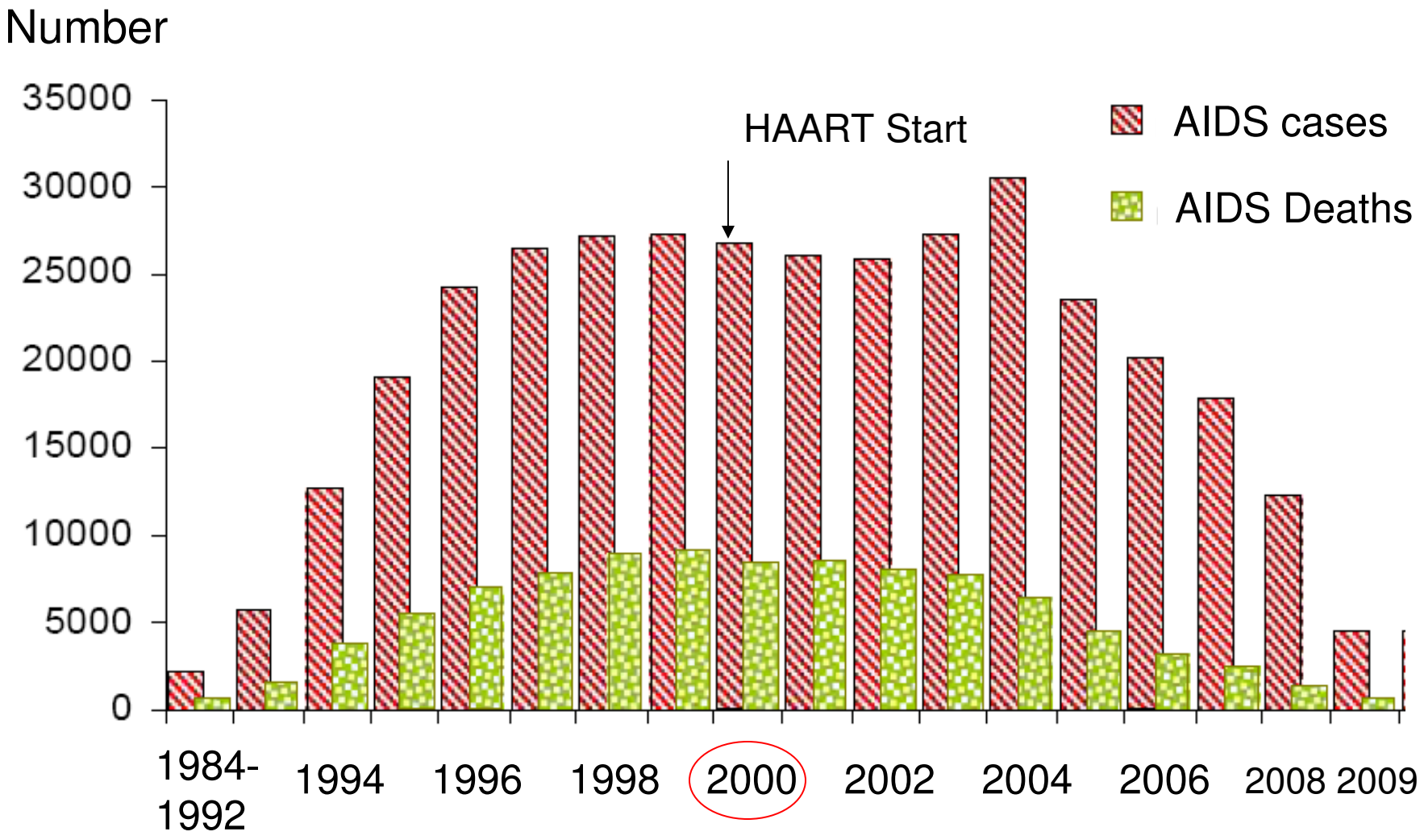
HIVDR surveillance once a year, on 5-10% on ART patients, since 2005

Reported AIDS cases and Deaths in China□2004-2009□



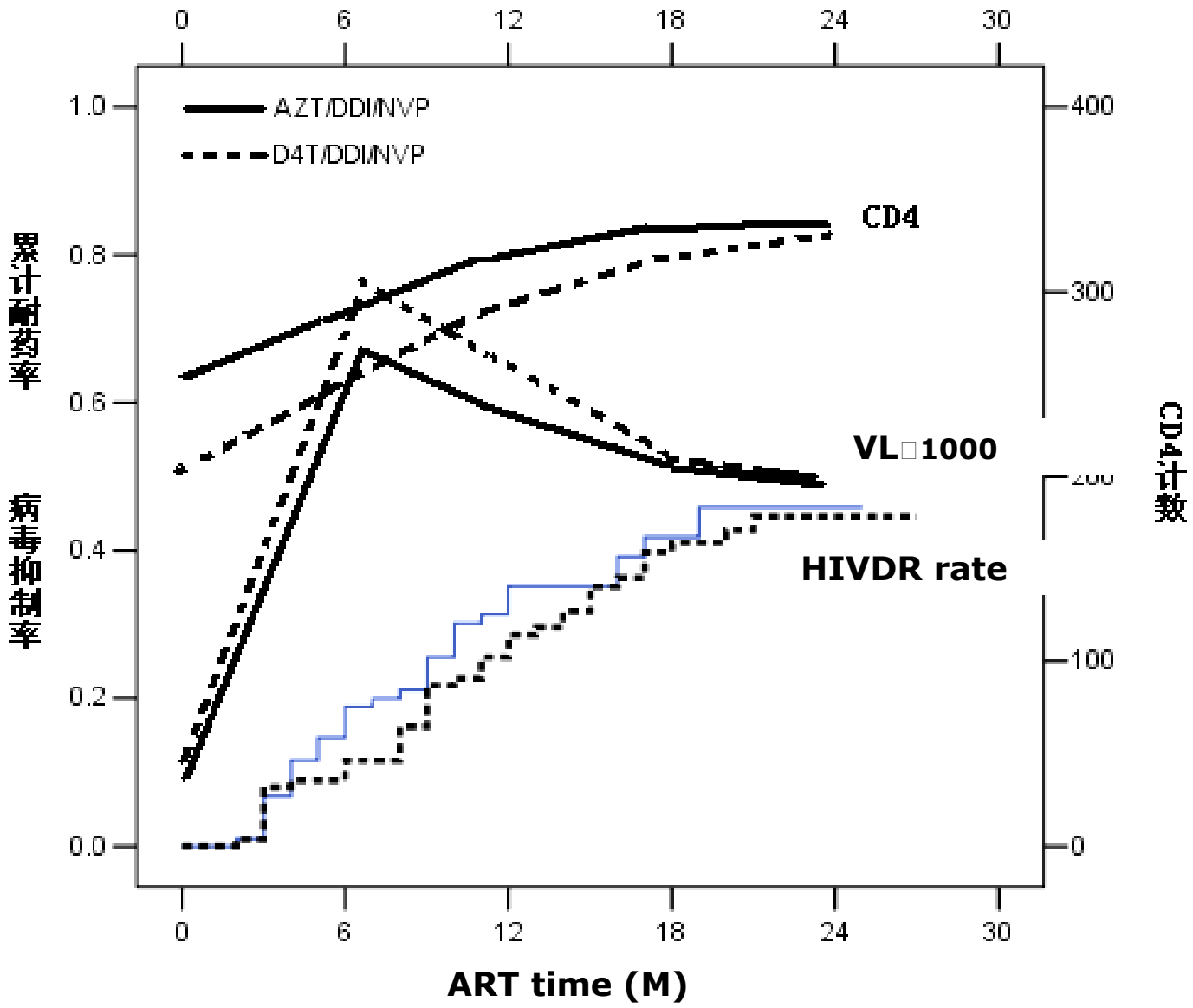


AIDS Reported cases in Thailand: 1994-2009

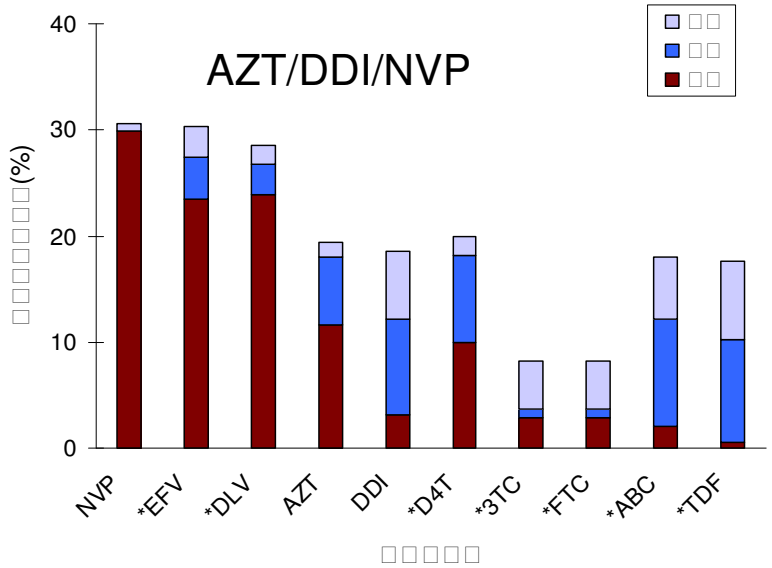


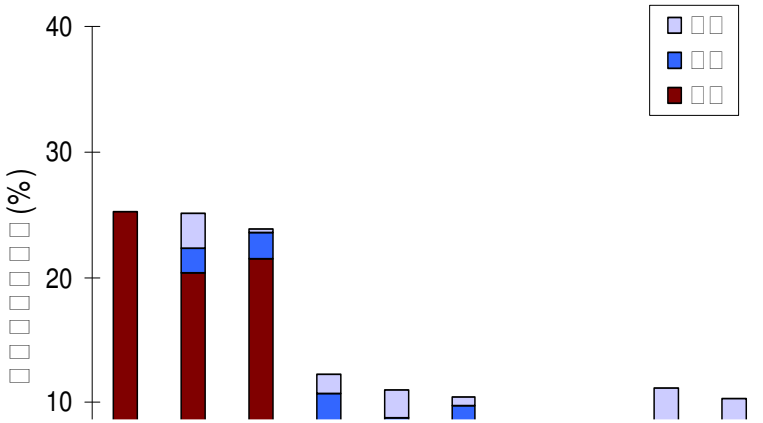
Source: Bureau of Epidemiology, MOPH-Thailand

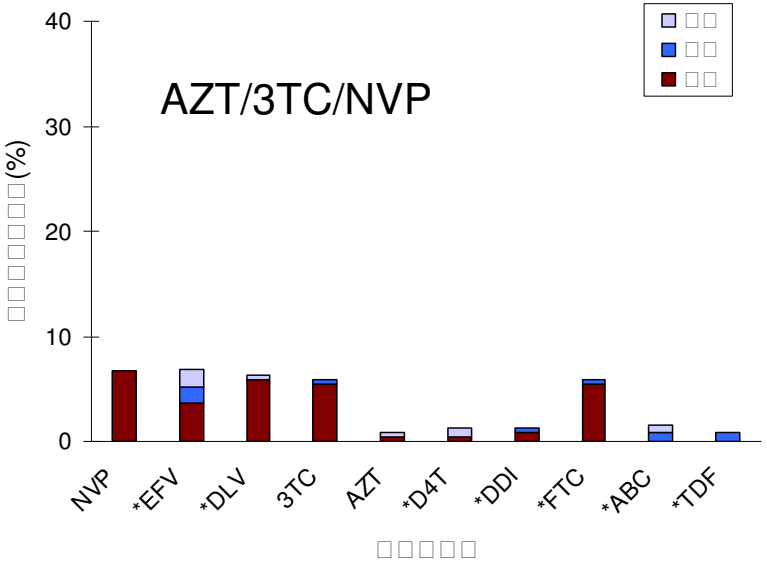
Viral load, CD4 and DR mutations in ART patients in China

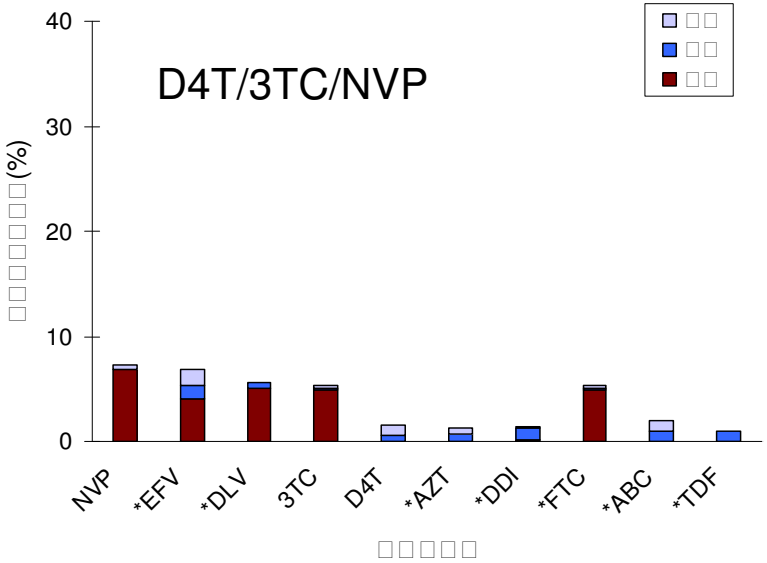


Profiles of HIVDR mutations in four major regiemes of China's ART programs

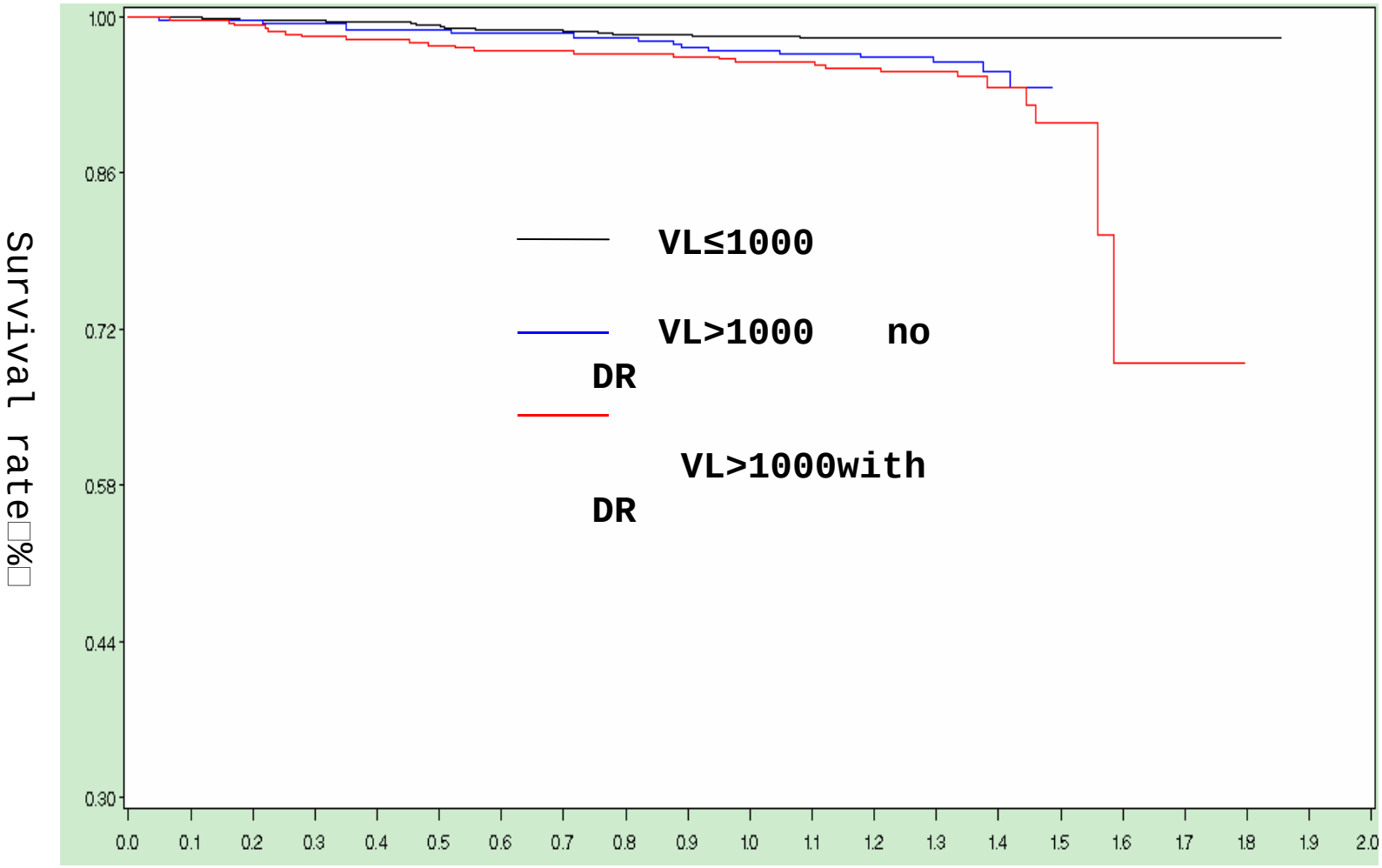




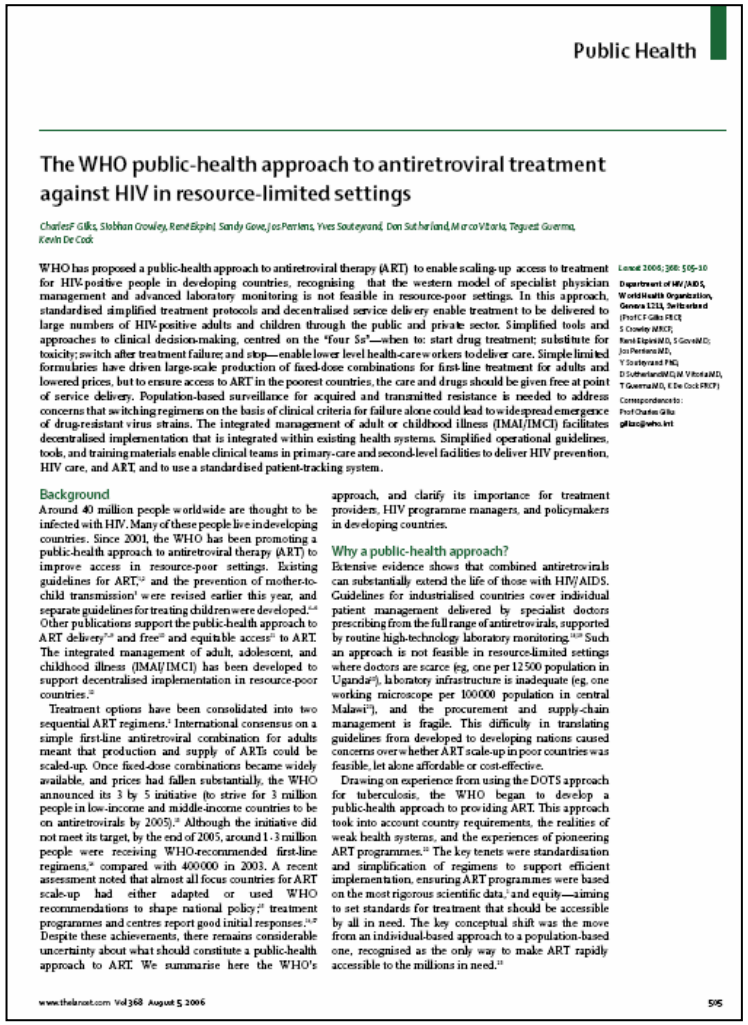




Survival (Kaplan-Meier curve) of ART patients with Viral load and HIVDR monitoring
-- from National HIVDR surveillance data 2006-2007 (N=3000)



Public Health ART and Lab Monitoring Strategy in China's Pilot Test



Public Health

The WHO public-health approach to antiretroviral treatment against HIV in resource-limited settings

Charles F Gilks, Siobhan Crowley, René Ekpini, Sandy Gove, Jos Perriens, Yves Souteyrand, Don Sutherland, Marco Vitoria, Teguest Guerma, Kevin De Cock

WHO has proposed a public-health approach to antiretroviral therapy (ART) to enable scaling-up access to treatment for HIV-positive people in developing countries, recognising that the western model of specialist physician management and advanced laboratory monitoring is not feasible in resource-poor settings. In this approach, standardised simplified treatment protocols and decentralised service delivery enable treatment to be delivered to large numbers of HIV-positive adults and children through the public and private sector. Simplified tools and approaches to clinical decision-making, centred on the "four Ss"—when to: start drug treatment; substitute for toxicity; switch after treatment failure; and stop—enable lower level health-care workers to deliver care. Simple limited formularies have driven large-scale production of fixed-dose combinations for first-line treatment for adults and lowered prices, but to ensure access to ART in the poorest countries, the care and drugs should be given free at point of service delivery. Population-based surveillance for acquired and transmitted resistance is needed to address concerns that switching regimens on the basis of clinical criteria for failure alone could lead to widespread emergence of drug-resistant virus strains. The integrated management of adult or childhood illness (IMAI/IMCI) facilitates decentralised implementation that is integrated within existing health systems. Simplified operational guidelines, tools, and training materials enable clinical teams in primary-care and second-level facilities to deliver HIV prevention, HIV care, and ART, and to use a standardised patient-tracking system.

Lancet 2006; 368: 505–10

Department of HIV/AIDS, World Health Organization, Geneva 1211, Switzerland (Prof C F Gilks FRCP, S Crowley MRCP, René Ekpini MD, S Gove MD, Jos Perriens MD, Y Souteyrand PhD, D Sutherland MD, M Vitoria MD, T Guerma MD, K De Cock FRCP)

Correspondence to: Prof Charles Gilks gilksc@who.int

Background

Around 40 million people worldwide are thought to be infected with HIV. Many of these people live in developing countries. Since 2001, the WHO has been promoting a public-health approach to antiretroviral therapy (ART) to improve access in resource-poor settings. Existing guidelines for ART,[1,2] and the prevention of mother-to-child transmission[3] were revised earlier this year, and separate guidelines for treating children were developed.[4–6] Other publications support the public-health approach to ART delivery[7–9] and free[10] and equitable access[11] to ART. The integrated management of adult, adolescent, and childhood illness (IMAI/IMCI) has been developed to support decentralised implementation in resource-poor countries.[12]

Treatment options have been consolidated into two sequential ART regimens.[1] International consensus on a simple first-line antiretroviral combination for adults meant that production and supply of ARTs could be scaled-up. Once fixed-dose combinations became widely available, and prices had fallen substantially, the WHO announced its 3 by 5 initiative (to strive for 3 million people in low-income and middle-income countries to be on antiretrovirals by 2005).[13] Although the initiative did not meet its target, by the end of 2005, around 1·3 million people were receiving WHO-recommended first-line regimens,[14] compared with 400 000 in 2003. A recent assessment noted that almost all focus countries for ART scale-up had either adapted or used WHO recommendations to shape national policy;[15] treatment programmes and centres report good initial responses.[16,17] Despite these achievements, there remains considerable uncertainty about what should constitute a public-health approach to ART. We summarise here the WHO's approach, and clarify its importance for treatment providers, HIV programme managers, and policymakers in developing countries.

Why a public-health approach?

Extensive evidence shows that combined antiretrovirals can substantially extend the life of those with HIV/AIDS. Guidelines for industrialised countries cover individual patient management delivered by specialist doctors prescribing from the full range of antiretrovirals, supported by routine high-technology laboratory monitoring.[18,19] Such an approach is not feasible in resource-limited settings where doctors are scarce (eg, one per 12 500 population in Uganda[20]), laboratory infrastructure is inadequate (eg, one working microscope per 100 000 population in central Malawi[21]), and the procurement and supply-chain management is fragile. This difficulty in translating guidelines from developed to developing nations caused concerns over whether ART scale-up in poor countries was feasible, let alone affordable or cost-effective.

Drawing on experience from using the DOTS approach for tuberculosis, the WHO began to develop a public-health approach to providing ART. This approach took into account country requirements, the realities of weak health systems, and the experiences of pioneering ART programmes.[22] The key tenets were standardisation and simplification of regimens to support efficient implementation, ensuring ART programmes were based on the most rigorous scientific data,[1] and equity—aiming to set standards for treatment that should be accessible by all in need. The key conceptual shift was the move from an individual-based approach to a population-based one, recognised as the only way to make ART rapidly accessible to the millions in need.[23]

Facts:

Clinical monitoring is insensitive
Lab is weak & certain assay is not available
Local clinical teams are not strong enough

Design principles:

1) Evidence-based and fitting to rural environments
2) Universal access to ART supported by public health approach of lab monitoring in close consultation with clinical teams.

Elements & Process :

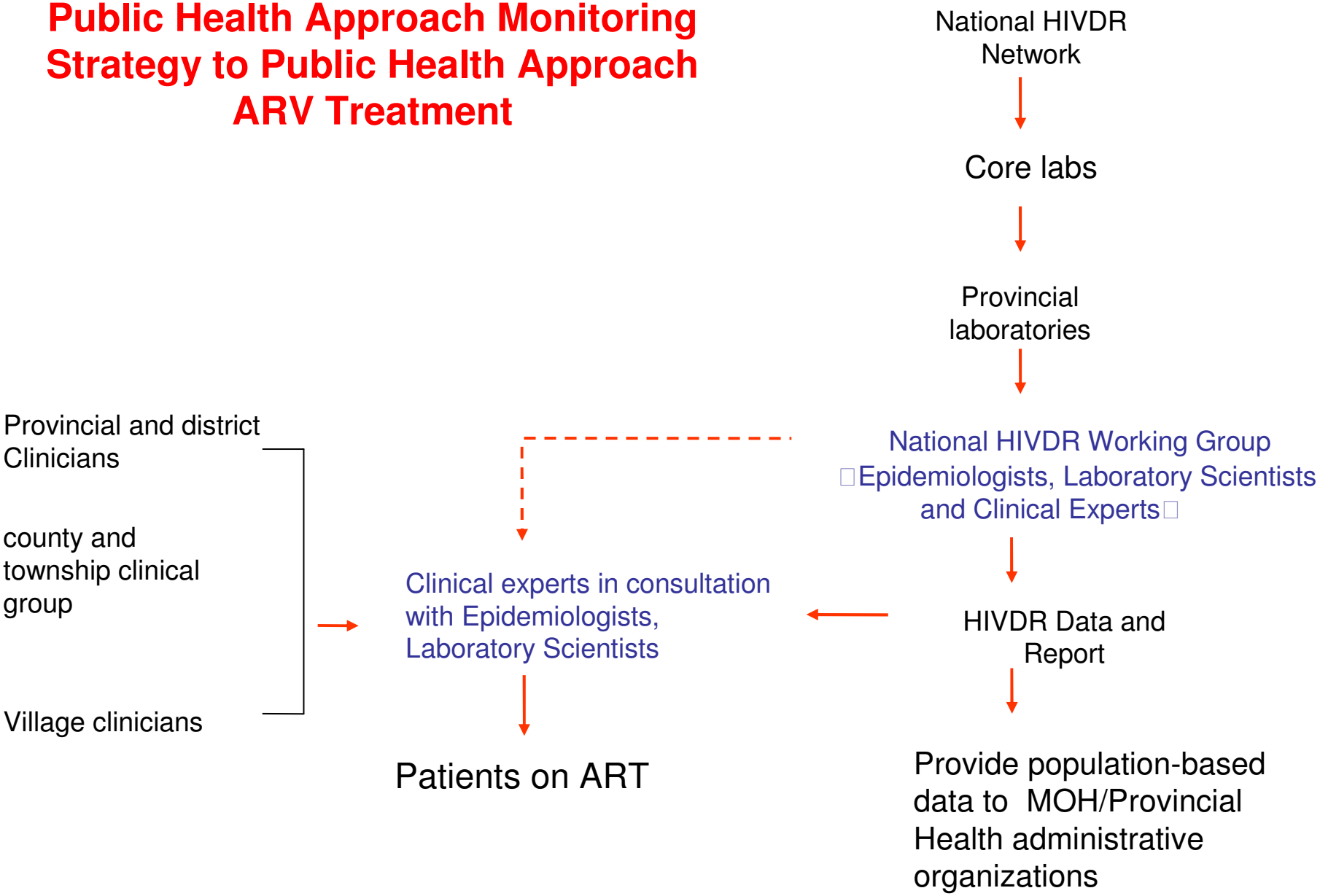
1) Universal clinical monitoring
2) Wide coverage of CD4/viral load plus population-based HIVDR surveillance
3) Regular consultation meetings between clinical and lab expert

Goal:

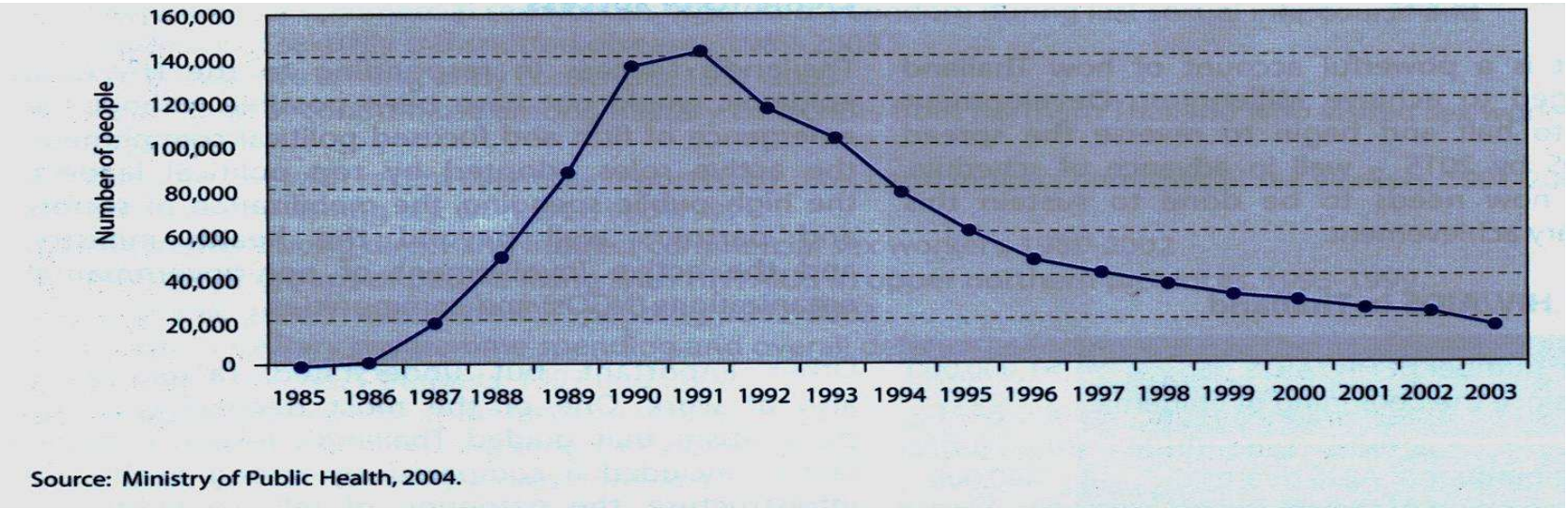
To provide a mechanism of achievable lab support for clinical decision-making in resource limiting settings.

World Health Organization

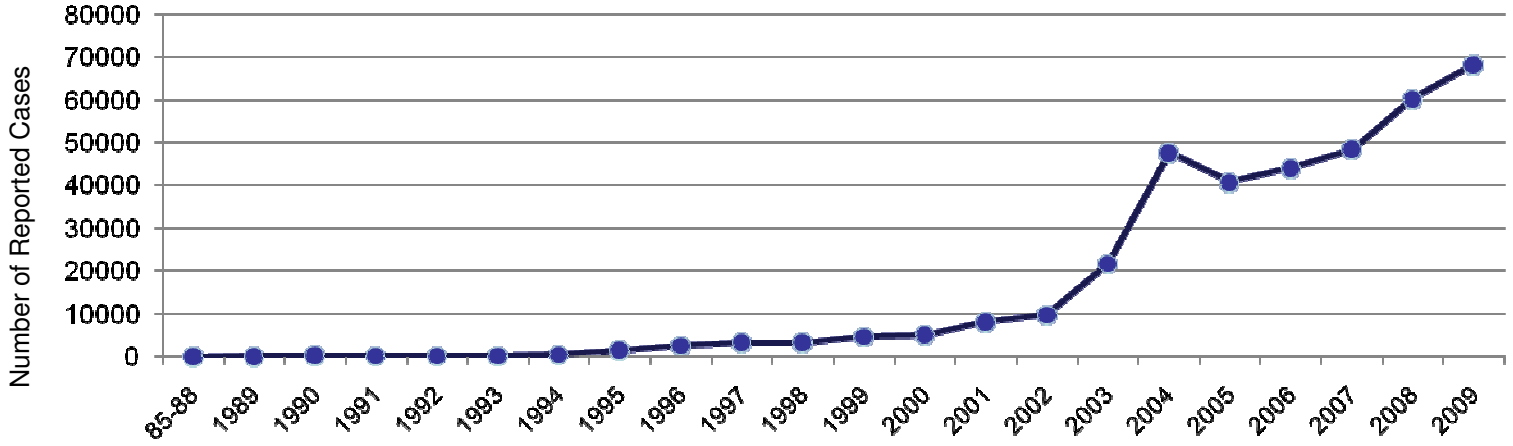
Public Health Approach Monitoring Strategy to Public Health Approach ARV Treatment



HIV Prevalence in Thailand□1985-2003□



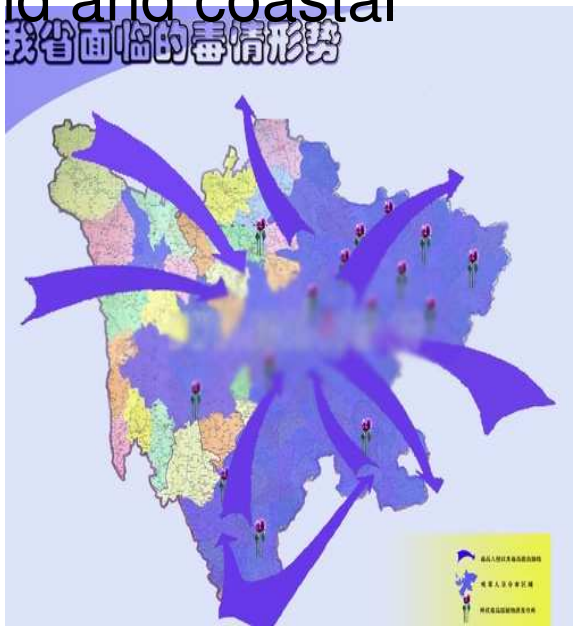
Reported HIV/AIDS Cases in China□1985-2009□



The HIV/AIDS spread situation in Liangshan profecture of Sichuan Province

- Liangshan Yi Autonomous Prefecture is located in southwest China bordering Yunnan and Guizhou provinces, which is also an important passage for drug transport from the golden triangle to inland and coastal China.

The HIV epidemic was started with IDUs in since 1997 and become mixed with heterosexual transmission later. Both drug and sex are the main mode for the HIV spread in Liangshan and is one of the highest HIV prevalence areas in China.



Butuo: the hardest HIV hit county in China

Butuo is located in the southeast County of Liangshan is a typical agricultural economy. Annual per-capita income of farmers is 1,435 RMB (about US$ 200).

Ethnic Yi accounts for 94% of Its total population of 84357 .

community.

The screening results of 31,111 of its general population (15-69 ages) in 2008 show that the HIV infection rate was 7.02%.

Except the self-infection transmission in IDUs, HIV-AIDS begins to

spread to the general population; even AIDS families have appeared.

Purpose and method

Purpose: The key of this study is to discover a new method for both disease prevention and poverty alleviation and will be an effective temporary and permanent solution for AIDS prevention and control, which also can quickly reduce the emerging AIDS infection rate, death rate and the level of prevalence among people.

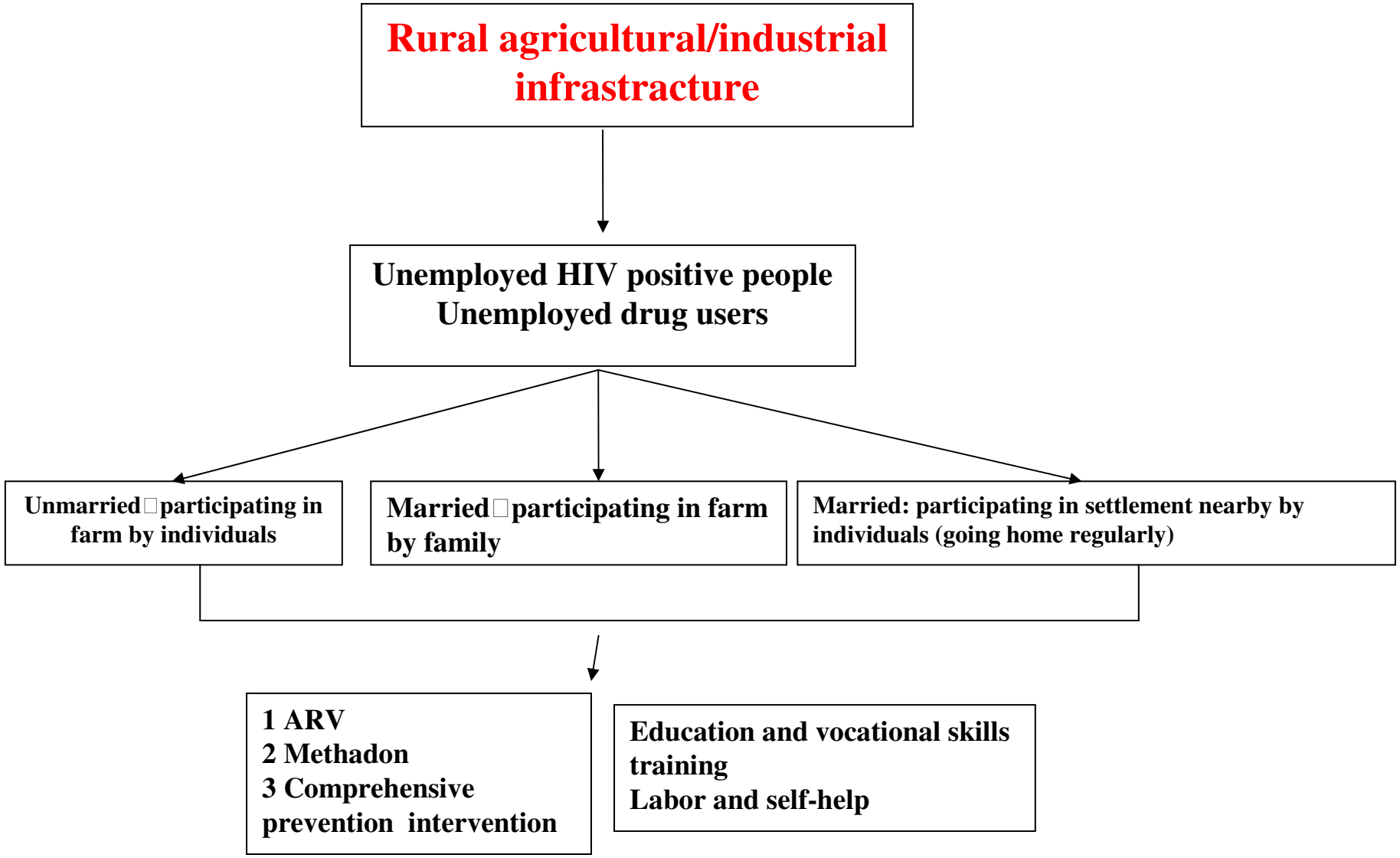
Method: On the basis of the raw data of AIDS prevention and control in Liangshan and Butuo, we set up a transmission dynamics mathematical model. By learning from the experience of China's eradication of sexually transmitted diseases and concentrative management in Cuba, we use a new model for AIDS prevention and control, which is mainly voluntary concentrative management. Fitting and forecast were made to this model and the others, to find out the prevention and control results of the HIV epidemic in the next 20 years, in order to optimize the selected control strategies in Liangshan.

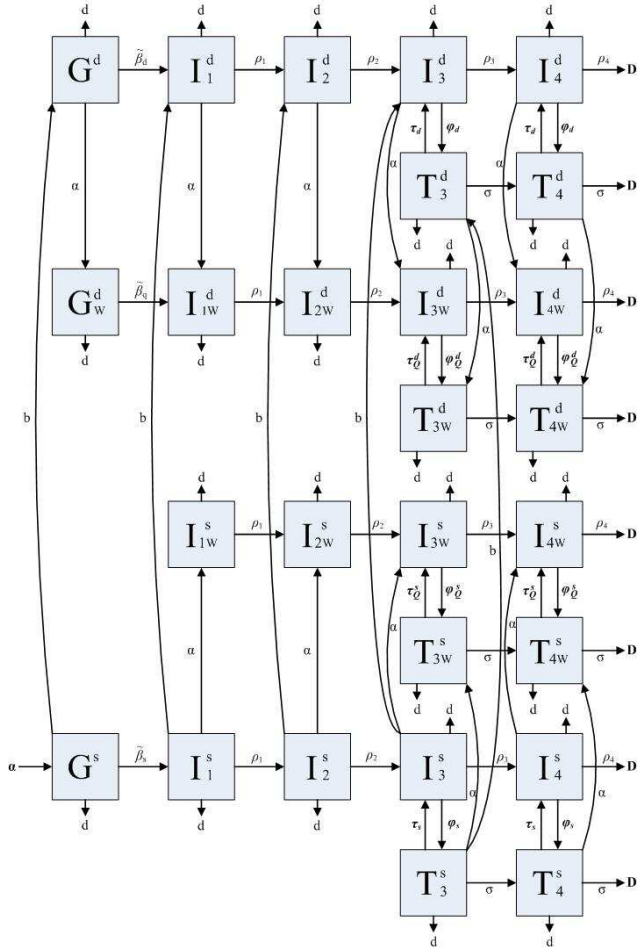
The design of a control project with novel control strategy based on past successful experience

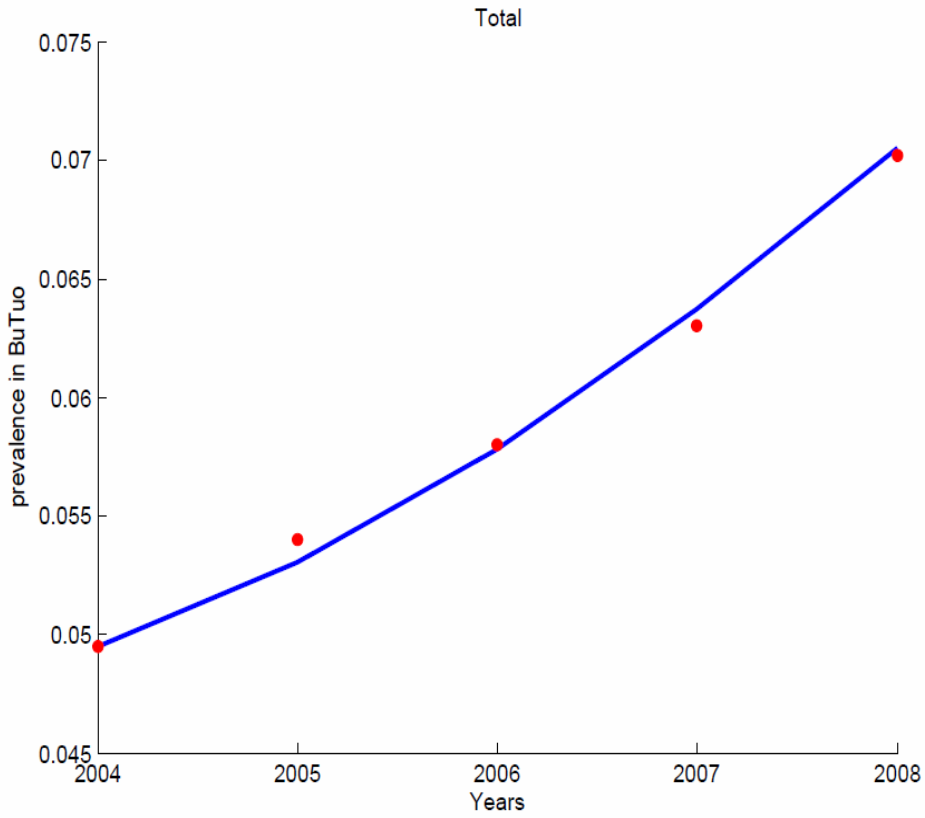
Building a sustainable model for HIV/AIDS control and prevention

To hit HIV/AIDS both at the epidemic and its roots

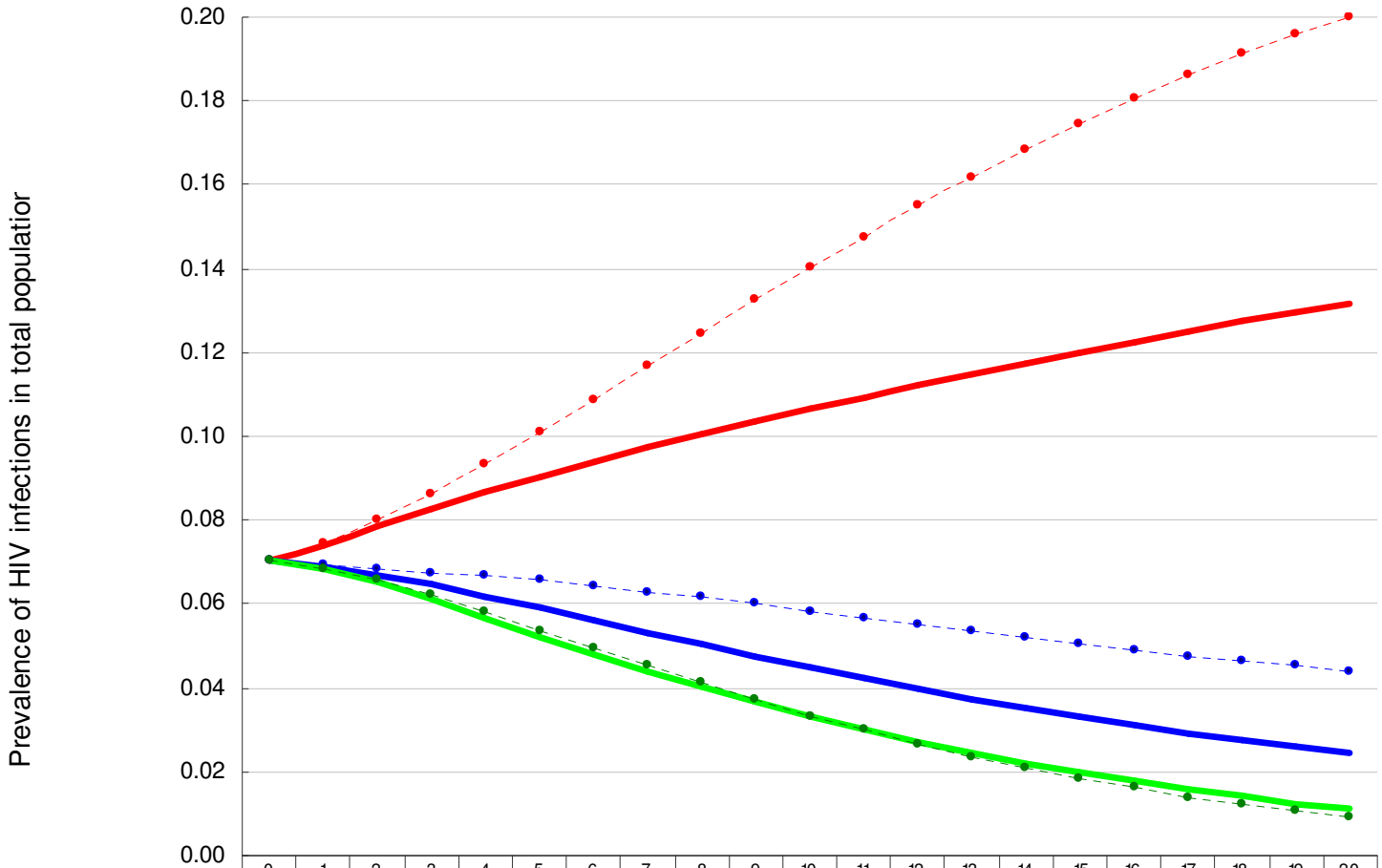
The rural social & economic infrastructure: the rural farm/indutrail enterprice


Rural agricultural/industrial infrastracture
Unemployed HIV positive people
Unemployed drug users
Unmarried participating in farm by individuals
Married participating in farm by family
Married: participating in settlement nearby by individuals (going home regularly)
1 ARV
2 Methadon
3 Comprehensive prevention intervention
Education and vocational skills training
Labor and self-help




Total
prevalence in BuTuo
Years
0.075
0.07
0.065
0.06
0.055
0.05
0.045
2004
2005
2006
2007
2008

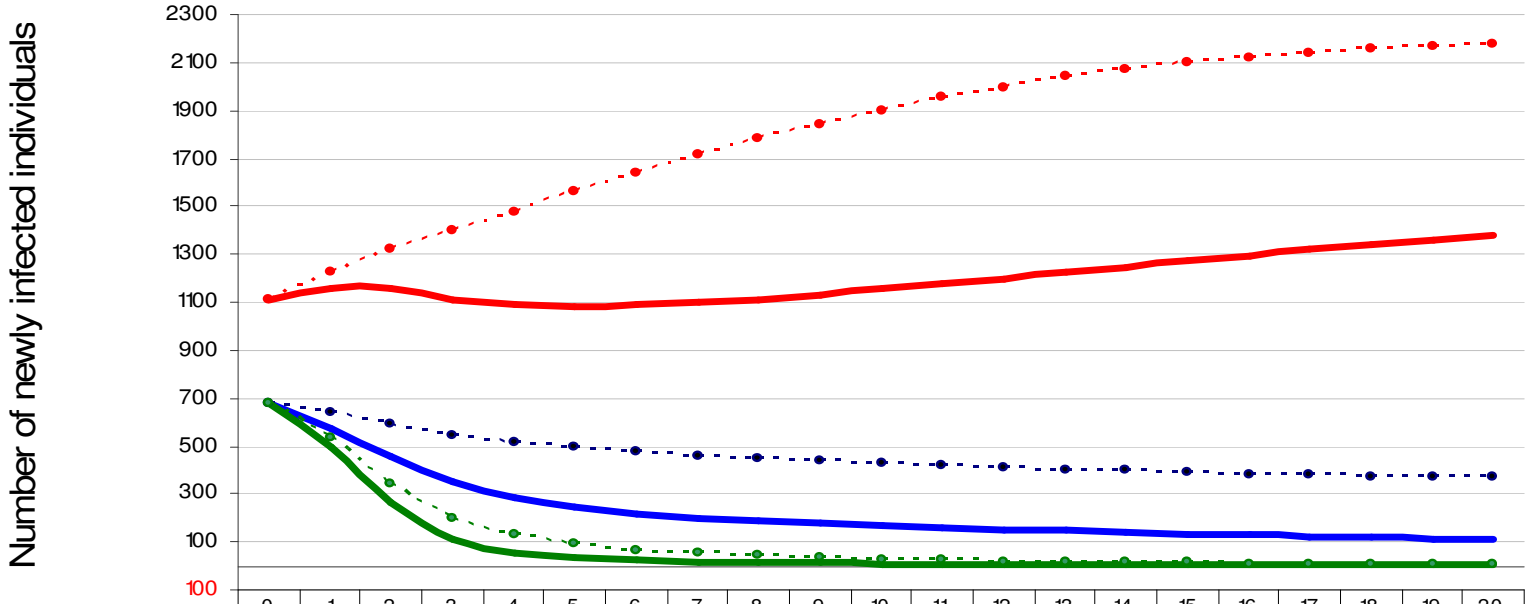
2010-07-27□ Model predictions: Prevalence of HIV infections in total population of Butuo county



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Current management ?complete treatment?	0.07	0.074	0.078	0.083	0.087	0.09	0.094	0.097	0.101	0.104	0.107	0.109	0.112	0.115	0.118	0.12	0.123	0.125	0.127	0.13	0.132
Current management ?partialtreatment?	0.07	0.074	0.08	0.086	0.093	0.101	0.109	0.117	0.125	0.133	0.14	0.148	0.155	0.162	0.169	0.175	0.181	0.186	0.191	0.196	0.2
Enhanced management ?complete treatment?	0.07	0.069	0.067	0.065	0.062	0.059	0.056	0.053	0.05	0.048	0.045	0.042	0.04	0.038	0.035	0.033	0.031	0.029	0.028	0.026	0.024
Enhanced management ?partialtreatment?	0.07	0.069	0.068	0.068	0.067	0.066	0.064	0.063	0.062	0.06	0.058	0.057	0.055	0.054	0.052	0.051	0.049	0.048	0.047	0.045	0.044
Farm ?complete treatment?	0.07	0.068	0.065	0.061	0.057	0.052	0.048	0.044	0.04	0.037	0.033	0.03	0.027	0.025	0.022	0.02	0.018	0.016	0.014	0.013	0.011
Farm ?partialtreatment?	0.07	0.069	0.066	0.062	0.058	0.054	0.049	0.045	0.041	0.037	0.033	0.03	0.027	0.024	0.021	0.018	0.016	0.014	0.012	0.011	0.009

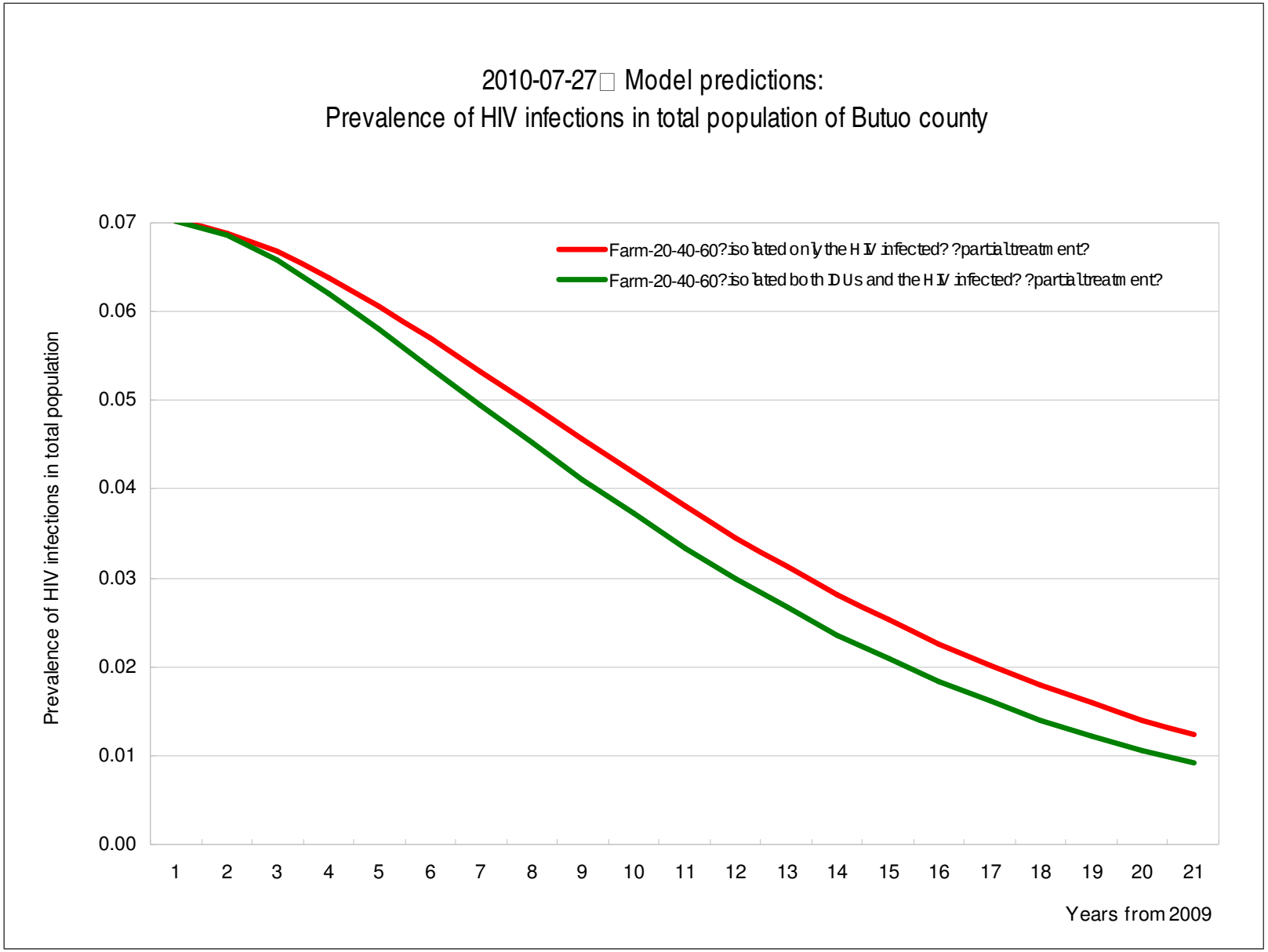
Years from 2009

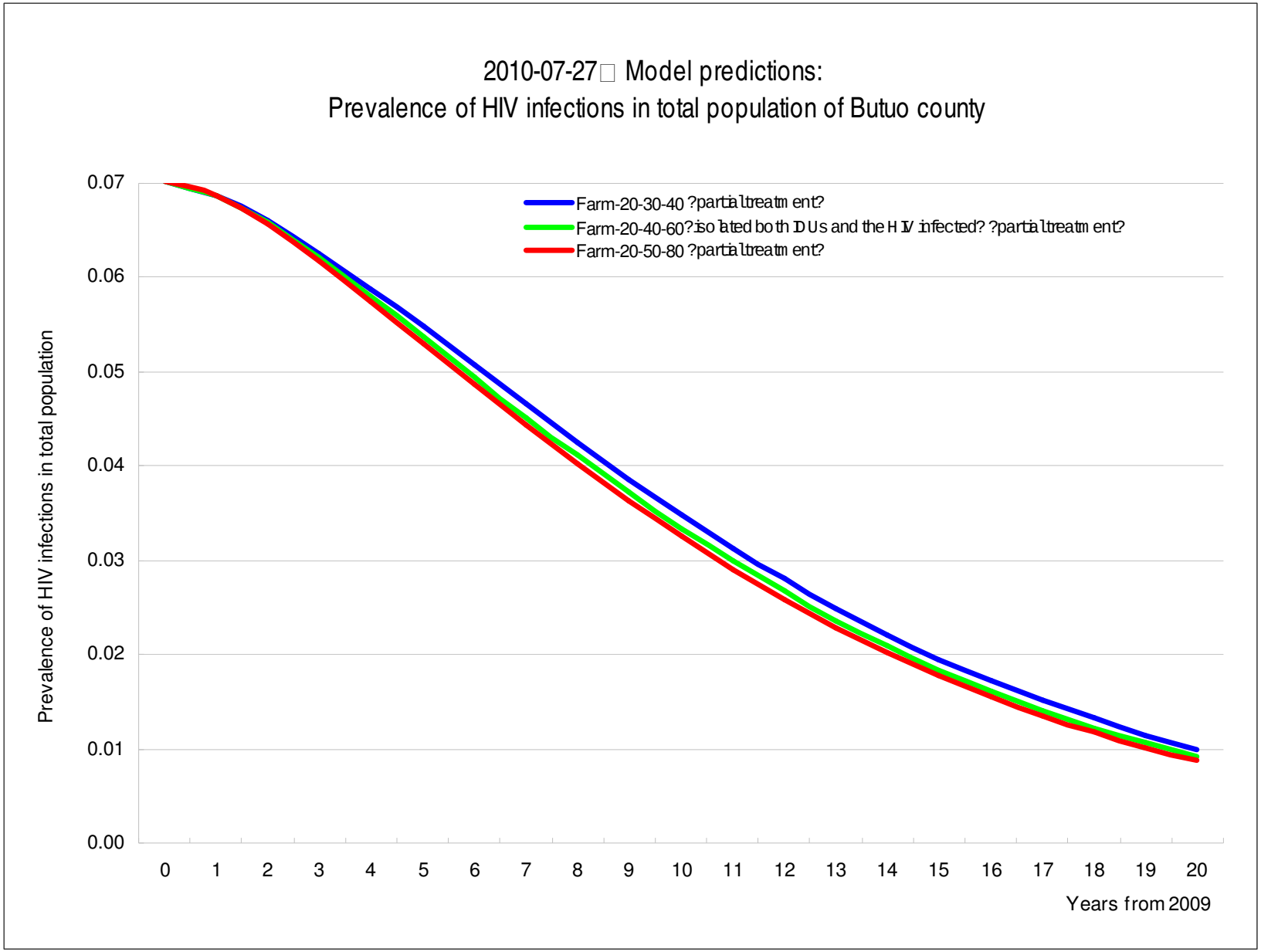
2010-07-27: Model predictions
Number of newly infected individuals in Butuo county



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Current management (complete treatment)	1107	1156	1153	1113	1092	1085	1088	1099	1114	1132	1153	1176	1199	1223	1247	1271	1294	1317	1339	1360	1381
Current management (partial treatment)	1107	1222	1317	1398	1479	1560	1638	1712	1781	1844	1901	1952	1997	2036	2070	2098	2122	2141	2157	2169	2178
Enhanced management (complete treatment)	677	569	453	349	286	246	220	202	189	178	169	161	154	147	141	135	129	124	118	113	108
Enhanced management (partial treatment)	677	636	590	545	514	490	472	458	445	435	425	416	409	402	395	390	384	379	375	371	367
Farm (complete treatment)	676.6	495.0	260.6	111.7	54.7	31.1	20.7	15.6	12.9	11.2	9.9	8.9	8.1	7.3	6.6	6.0	5.4	4.9	4.4	4.0	3.6
Farm (partial treatment)	676.6	529.3	342.9	200.9	129.6	90.1	66.2	50.6	39.7	31.9	26.0	21.4	17.9	15.0	12.7	10.8	9.2	7.9	6.8	5.8	5.0

Years from 2009


2010-07-27□ Model predictions:
Prevalence of HIV infections in total population of Butuo county
Prevalence of HIV infections in total population
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Years from 2009
Farm-20-40-60?isolated only the HIV infected??partial treatment?
Farm-20-40-60?isolated both IDUs and the HIV infected??partial treatment?


2010-07-27□ Model predictions:
Prevalence of HIV infections in total population of Butuo county
Prevalence of HIV infections in total population
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Years from 2009
Farm-20-30-40 ?partial treatment?
Farm-20-40-60?isolated both IDUs and the HIV infected? ?partial treatment?
Farm-20-50-80 ?partial treatment?

Survey on the Willingness to participant in the farm in Butao and three other counties of Liangshan

Time: Mar-2010

Site: 3 counties in Sichuan including Butuo□Jinyang&Xichang

Subjects: uninfected IDUs and HIV infected people

Results:

Acceptance

Willing:77.8%□635/816), not willing: 22.2%□181/816□

Comment on the model

62.9%(Thanks government for the concern)

44.4%(Hope it can be realized soon)

Distance

Close (77.6%); Do not care(14.0%); Far (8.3%)

Whole family move in

Yes (66.9%), No(23.1%)

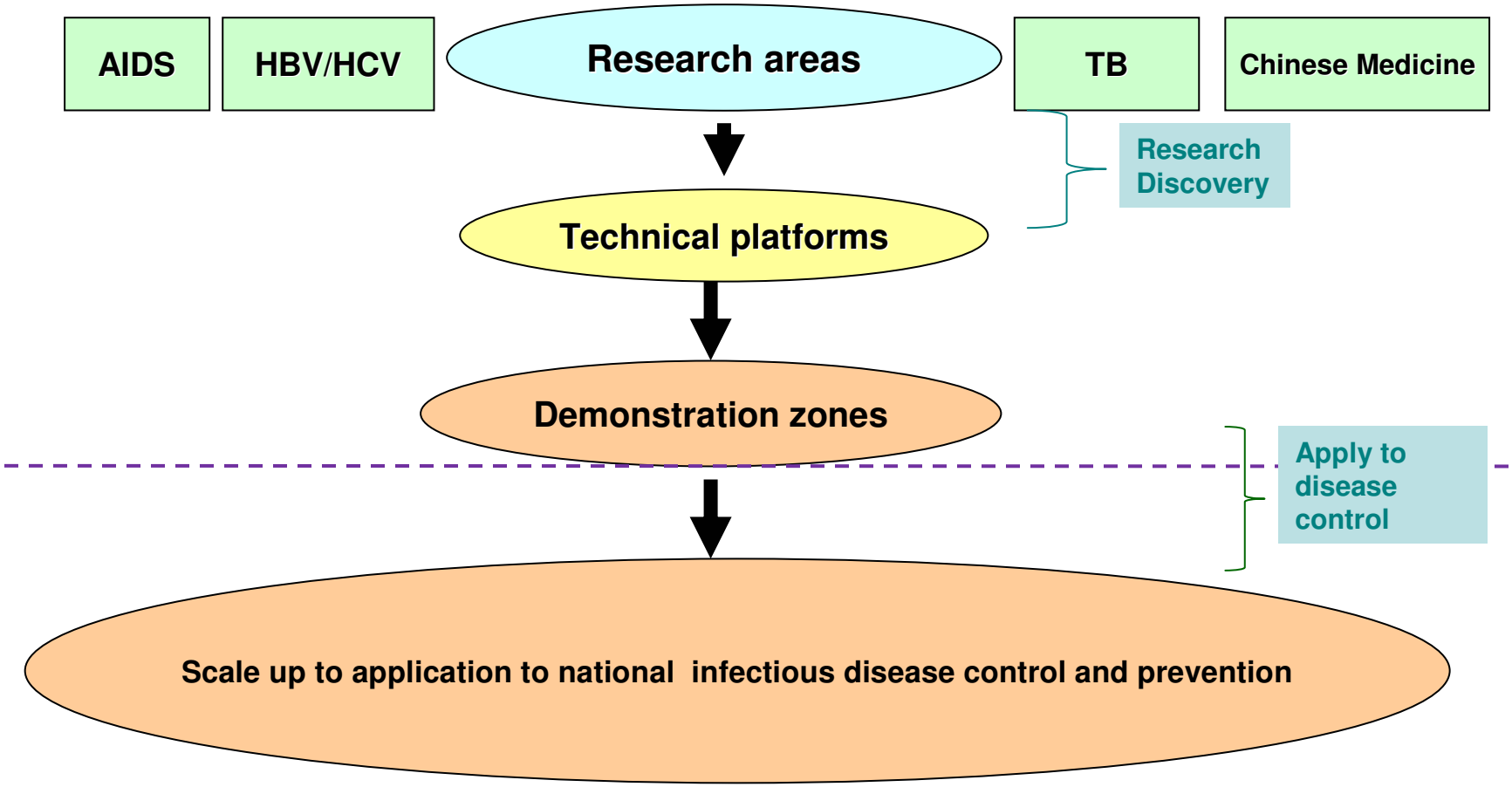
Frequency to return home If close□

within a week□82.2%□, The rate for Return home everyday or once a week are the same at 31.1%□Mode□

If far□Once a month 42.6%□Mode□□Once a week□18.4%□

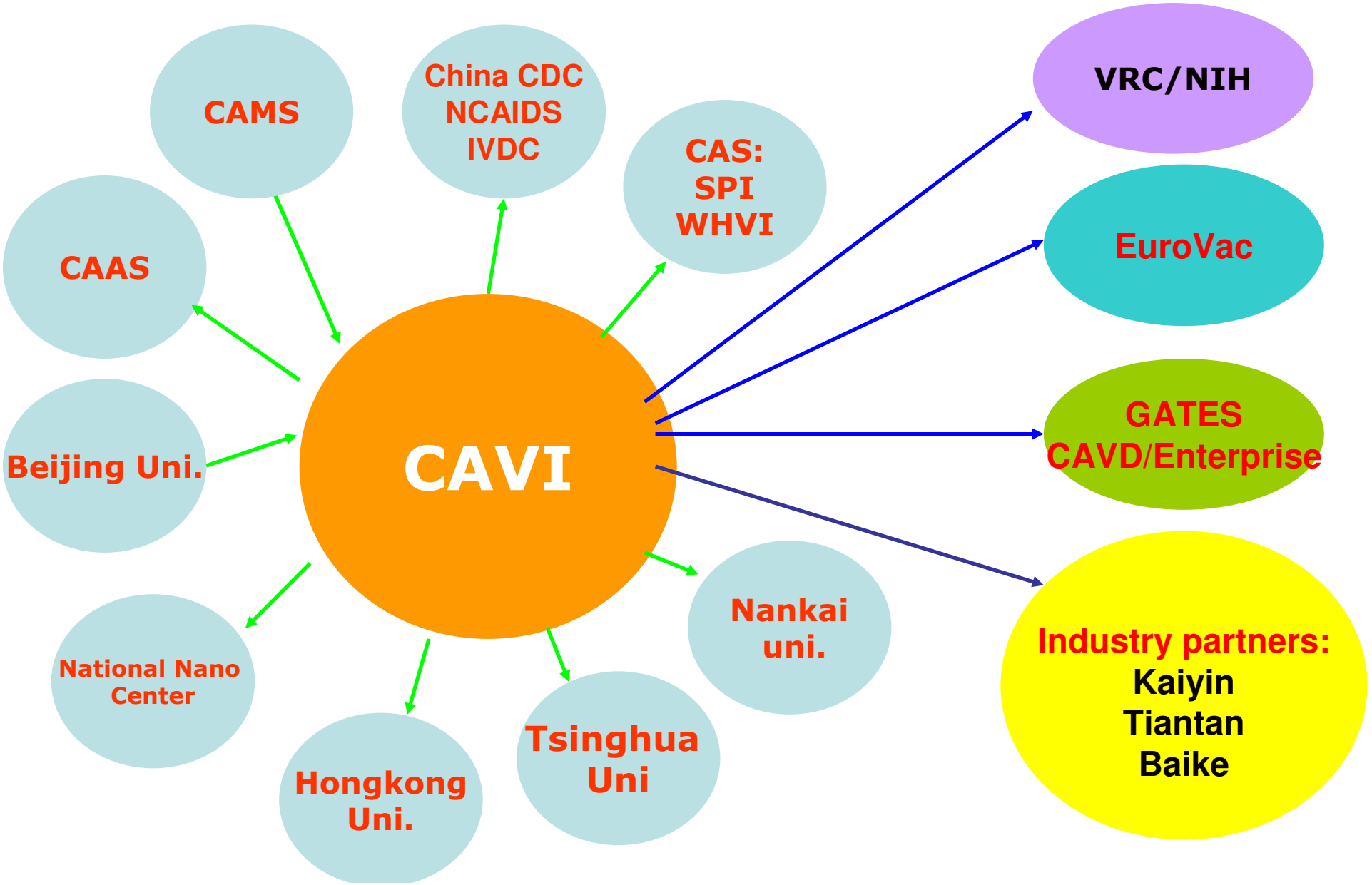

China CIPRA Concluding M
主办单位：中
onsored by: Chinese Center
2008
CROWNE PLAZA
BEIJING
北京国际艺苑皇冠假日酒店
THE PLACE TO MEET
NATIONAL IN

Design and research model of the National Key Infectious Disease Projects



Traditional research ends in discovery and publication of research findings. The national key projects moves on to apply its findings to disease control activities first through trial in demonstration areas and then scale up to the national disease control activities

China AIDS Vaccine Initiative (CAVI)



The IDRC project Scientific Committee

Name	Institution/Department
Yiming Shao, MD, PhD, Prof.	National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention
Jianhong Wu, PhD, Prof.	Canada Research Chair in Applied Mathematics (Tier I), Center for Disease Modeling, York University, Canada
Daqian Li, Prof.	Member of the Chinese Academy of Sciences School of Mathematical Sciences, Fudan University, China
Zhien Ma, Prof.	Department of Applied Mathematics, School of Science, Xi'an Jiaotong University, China
Zhenglai Wu, Prof.	Department of Epidemiology, Peking Union Medical University, China
Xianming Pan, PhD, Prof.	The Key Laboratory of Bioinformatics, Ministry of Education, School of Life Sciences, Tsinghua University, China
Jishou Ruan, Prof.	Department of informatics and probability, College of Mathematics, Nankai University

The investigators of the Public health sector

Name	Institution/Department	Role
Yiming Shao, MD, PhD, Prof.	**National Center for AIDS/STD Control and Prevention, China CDC**	**Project leader**
Yuhua Ruan, PhD, Prof.		Epidemiology and biostatistics
Hui Xing, Prof.		Laboratory research
Xiang He, PhD, associated Prof.		Laboratory research
Wei Shi, Ph.D. Prof.	**Chaoyang Bureau of Health, Beijing, China**	**Field leader and data gathering**
Jianhua Zhang, MD. Prof.	**Liangshan Prefecture CDC, Sichuan Province, China**	**Field leader and data gathering**

The investigators of the mathematic sector

Name	Institution/Department	Role
Daqian Li, Prof.	**Member of the Chinese Academy of Sciences, School of Mathematical Sciences, Fudan University, China**	**Sub-project leader**
Guanghong Ding, Professor		Modeling and management of communicable diseases
Wei Yao, PhD, Associate Prof.		Modeling and management of communicable diseases
Zhien Ma, Prof.	**Department of Applied Mathematics, School of Science, Xi'an Jiaotong University, China**	**Sub-project leader**
Yicang Zhou, PhD, Prof.		Modeling and management of communicable diseases
Yanni Xiao, PhD, Prof.		Modeling and management of communicable diseases
Jie Lou, PhD, Associate Prof.	**Department of Mathematics, Shanghai University**	**Sub-project leader**
Litao Han, PhD, Associate Prof.	**School of Information, Renmin University of China**	**Sub-project leader**
Xianming Pan, PhD, Prof.	**The Key Laboratory of Bioinformatics, Ministry of Education, School of Life Sciences, Tsinghua University, China**	**Sub-project leader**
Jishou Ruan, Prof.	**College of Mathematics, Nankai University**	**Sub-project leader**

The graduate students/Post Doctor participating the project

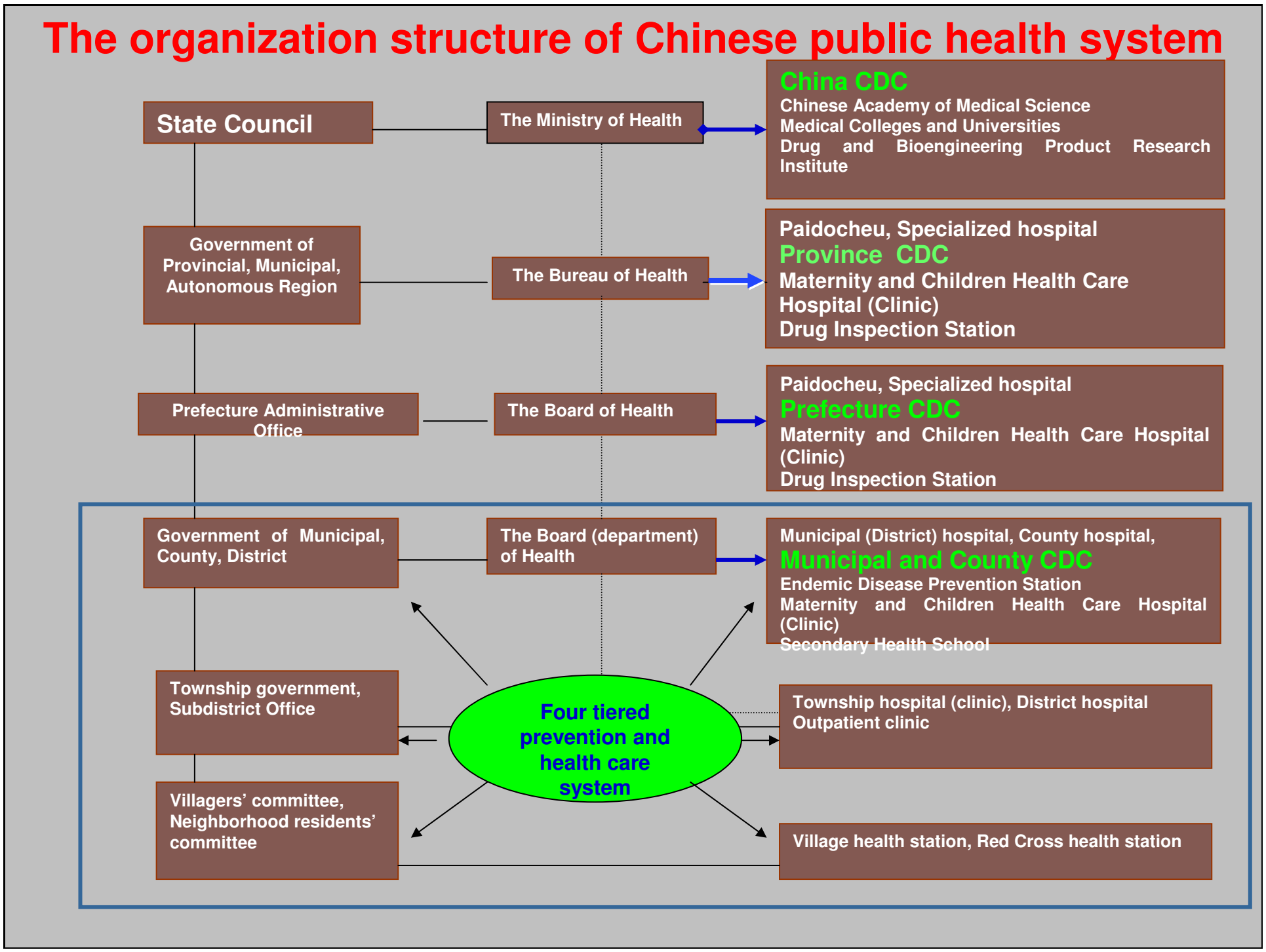
Total number of students:

Master of Science and public health , 11

PhD, 10 persons;

Post doctor, 5 persons.

The organization structure of Chinese public health system



China CDC overseeing China's Public health system can serve as the Nod for Sino-Canada collaboration in infectious disease research and control