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Gender Policy and HIV in China

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Editors

Qiang Ren · Baochang Gu · Xiaoying Zheng · Stephanie Wang · Chris Russell
Co-Editors

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Editors

Dr. Joseph D. Tucker
Massachusetts General Hospital
Division of Infectious Diseases
55 Fruit St., Boston MA 02114
USA
jtucker4@partners.org

Co-Editors

Dr. Qiang Ren
Peking University
Inst. Population Research
5 Yiheyuan Rd., 100871 Beijing
Haidian China, People's Republic
renqiang@pku.edu.cn

Prof. Xiaoying Zheng
Peking University
Inst. Population Research
5 Yiheyuan Rd.
100871 Beijing, Haidian
China, People's Republic
xzheng@pku.edu.cn

Chris Russell
3907 Nagle St.
Bryan TX 77801
USA
lewinski4th@homail.com

Dudley L. Poston
Texas A & M University
Dept. Sociology, 4351 TAMU
College Station
TX 77843-4351
USA
d-poston@tamu.edu

Prof. Baochang Gu
Renmin University of China
Center for Population &
Development Studies
59 Zhongguancun St.
100872 Beijing, Haidian
Science Bldg.
China, People's Republic
bcgu2008@gmail.com

Stephanie Wang
Harvard University
Berkman Center for Internet & Society
23 Everett St.
Cambridge MA 02138
2nd floor
USA
stephwang@post.harvard.edu

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DEDICATION

To:
Richard E. Ewing
who encouraged and supported
the development and writing of this book,
who wrote the Preface for the book,
but who did not live to see the book
published.

Requiescat in Pace!

Preface

In recent years Chinese and American scientists have seen the sphere of research collaboration expand further than ever before. Just as economic and political links have multiplied between the United States and China in keeping with our global influence, valuable new scholarly connections are being forged between our countries. The biennial China-U.S. Relations Conferences in 2003 and 2005 were outstanding examples of cooperative investigations in areas important to the scholars and citizens of both nations. Such cooperation continued in the 2007 conference, titled the George Bush China-U.S. Relations Conference in honor of the 41st U.S. President, who was instrumental in launching the series.

Collaborative "Research Roundtables" are central to the substance and success of the conferences. This book reports on the findings of one such roundtable from the 2005 conference, "Gender Policy and HIV in China." The experts who participated in this roundtable comprised a multi-disciplinary group of U.S. and China scholars, experts, policy makers, and activists, all addressing in various ways the issue of gender inequality as a factor in the spread and control of HIV in China. The North American and Chinese participants pooled their expertise in demography, sociology, public health and law to shed light on this critically important public health issue.

As a scientist and an administrator, I believe there is nothing more vital to research than this kind of collaboration between scholars. In my former capacity as Vice President for Research at Texas A&M University—an institution that is home to many highly talented scientists working in a broad spectrum of research disciplines—I had the privilege of seeing the power of intellectual partnerships in science at close range. I am therefore committed to ensuring Texas A&M's continued participation in the George Bush China-U.S. Relations Conference series. I know that future conferences will yield valuable scientific contributions—just as this roundtable did.

Texas, USA — Richard E. Ewing

Acknowledgements

The idea of a book on gender policy and HIV in China was first introduced in planning for a roundtable session of the same title, which was held at Peking University in November of 2005. The roundtable was part of the "Second China-U.S. Conference on Trade, Diplomacy, and Research" that was organized and sponsored by the Chinese People's Association for Friendship with Foreign Countries, Texas A&M University, the George Bush School of Government and Public Service, and the George Bush Presidential Library Foundation.

The editors of this book were instrumental in varying ways in organizing the "Gender Policy and HIV in China Working Group." Joseph D. Tucker and Baochang Gu first proposed the research focus. Dudley Poston and Xiaoying Zheng then sought support from their colleagues at Texas A&M University and Peking University regarding the establishment of a "Gender Policy and HIV in China" roundtable as one of the roundtables to be included in the "Second China-U.S. Conference on Trade, Diplomacy, and Research." Qiang Ren and Stephanie Wang assisted in all these efforts. The Working Group also obtained funding from the Ford Foundation and from Texas A&M University to enable us to bring several of the chapter authors to the roundtable session in Beijing, to provide for simultaneous translation at the roundtable, and to provide funds to assist in the publication of this book.

We thank Eve Lee and the Ford Foundation in Beijing, China who provided initial funding for the development of our Working Group in 2005, as well as funding for the organization and development of the roundtable. We thank Richard Ewing, Rick Nader, Julie Barker and Ben Crouch, all of Texas A&M University, for their support, encouragement and funding support.

The roundtable session in November of 2005 was aided significantly by the four book editors who attended the Beijing conference (Gu, Poston, Ren, and Zheng), as well as several others who presented their research and/or assisted in the logistics of the roundtable session, and provided support and encouragement; these include Ben Crouch, Sandra Hyde, Crystal Copeland, Carol Walther, Xiushi Yang, Scott Burris, Tianfu Wang, Xiaoying Zheng,

Guomei Xia, and Chenghua Hu. Although not able to attend the conference, the Working Group appreciated advice from Joan Kaufman of Harvard University, Drew Thompson of the Nixon Center, and Dongbao Yu at the World Health Organization. The Working Group benefited greatly from the gender analysis of Dr. Jinling Wang of the Zhejiang Academy of Social Sciences; her work was presented at the conference but was not able to be a part of this book.

We also express thanks to the Peking University Institute of Population Research, especially Chenghua Hu, and the several sociology students who translated papers and other documents in preparation for the conference. We are indebted to Peking University for the working group website server space, and to Wenxin Du of Swarthmore College for website design.

Several months after the close of the conference, Qiang Ren, Joe Tucker and Stephanie Wang took the lead in assembling the edited versions of the research papers presented at the conference. They also asked other scholars to contribute chapters. This resulted in the eleven substantive chapters that now form our book. Tucker, Wang and Poston conducted the first round of editing. Poston then did the final editing of all the chapters. They were then sent back to the chapter authors for correction and review, and returned to Poston. He and his graduate student (Chris Russell) then edited again and finalized all the chapters. Chris Russell so significantly assisted in the editing of the chapters at this stage that we opted to add her as one of the editors of the book.

We also thank Evelien Bakker and Bernadette Deelen of Springer for their encouragement and for working with us so closely in the production of this book.

Of all the persons we have acknowledged, we pay special tribute to the late Richard E. Ewing, who at the time of our Roundtable in Beijing, was the Vice President for Research at Texas A&M University. He represented Texas A&M University at the Conference in Beijing in 2005. He provided funding for our roundtable, and later encouraged us in the writing and production of this book. He also wrote the book's Preface. Sadly, he died before our book was published. We dedicate our book to Dr. Ewing and his memory.

College Station, TX, USA — Dudley L. Poston
Boston, MA, USA — Joseph D. Tucker

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Contributors

Scott Burris is James E. Beasley Professor at Temple University's Beasley School of Law, and Associate Director of the Center for Law and Public Health at Georgetown and Johns Hopkins Universities. His work focuses on the effect of laws and legal practices on health (scott.burris@temple.edu).

Rachel Traut Cortes is a doctoral student in the Department of Sociology at Texas A&M University. She holds an MS degree in sociology and demography from Texas A&M University. Her dissertation research deals with bio-social aspects and issues of health. Her prior research focused on socioeconomic status, industrial accidents and mortality.

D.W. Choy is a Visiting Scholar in the School of Law at the Chinese University of Hong Kong. Her research interests include criminal justice and human rights in China and Hong Kong.

Jack DeWaard is a doctoral student in the Department of Sociology, and an NICHD Trainee with the Center for Demography and Ecology, at the University of Wisconsin Madison. His research focuses on the measurement and social consequences of international migration in developed countries.

Avraham Y. Ebenstein is a Robert Woods Johnson Scholar in Health Policy at Harvard University. His fields include labor economics, demography and family economics. His research focuses on the impacts of fertility control policy in China on the sex ratio. Also, he has investigated policies to address the "missing girls" phenomenon in Asia (aebenste@rwj.harvard.edu).

The late **Richard E. Ewing** was Distinguished Professor of Mathematics at Texas A&M University and was the Vice President for Research at Texas A&M. He conducted research in mathematics and computation sciences and had extensive experience in multi-million dollar government and industrial partnerships. He had traveled to China 36 times since 1986 for academic and research purposes. He listed more than 300 scientific publications, served on

the editorial boards of 12 major national and international scientific journals, and held an honorary guest professorship from Shandong University.

Hualing Fu is Garvey Schubert Barer Visiting Professor, School of Law; and Associate Professor & Director, Center for Comparative and Public Law, The University of Washington. His research interests include criminal justice studies, and dispute resolution and legal relations between Hong Kong and mainland China (hlfu@hkucc.hku.hk).

Ginny Garcia is a doctoral student in the Department of Sociology at Texas A&M University. She holds an MS degree in sociology and demography from Texas A&M University. Her dissertation research deals with immigration status and poverty among Mexican Americans. Her prior research studied sexually transmitted infections in China and the U.S. (ginny.garcia@utsa.edu).

Baochang Gu is Professor of Demography, Center for Population and Development Studies, Remin University of China. He holds Adjunct Professor positions at Peking University, East China Normal University, Fuzhou University, and Kunming Medical College. He is a member of WHO's Specialist Panel for Social Science and Operation Research on Reproductive Health, and a member of the IUSSP Panel on low fertility. He is a member of the Population Advisory Committee of China's National Population and Family Planning Commission (NPFPC), a member of the Specialist Panel on Reproductive Health, Ministry of Health (MOH), and a standing Council member of the China Population Association.

Sara Hertog is an Associate Population Affairs Officer with the Population Division of the United Nations Department of Economic and Social Affairs. Her work focuses on modeling HIV/AIDS epidemic dynamics, with particular attention to gender-specific HIV risks.

Yan Hong is an Assistant Professor of Social and Behavioral Health in the School of Rural Public Health at the Texas A&M Health Science Center. Her research focuses on behavioral interventions for HIV/STD. She received her Ph.D. from the Johns Hopkins University Bloomberg School of Public Health (yhong@srph.tamhsc.edu).

Ethan Jennings is a graduate student in the Population Studies Center of the University of Pennsylvania. His research topics include marriage and fertility policy, migration, and political economy of Northeast Asia.

Wolfgang Lutz is the leader of the World Population Program at IIASA, and director of the Vienna Institute of Demography of Austria Academy of Science. He has worked on family demography, fertility analysis, population projection, and the interaction between population and environment.

Lenore Manderson is Professor at the Key Center for Women's Health of the University of Melbourne. Her work is now focusing on research and training dealing with women and related issues.

M. Giovanna Merli is an Associate Professor of Public Policy Studies and Sociology at Duke University. She specializes in the demography of China and Vietnam, health and population policy in developing countries, and HIV/AIDS epidemiology and modeling. She has designed and coordinated large-scale surveys of sexual behavior and sexual networks among urban residents, rural migrants and female sex workers in Shanghai.

Dudley L. Poston, Jr. is Professor of Sociology, the Director of Asian Studies, and the George T. and Gladys H. Abell Endowed Professor of Liberal Arts at Texas A&M University. He holds Adjunct Professorships at Renmin University, Fuzhou University, and Nanjing Normal University. His research focuses on the demography of China and South Korea, the demography of homosexuality, and the social demography of gender (d-poston@tamu.edu).

Qiang Ren is Associate Professor of Demography at the Institute of Population Research at Peking University. He studies demographic transition, environmental population health, and social change-marriage-fertility nexus in China. He teaches courses on economics of population and environment (renqiang@pku.edu.cn).

Chris Russell is a doctoral student in the Department of Sociology at Texas A&M University. She holds an MS degree in sociology and demography from Texas A&M University. Her dissertation research deals with manufactured longevity. Her prior research studied the relation between religion and mortality.

Sergei Scherbov is a head of the Research Group on Population Dynamics and Forecasting at the Vienna Institute of Demography of Austria Academy of Science, and a research scholar at IIASA's World Population Program. He has worked on demographic modeling, population projections, demographic software, and data analysis.

Edmund Settle is the program officer of the United Nations Development Program (UNDP), China Office. He is engaged in interventions, advocacy and program management to at risk populations for HIV/AIDS control and prevention.

Feng Tian is a graduate student in the Department of Sociology, and the Center for Demography and Ecology, at the University of Wisconsin, Madison. Her research interests center on population and health in China, especially health inequalities and the behavioral determinants of sexually transmitted diseases.

Joseph D. Tucker is an Infectious Disease Fellow at Massachusetts General Hospital. His work has focused on the prevention of STD/HIV among marginalized populations in China. His research has also looked at how China's emerging surplus of men will impact future STD/HIV transmission. He is now investigating the administrative and legal regulations governing China's sex industry (jtucker4@partners.org).

Ruotao Wang is a Research Fellow at the National Center for AIDS Control and Prevention, Chinese Center for Diseases Control and Prevention. His research focuses on the law, policy, and ethics studies and training with regard to HIV/AIDS prevention and control.

Stephanie Wang is a resident fellow at the Berkman Center for Internet and Society at Harvard Law School. She has conducted human rights advocacy as well as research and analysis on topics in building Chinese rule of law, the rights of people with HIV/AIDS in China, and the evolving concept of discrimination in Chinese society. She graduated from the University of California, Los Angeles with a BA in History and Asian American Studies, and received her JD from Harvard Law School.

Tianfu Wang is Associate Professor of Sociology at Tsinghua University in Beijing. His main research interests deal with social inequality, the family and marriage, and statistical methods. He has studied the sexual behaviors of China's urban population, domestic violence and spousal relationship in urban Chinese households, and income distribution in China.

Guomei Xia is Professor and Director of the Center for HIV/AIDS Social Policy Studies at the Shanghai Academy of Social Sciences. Her research focuses on HIV/AIDS social policies and marginalized populations. She has directed various research projects sponsored by UNDP, the Ford Foundation, Oxfam Hong Kong, and the U.S. State Department. Her work focuses on dealing with female migrants' family planning, drug elimination, HIV/AIDS laws and policies, and the social prevention of HIV/AIDS in China.

Xiushi Yang is Professor of Sociology and Criminal Justice at Old Dominion University. His teaching and research areas include social demography, health behavior, migration and urbanization, and applied statistics, international political economy, international development, globalization, and Latin American policies (xyang@odu.edu).

Dongbao Yu is a research fellow at the National Center for AIDS Control and Prevention, Chinese Center for Diseases Control and Prevention. His research focuses on policy studies of HIV/AIDS prevention, and the monitoring and evaluation of national AIDS programs (yud@who.int).

Li Zhang is Assistant Professor of Sociology at the L. Douglas Wilder School of Government and Public Affairs,Virginia Commonwealth University. She holds a Ph.D. degree in sociology and demography from Texas A&M University. She teaches classes in demography, and urban sociology. Her current research focuses on male fertility and internal migration in China.

Xiaoying Zheng is Professor of Population Health at the Institute of Population Research at Peking University. She studies reproductive health, the relationships among population, environment and health, and health economics in China. She has served as the Principal Investigator on several research projects, particularly one dealing with Population-Based Studies of Genetic and Environmental Determinants of Birth Defect Prevention in China.

Introduction

Joseph D. Tucker and Dudley L. Poston

China's concentrated HIV epidemic is on the brink of becoming a generalized one in several regions of the country. Social factors relating to gender and gender inequality exacerbate the spread of HIV and sexually transmitted infections (STI) in China. A better understanding of the proximate social determinants of HIV related to gender is crucial for effectively curbing HIV and other STIs in China. Aspects of China's governance, including administrative procedures, the developing legal system, social institutions, and the public health infrastructure, are all instrumental in shaping strategies and responses to HIV. Although an international consensus suggests that women who are more economically and socially vulnerable are also at greater risk of HIV infection, few initiatives have focused on discrete areas where achievable and sustainable policy measures could be meaningfully linked to the public health response. Furthermore, there has been a dearth of sociological and public health assessments and responses to the specific health needs of China's emerging surplus men.

The expansion of sexually transmitted HIV in the People's Republic of China highlights the need for prevention and treatment focused on high risk sexual groups. The UNAIDS report released in January 2006 estimated that 49% of new 2005 HIV infections were from sexual transmission, and that over 40% of those living with HIV in China were infected through sex. Commercial sex worker HIV prevalence has jumped from 0.02% in 1996 to 0.93% in 2004 (MOH/UNAIDS/WHO 2006). A greater than 1% seroprevalence of HIV in some areas suggests that the epidemic may be generalized, moving beyond high risk groups to low risk individuals.

Moving beyond a purely biomedical approach to HIV/AIDS requires inter-disciplinary work that links together various groups involved in the

J.D. Tucker (✉)
Division of Infectious Diseases at Massachusetts General Hospital, Boston, MA, USA
e-mail: jtucker4@partners.org

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response to HIV. In 2005 a small group of U.S. and China scholars, experts, and activists came together in Beijing to consider how gender inequality affects the spread and control of HIV in China. The goals of the working group included developing a web page now available through the Peking University Institute of Population Research website, writing and publishing this book, and informing Chinese policy makers.

China's evolving population dynamics are fundamental for understanding the social context of HIV in China. In Chapter 1, Ren, Zheng, Lutz and Scherbov explore how population dynamics mediate HIV/AIDS in China. They review three population variables around which significant empirical uncertainty exists, namely, fertility rates, sex ratios at birth, and age structures. An analysis of the age structures and demographics of those living with HIV in China over time shows that younger (20–39 years old) men represent the majority of known HIV cases, but that the percentage of HIV positive women has been increasing. Since the advent of ultrasound selective abortion in the 1980s, a large number of boys have been born in China that could impact future STI/HIV transmission. In order to better quantify the potential impact of the increasing numbers of young men on HIV spread in China, Ren and Zheng explore several scenarios which incorporate different sexual mixing patterns and social changes (Merli and Hertog 2007). Their model suggests that population dynamics could have a substantial influence on sexual dynamics and heterosexual HIV spread in China.

In Chapter 2 Merli, DeWaard, Tian and Hertog explore the potential implications of male and female migration in China for the spread of HIV; they use a mathematical compartmental model of the spread of HIV. Although mathematical simulation models have been shown to be relatively unsuccessful at accurately reproducing HIV/AIDS epidemics and do not do well in forecasting the course of the Chinese epidemic, the authors show that they are useful for understanding the temporal dynamics of the spread of HIV in a population and the dynamic relationship between structural, population, and individual level factors in fueling the progression of HIV. Merli and her colleagues use the model to examine the role of migration in changing the dynamics of HIV transmission by altering population patterns of exposure to the risk of infection and HIV prevalence rates among population subgroups and by creating the conditions that lead individuals to acquire infection.

In Chapters 3 and 4, the number and characteristics of China's projected surplus group of young men are sketched. According to Poston and Zhang's demographic estimates presented in Chapter 3, the subpopulation of young unmarried men will number around 32 million, coming of age in the next ten years. Sketching their characteristics is more challenging, but using

historical examples from China reveals that they may be uneducated, migratory, and unemployed (Tucker et al. 2005). The large number of sex workers in China may well expand in order to meet the new sexual needs of this demographic group, especially in areas with higher sex ratios or areas where surplus men migrate.

Chapter 4 by Ebenstein and Jennings explores the changing demographics of China's population in the context of sexually transmitted diseases and HIV transmission. In the setting of enforced low fertility and male preference, China has far more young men than women. A subset of young, poor men who fail to marry may migrate to urban areas in search of wives and jobs. In urban areas these "bare branches" (the unmarried men) could have an increased sexual risk compared to their rural counterparts, increasing the risk of STIs and HIV. The authors propose several models of the HIV epidemic in China based on various estimates of the sex ratio at birth. Their analysis suggests that regardless of rapid changes in the sex ratios at birth, China will face a large surplus of men whose sexual behaviors could have a significant impact on the STI/HIV epidemics of China.

Chapters 5 through 8 focus on HIV/STD risk in China for both males and females. Using data sets from Yunnan Province, Yang and Xia in Chapter 5 explain how the increased sexual risk of commercial sex workers derives from their migratory behaviors. Gender inequities are exacerbated by migration from rural to urban areas in China, making the sexual behaviors of temporary female migrants more risky after arriving in cities. Poverty, gender segregation, and lack of family/social resources which differentially impact women are thought to be some of the chief mechanisms underlying this relationship. Behavioral skills and self-efficacy training among temporary female migrants is needed in order to prevent the spread of STDs/HIV among these populations.

Understanding the medical and public health needs of emerging surplus men is complicated by a paucity of studies and government surveillance. Many of these issues are discussed in Chapter 6 by Tucker and Wang. While antenatal clinic and commercial sex worker STI and HIV studies are part of the government's routine screening procedures, only devoted STI clinics appreciate the male heterosexual risk of China. Nevertheless, there have been several small studies showing that groups of young male migrants in China are at increased risk of STI/HIV (He et al. 2006; Wang et al. 2006). Tailoring interventions and STI/HIV treatment for this group will be challenging because of their low literacy, transience, and poverty. The recent HIV response has also focused more on the male component of sexual HIV transmission, as demonstrated by special programs in the Global

Fund Round Five application and the epidemiologic investigation of the NIH CIPRA program.

Chapter 7 by Yan Hong explores the potential for HIV structural interventions in China. Instead of focusing on individual behavior change, structural models of change rely on changing the matrix of social, economic, and cultural conditions that predispose a community to HIV/STI. While there are inherent problems with defining and measuring the extent of social change attributed to a structural intervention, such programs should hold great promise in the context of China's top-down oriented public health infrastructure. Drawing on several international examples, structural HIV prevention efforts are further defined and the limitations explained. Hong shows that legislative and policy reform that accelerates social change is one example of how structural interventions could help curb China's STI and HIV epidemics.

In Chapter 8, Garcia, Cortes and Poston note that STIs are a problem of enormous import in China and the world today and continue to spread at alarming rates. Indeed sexually transmitted infections are gaining a foothold in China's heterosexual population, who is at risk of infection for several reasons. These include the spread of infection via commercial sex workers in coastal provinces into mainland China by educated business men, as well as the growing number of surplus boys. Garcia and her colleagues estimate several statistical models predicting the log odds of the urine of the Chinese respondents showing the presence of an STI, of whether they responded to having had a bacterial infection in the last year, and of whether they indicated having ever had an STI.

In addition to public health interventions, legal reform (related to HIV specifically and high risk groups generally) has great capacity to catalyze HIV policy change. Legal and policy perspectives on gender and HIV in China are the focus of Chapters 9, 10, and 11. Burris and Xia (Chapter 9) show how the law influences the risk environment for commercial sex workers in China. Instead of decreasing the sexual risk of individual women, this social epidemiologic argument holds that deconstructing the risk environment should be central to HIV control. Understanding the ecological determinants and structural basis for the vulnerability of commercial sex workers is crucial for forming an effective legal and social policy response. The State Council's HIV law released in March 2006 establishes a mandate for this legal work, but changing how the law is implemented in China requires broader measures; these include the training of police officers about HIV and sexual rights, and Public Security Bureau cooperation with public health and medical centers.

In Chapter 10, Fu and Choy describe the *laojiao* (re-education) administrative system that detains tens of thousands of commercial sex workers each

year in China. Their chapter explores the legal framework, police response, and administrative detention structures that affect detention of commercial sex workers in China. The re-education system has a long history in China, and has dramatically changed in response to market reforms during the last twenty years. Understanding the administrative detention system for sex workers in China is complicated by regional variation and different interpretations of the law, but it is important for providing necessary resources to commercial sex workers. Although there are many gaps in our understanding of what happens to detained women, Fu and Choy provide valuable sources and descriptions of police structures and legal foundations.

In Chapter 11, Yu, Settle, Wang, and Manderson further explore the social and legal context of sex work in China, focusing on successful programs and how sex work can be decriminalized and de-stigmatized. Their analysis suggests that condom use programs directed to sex workers mandate cooperation with the police and Public Security Bureau. The "hard strike" campaigns of the 1990s are unlikely to be useful for HIV prevention and treatment, and may well thwart effective HIV prevention efforts. In order to identify and help those in the greatest need of HIV prevention resources, local police need to have better relations with commercial sex workers.

As the male surplus of China continues to grow, the government has incentivized having single daughters. Guangdong families that have a single daughter will receive money directly after having the daughter, and other areas of China have a policy of giving 600 RMB per year per person after the age of 60 years old. Hainan Province has worked in cooperation with the United Nations Population Fund to create structural incentives for having single daughters (Ryan 2005). However, many of the same social forces supporting son preference – gender inequality, poverty, and traditional cultural preferences – still exist today.

Chinese HIV policies that decrease the risk environment of commercial sex tend to apply a gender balanced mechanism that incorporates heterosexual male risk, and work to acknowledge the sexual rights of women are urgently needed. Preventing the sexual transmission of HIV in China represents a great challenge requiring further social science study and action. It is hoped that this book is a step in that direction.

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Part I
Chinese Population Dynamics and HIV/STD Risk

Chapter 1
Uncertain Population Dynamics and HIV/AIDS in China

Qiang Ren, Xiaoying Zheng, Wolfgang Lutz and Sergei Scherbov

Introduction

It is well known that China accounts for one-fifth of the population of the world, making China's population trends directly relevant for global population dynamics. In this context, it is surprising how much uncertainty exists about current demographic conditions in the world's largest country. Recently published estimates of China's total fertility rate for around the year 2000 range from 1.22 (NSB, 2002a,b) to 2.3 (Liang, 2003) – a discrepancy of 1.1 children per woman. There are more than 30 estimates of the fertility levels. Though most scholars and organizations consistently agree that fertility in China is below the replacement level, there are also scholars who believe that fertility in China falls below the lowest levels, and is at a par with fertility in some of the southern European countries (see Ren, 2005; Zhang and Zhao, 2006). There are probably few countries in the world where estimates about current fertility rates differ by such a large factor.

Of course, the uncertainty with regard to fertility is not the only demographic data question in China today; there is also not a consensus concerning the sex ratio at birth. Estimates for the sex ratio at birth range from 113 (Wang, 2003) to 123 (Ma, 2004). This is a remarkable difference that will significantly influence the future ratio of adult men to women in the population, and therefore its population dynamics (see the chapter in this volume by Poston and Zhang for more discussion).

Uncertainty also exists around the size of the youngest age group in China. The size of the age group 0–4 in 2000 is given as 71 million in the 2000 census, but estimated by others to be 86 million (Zhang et al.,

Q. Ren (✉)
Institute of Population Research at Peking University, Beijing, PRC
e-mail: renqiang@pku.edu.cn

J.D. Tucker, D.L. Poston (eds.), *Gender Policy and HIV in China*, The Springer Series on Demographic Methods and Population Analysis 22, DOI 10.1007/978-1-4020-9900-7_2,

2004). The difference of 15 million in just one age group is not only daunting in absolute number, but also represents a sizeable relative difference of 20%.

In considering the uncertainty of current and future demographic variables, we must reconsider other relevant and uncertain events because they too affect the future population statistics as well as trends in population structure. Trends in HIV/AIDS present very important questions that need to be addressed. Compared with the global spread of HIV/AIDS, the Chinese HIV epidemic is still focused in high risk groups. Since the Chinese HIV epidemic has not become generalized, there are important opportunities for heterosexual HIV prevention. We should not merely use the prevalence rate of HIV/AIDS to evaluate the potential for becoming generalized, but need to recognize the true risk of HIV/AIDS in the process of a substantial demographic transition.

From a demographic perspective, the patterns in the numbers and dissemination of the HIV/AIDS population will be heavily influenced by uncertain population dynamics; these include not only rural-urban migration and thus heterosexual behavior, but also the size of the future adult population (with respect especially to age and sex) that will be determined by shifting demographic conditions. HIV/AIDS has been the subject of much concern; and the argument that an HIV/AIDS epidemic may soon spread to the general population via heterosexual transmission in China is not without merit (Merli et al., 2004).

Before we discuss HIV/AIDS in China, this chapter will first discuss the future trends and the options for systematically studying quantitative information about this uncertainty in population estimates and projections as they are the basic information for inferring the Chinese HIV/AIDS situation in the future. We then carry out probabilistic projections which cover both the uncertainty of current conditions and future trends. The third part of our analysis will discuss the population-based HIV/AIDS situation. The final sections will present and discuss the results and conclusions. We hope to provide insight about HIV/AIDS in China based on possible demographic changes.

Current Fertility Level

Table 1.1 provides a list of more than 30 estimates of China's total fertility rate (TFR) that have been published since 2000. The sheer number of different values estimated for a situation in which only one number can be true gives an indication of the uncertainty as well as the controversy surrounding current level of fertility in China. These published estimates of the

Table 1.1 Different estimates of the total fertility rate for China in 2000

Source	TFR	Notes
Wang (2003)	1.718[(1)]; 1.703[(2)]; 1.723[(3)]	[(1)] Uncorrected fertility pattern: calculation directly by age-specific fertility rate of 2000 census without considering the underreporting of children; [(2)] Adjustment by backfilling the underreporting of children: to keep age-parity-specific rate of 2000 census stable, re-estimate the fertility pattern after backfilling those children who are underreported in the census; [(3)] Adjustment by fertility pattern of the second child: due to the serious underreporting of the second child, re-estimate the fertility pattern of the second child by backfilling those children who are underreported in the census.
Liang (2003)	2.3	
Yuan et al. (2003)	1.71[(1)]; 1.78[(2)]; 1.63[(3)]	[(1)] Calculation by National Statistical Yearbook; [(2)] Statistics of State Family Planning Committee; [(3)] Using the surviving method for children aged 0–10 years in 2000, the number of births has been estimated for each year assuming a life expectancy in 1990 of 67.767 for males and 71.15 for females, and in 2000 of 69.54 for males and 73.01 for females.
CPIC (2003)	1.80	
NSB (2002a,b)	1.22	
Zhang et al. (2004)	1.63[(1)]; 2.0[(2)]	[(1)] adjustment by the underreporting rate of 18.94% for 0–9 years old; [(2)] assuming the number of population aged 10–19 years old is correct, the underreporting rate for children aged 0–9 years old is 13.68%, the adjusted TFR is 2.0 assuming the underreporting rate is the same between 1990 and 2000.
Zhai (2003)	1.8	
Guo (2003, 2004)	1.58	Calculation by author eliminating the effect of tempo.
Zhang (2003, 2004)	$1.5 \sim 1.6$	
Retherford et al. (2004)	1.36[(1)]; 1.38[(2)]; 1.58[(3)]	[(1)] Calculation by own-children method; [(2)] Calculation by birth history reconstruction; [(3)] Adjustment by a factor from the comparison between the 1990 and 2000 censuses.

Table 1.1 (continued)

Source	TFR	Notes
Ding (2003)	1.35	
Guo (2004)	1.23[(1)]; 1.3[(2)]	[(1)] Calculation by the method of children-mother match with 2000 census, 1% microdata; [(2)] Author's opinion based on actual reflected TFR from national survey and census.
SFPC (2002)	1.45	
Cui and Zhang (2002)	1.3	
Yu (2002)	1.55[(1)]; 1.32[(2)]; 1.6–1.8[(3)]	[(1)] Estimated by the number of population from 2000 census data; [(2)] Estimated by the number of children from 2000 census data; [(3)] Estimated by author.
ESCAP (2002)	1.8	
U.S. Bureau of the Census (2004)	1.7	
Zhang and Cui (2003)	1.38[(1)]; 1.63[(2)]; 2.0[(3)]; 1.8[(4)]	[(1)] Calculation using only the census long form; [(2)] Lower limit value; [(3)] Upper limit value; [(4)] Author's estimated round value.
SFPC (2001)	1.8	

total fertility rate in China in 2000 range from 1.22 (NSB, 2002a,b) to 2.3 (Liang, 2003). All the estimates use various rationales and methods. Here is a summary of these results: (1) Official publications place the TFRs at about 1.7–1.8. (2) Most of the estimated TFRs lower than 1.5 are directly based on data from surveys and censuses. (3) Weighted TFRs are around 1.6–1.7 and have been adjusted through indirect demographic methods or via accounting for the underreporting of births. (4) Some scholars believe that the TFR should be above 2.0 owing to their personal observations and field study.

Even though we have a range of TFR values, we can judge the trend by systematically comparing panel data. To provide a temporal perspective, Table 1.2 gives times series data for the TFR since the mid-1980s from five independent sources. These show considerable variation, but for the period since the early 1990s, all give values below 1.5. There is widespread agreement among experts that there is an underreporting of births, particularly in the years immediately preceding the census/survey. The critical question is what degree of underreporting is being assumed, and accordingly, what correction factors should be applied? This is where the alternative estimates for the TFR around 2000 differ.

Table 1.2 Total fertility rate for China since 1990

Year	NSB[1]	1992 survey[2]	1997 survey[3]	2001 survey[4]	2000 census[5]
1986	2.42	2.46	2.59		
1987	2.59	2.57	2.66		
1988	2.31	2.28	2.41		
1989	2.25	2.24	2.40		
1990	2.17	2.04	2.29	2.29	2.37
1991	2.01	1.66	1.75	1.77	1.80
1992	1.86	1.47	1.57	1.59	1.68
1993	1.71		1.51	1.52	1.57
1994	1.56		1.32	1.41	1.47
1995	1.43		1.33	1.45	1.48
1996	1.55		1.35	1.36	1.36
1997	1.46			1.27	1.31
1998	1.46			1.34	1.31
1999	1.45			1.29	1.23
2000				1.45	1.23

[1] NSB (1988–2000); [2] Yu and Yuan (1996); [3] Guo (2000); [4] Ding (2003); [5] Guo (2004).

The rationales and methods of the individual estimates are well documented in the specific studies. We feel the most confident about the estimate of the Retherford et al. (2004) estimate for the TFR of around 1.5, using the own-children method. This is the median value of a normal distribution which covers 95% of the TFR range between 1.2 and 1.8. This value of 1.5 has the broadest consensus among the experts.

Sex Ratio at Birth

Tables 1.3, 1.4, and 1.5 provide different estimates of the sex ratio at birth (SRB) in 2000, another highly uncertain and very controversial demographic variable in China. Table 1.3 indicates that the problem of biased sex ratios at birth is particularly strong for births at higher parities. Table 1.4 shows the temporal trend of biased SRBs, and, moreover, that the unbalanced SRB has become more serious since the mid-1980s. Specifically the SRB reached 111 in 1985, and has been above 120 since 1997. This is a very serious social issue drawing a lot of public attention. Table 1.5 provides seven different estimates of the sex ratio at birth in 2000 that range from 113 to 123. We evaluate these data assuming a normal distribution with 95% between 113 and 123. Over time we assume that by 2030 a normal sex ratio at birth of 105 will be reached with linear interpolation between 2000 and 2030.

Table 1.3 Sex ratio at birth by parity, 1989, 1994, and 2000

Year	Total	First child	Second child	Third child and above
1989	111.3	105.2	121.0	127.0
1994	115.6	106.4	141.1	154.3
2000	116.9	107.1	151.9	159.4

Years 1989 and 2000 are taken from the census data (NSB, 1993, 2002b); 1994 is taken from NSB (1997).

Table 1.4 Historical trends in the sex ratio at birth in China, 1953–2000

Year	Sex ratio at birth	Year	Sex ratio at birth	Year	Sex ratio at birth
1953	104.9	1973	107.3	1987	111.0
1960	110.3	1974	106.6	1988	108.1
1961	108.8	1975	106.4	1989	111.3
1962	106.6	1976	107.4	1990	114.7
1963	107.1	1977	106.7	1991	116.1
1964	106.6	1978	105.9	1992	114.2
1965	106.2	1979	105.8	1993	114.1
1966	112.2	1980	107.4	1994	116.3
1967	106.6	1981	107.1	1995	117.4
1968	102.5	1982	107.2	1996	118.5
1969	104.5	1983	107.9	1997	120.4
1970	105.9	1984	108.5	1998	122.1
1971	105.2	1985	111.4	1999	122.7
1972	107.0	1986	112.3	2000	119.9

Gu and Xu (1994) for 1960–1992; Lu (2003) for 1993–2000

Table 1.5 Different estimates for the sex ratio at birth in 2000

Source	Sex ratio at birth
Wang (2003)	113.40
SPFPC and CPDC (2003)	116.86
NSB (2002b)	117.79
Ma (2004)	122.65
Lu (2003)	119.9
Banister (2002)	120
Zhang and Cui (2003)	>= 115

Size of Youngest Age Groups

The third type of uncertainty in population variables considered here concerns age structure, and in particular, the relative size of the youngest age groups. In the analysis of birth levels above, there is reason to assume that there is a significant amount of underreporting of children that corresponds to the underreporting of births in the measurement of recent fertility. This underreporting becomes evident when producing projections of the Chinese population based on the beginning year of 1990.

If we choose a rather high fertility level from our distribution of the 2000 TFRs, we also need to choose a size of the youngest age group that is comparatively larger because it was produced by higher fertility rates earlier. In order to deal with this consistency issue between the chosen level of TFR and the size of the youngest age groups, we designed a specific method that calculates a separate age distribution for the year 2000 for each of 1,000 separate simulations. This formula is based on the assumption that underreporting primarily affects children below school age. It assumes that the number of seven year old girls and boys reported in the census is more or less correct. Based on this assumption, we were able to calculate which level of TFR in 1993 produces the given number of children of that age group. Next,

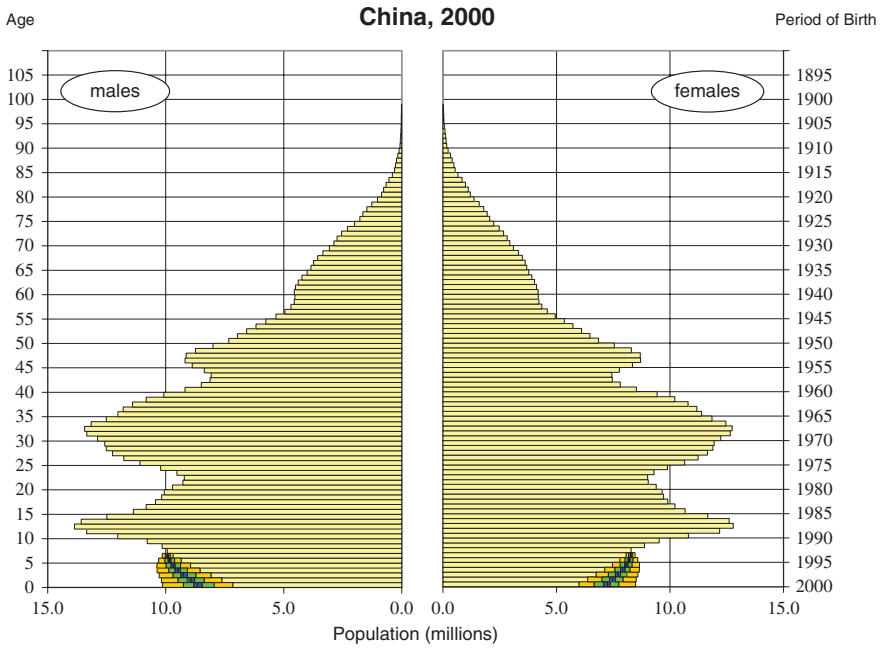

Fig. 1.1 Probabilistic age pyramid, 2000

for each simulation run, a TFR value for 2000 was randomly chosen. Then for each simulation, the following calculations were performed: A linear interpolation was applied between the TFR estimated for 1993 and the one assumed for 2000. The resulting TFRs were then applied to a projection that reproduces the number of births between 1993 and 2000. Applying plausible child mortality rates produced a new age structure for the year 2000. As a result, for each simulation run we have a separate age structure for children, which is exactly consistent with the fertility level chosen for the specific run.

Figure 1.1 shows the resulting distribution of the age pyramid of China in 2000. The gray area shows the age-specific uncertainties due to the alternatively estimated age distributions.

Method and Assumptions

For the projection methodology itself, we chose the same approach as extensively discussed in Lutz and Goldstein (2004). It is a stochastic simulation with annual fluctuations of vital rates within a variance as defined by expert opinion. The trends and the assumed ranges follow the same logic as in Lutz et al. (2004). In short, for fertility a normal distribution was assumed with a mean of 1.5 and 95% of all cases in the range between 1.0 and 2.0 before 2030, and after that with a mean of 1.7 and 95% of all future cases in the range between 1.2 and 2.2. This assumption implies that there is a chance that five percent will fall outside this range on either side.

For mortality the starting life expectancy for 2000 was assumed to be 69.7 years for men and 74.5 years for women. We took this as a point estimate without any further considerations. For the future, however, we assumed that life expectancy would on average increase by two years per decade, with 95% of the distribution falling between an increase of only one year and three years per decade. This implies that for 2050 the ranges for life expectancy at birth would range from 74.7 to 84.7 for men and from 79.5 to 89.5 for women. We also assumed a closed population, i.e., no international net migration gains or losses.

Uncertain Population Dynamics in the Future

Figures 1.2 and 1.3 show the results of 1,000 simulations, each a separate cohort-component projection with the starting conditions as well as the fertility, sex ratio at birth, and mortality drawn from the uncertainty as described above. The figures present the results in terms of fractiles of the resulting distributions. The outside shaded area gives the range into which

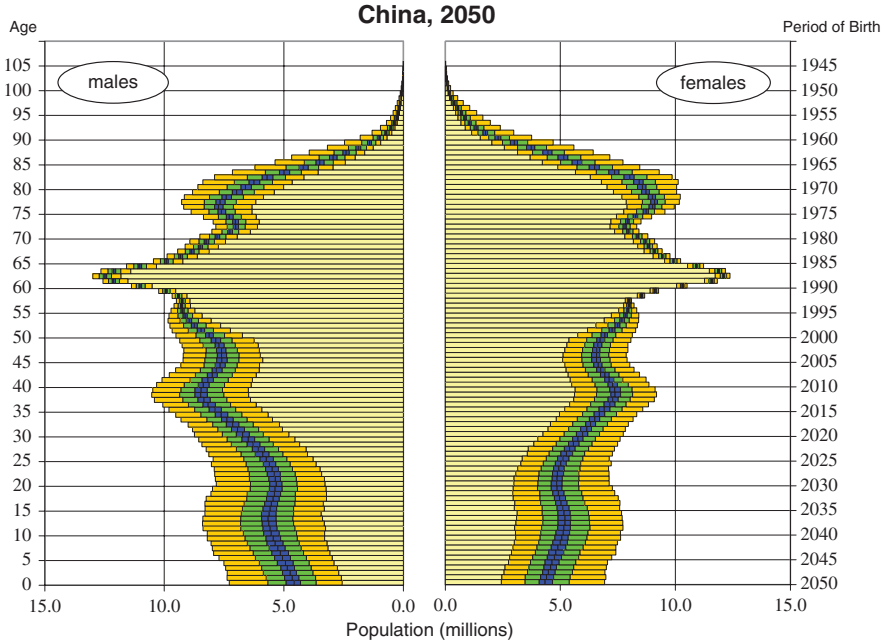

Fig. 1.2 Probabilistic age pyramid, 2050

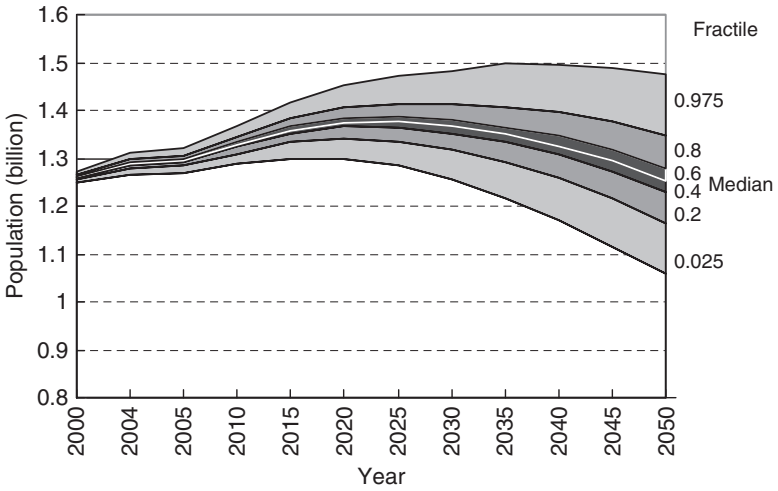

Fig. 1.3 Fractiles of distribution for total population, 2000–2050

95% of the simulated cases fall, the darkly shaded area the 60% range, the lightly shaded center area the inner 20%, and the white line in the center gives the median.

Figure 1.2 shows the probabilistic age pyramid for China in 2050. To the left are listed the single years of age and to the right the corresponding years of birth of the cohort. For all cohorts below age 50, i.e., those born after 2000, the broad band of uncertainty reflects the combination of uncertain fertility in 2000 and uncertain future fertility trends. For the youngest cohorts, this uncertainty range is significant, with the 95% interval going from around 2.5 million girls to 7.5 million girls, i.e., the difference is a factor of three. For those aged 50–70 in 2050, the uncertainty range is the smallest. This is because these cohorts are already born, and we roughly know the cohort size (subject only to the uncertainty about the current age distribution as discussed above); moreover, they have not yet entered the high mortality ages when the uncertainty begins about future old-age mortality. It is also remarkable that as a consequence of Chinese demographic history, these very large age groups born between 1985 and 1990 are not only the biggest cohorts today, but will also be by far the biggest cohorts in 2050. And as the figure illustrates, there is very little uncertainty about this.

Figure 1.3 shows the resulting uncertainty distribution for total population size. The median of the distribution shows further growth until reaching a peak at 1.38 billion in 2020–2030, where it starts to slowly decline. In 2050 the median is already down to 1.25 billion. But as can be expected, the range of uncertainty increases with the passage of time. The upper 0.975 fractile keeps growing until around 2035 reaching almost 1.5 billion, and the lower 0.025 fractile already starts to go down in 2015 after having reached a peak of 1.30 billion. The 95% range in 2050 goes from 1.10 billion to 1.54 billion.

HIV/AIDS Situation

The Scale of HIV/AIDS

According to the Chinese Ministry of Health, until mid-2003 the reported number of HIV-positive cases nationwide was 45,184. At that time there were 3,549 people living with AIDS and a total of above 1,047 AIDS-related deaths. However the reported number increased dramatically in the first 9 months of 2004 and was greater than the entire year of 2003 (Fig. 1.4) (SC-AIDS-WCO and UN, 2004). Great uncertainty exits about the scale of HIV/AIDS in China. For instance, the China HIV/AIDS Information Network declared on November 6, 2003 that there were 840,000 people living with HIV, of whom 80,000 were living with AIDS. UNAIDS (2002)

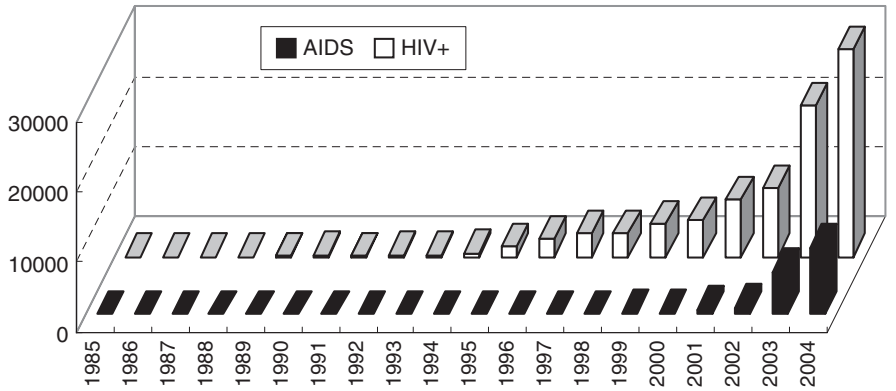

Fig. 1.4 The distribution of HIV/AIDS in China, 1985–2004
There were only 9 months in 2004.

estimated that the overall number of infections was at more than one million at the end of 2001, based on HIV surveillance. The Ministry of Health reported that HIV infections have risen by 30% yearly since 1994 after a decade of generally low levels of infection (Plafker, 2001).

Characteristics of the HIV/AIDS Epidemic

Understanding of the characteristics contributing to the spread of HIV/AIDS demands an analysis of the changing demographic conditions. Current available results of HIV/AIDS research indicate that there are three main characteristics that define the HIV/AIDS epidemic in China:

1. HIV risk factors are increasingly complex, from the 1980s when primary modes of infection were unsafe homosexual or heterosexual behaviors in cities, to now extending to rural areas and encompassing other risk factors. These include HIV infections that are the result of intravenous drug use, plasma collection practices, sexual contacts, blood transfusions, and mother-to-child transmissions.
2. HIV/AIDS spreads in China very rapidly. In 1985, HIV/AIDS was reported in just two areas (Beijing and Zhejiang). In 1995 there were only three provinces without HIV/AIDS infections (Qinghai, Gansu and Inner Mongolia), and by 1998 HIV had spread to all of China's 31 provinces/autonomous regions/municipalities.
3. At the beginning of HIV/AIDS infections in China, the young people were the primary age group affected. But HIV has now spread to all the age groups in the Chinese population, although 80% of infections occurs now among people between the ages of 20 and 39 years.

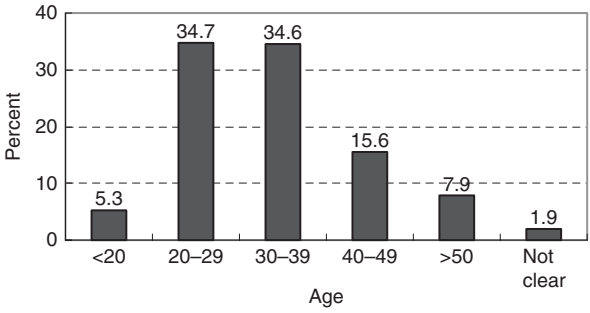

Fig. 1.5 HIV/AIDS structure by age in China

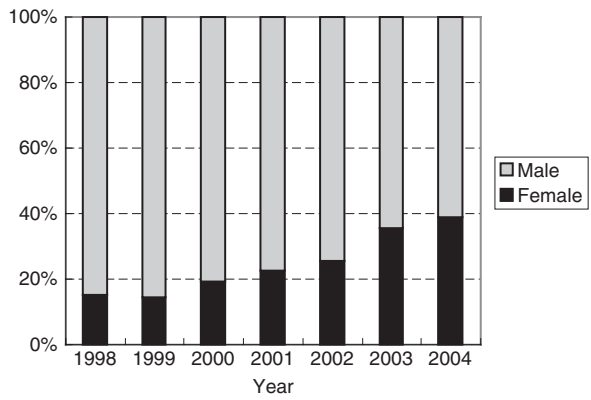

Fig. 1.6 HIV/AIDS structure by sex and age in China

According to available statistics (SC-AIDS-WCO and UN, 2004), some HIV high risk groups include subgroups of men and sexually active young people. As shown in Fig. 1.5, prevalence was higher among both sexes aged 20–39 (72%); the prevalence at the other ages was 28%, with significant percentages at ages much older and younger. Figure 1.6 also indicates that 72% of HIV/AIDS infections were men. While women account for only around one-third of infections, their proportion grows every year.

HIV/AIDS Uncertainty in the Future

The above characteristics of the HIV/AIDS epidemic mainly focus on informal internal migrants and urban areas which have been monitored by national surveillance systems. It is well known that HIV/AIDS may spread to the general population in China. However, these future trends are uncertain not only because of the uncertainty of current and future age structures in China, but also because of the uncertainties in future sexual behavior.

Short-term projections of the number of HIV cases are the following. With no intervention, the number of HIV cases would be either 10 million people infected by 2010 (UNAIDS, 2002) or 20 million infected (Brady et al., 2001; Morrison and Gill, 2003). In considering heterosexual transmission, the number of HIV infections would reach 11.5 million by the parameter inputs set by the Chinese Health and Family Life Survey (CHFLS); or the number of HIV infected would be 21 million according to figures on sexual behavior in the United States. If intervention can be implemented successfully, the numbers of HIV infected would be under 1.5 million by the 2010 (Dai, 2005).

It is very difficult to project the number of HIV/AIDS infections, not only because of uncertain future trends of population size, age structure, sex structure and so on, but also because of the changes in the patterns of adult sexual behavior and the efficiency of control for STI and HIV/AIDS by the government. Merli et al. (2004) conducted a simulation study of future patterns of HIV/AIDS transmission in China with several scenarios using various assumptions about sexual behavior. In their study, there are two patterns of sexual behavior and seven scenarios of adulthood HIV prevalence rates. They used 1990 China census data for the beginning age structure and projected using a multi-state population approach. Their method of projection does not consider the uncertainty of demographic variables such as age structure, fertility, and the sex ratio at birth. Herein we use the same patterns of sexual behavior and the scenarios of Merli et al. (2004). We introduce a demographic projection for China, as above, and make crude estimates about the risk population of HIV/AIDS in 2010. Compared with the estimates of other authors and institutes, we chose the year 2010 as the projected point.

There are two sexual mixing patterns in this model – assortative mating assumes that similar groups will have sex with each other, and random mixing assumes that people will randomly have sex. Table 1.6 indicates that the number of HIV infections under the sexual mixing pattern of assortative mating would be much lower than that for the sexual pattern of random mixing according to the assumptions of adult prevalence made by Merli et al. (2004). From the scenarios we implemented, the number of projected HIV infections range from 1.2 million to 21.4 million. If we assume the sexual behavior patterns observed in the Chinese Health and Family Life Survey (CHFLS) (Parish et al., 2003), the number of HIV infections would be the lowest under the sexual behavior pattern of assortative mixing (1.2 million in 2010 for scenario A). Otherwise it would be 8.4 million under the random sexual behavior pattern. The most high-risk situation would be the case where the distribution in China by sex activity groups was like the U.S., and the number of HIV infections would reach 21.4 million (scenario D) under the sexual pattern of random mixing; the number would reach 12.1 million

Table 1.6 Estimated number of adults (age 15–49) living with HIV/AIDS under various simulated scenarios, China, 2010

	Adult prevalence (%)*		Number of adult infections by uncertain population					
			Assortative mixing			Random mixing		
Scenario*	Assortative mixing	Random mixing	Median	Lower limit 2.5%	Upper limit 97.5%	Median	Lower limit 2.5%	Upper limit 97.5%
Scenario A	0.16	1.11	1218477	1215501	1221261	8453186	8432536	8472500
Scenario B	0.18	1.531	1370787	1367438	1373919	11659304	11630823	11685943
Scenario C	0.19	1.54	1446942	1443407	1450248	11727843	11699195	11754639
Scenario D	1.59	2.81	12108617	12079039	12136283	21399506	21347232	21448400
Scenario E	0.20	1.56	1523096	1519376	1526577	11880153	11851132	11907297
Scenario F	0.36	1.78	2741574	2734877	2747838	13555559	13522446	13586531
Scenario G	0.27	1.63	2056180	2051157	2060878	12413236	12382914	12441599

* Scenarios and prevalence adopted from Merli et al. (2004). Sexual mixing patterns: one that individuals choose partners with like characteristics is assortative mixing, and other in which this pattern is random mixing.
Scenario A. Sexual relation regime observed in CHFLS (without chlamydia).
Scenario B. With chlamydia (Baseline).
Scenario C. Increase in demand for commercial sex commensurate to average income growth.
Scenario D. What if the distribution by sex activity groups were like US?
Scenario E. 40% men engaged/involved in prostitution after 20 years.
Scenario F. 40% men engaged/involved in prostitution after 20 years and 2 contacts per month.
Scenario E. Men with prostitutes after 20 years, 2 contacts per month and 100% condom program.

even under the sexual pattern of random mixing. The closest description of Chinese sexual behavior implied by the CHFLS yields 1.4 million for the sexual pattern of assortative mixing and 11.7 million for the sexual pattern of random mixing (scenario B). Comparing these estimates with the number of infections in 2010 projected by UNAIDS, irrespective of the sexual behavior patterns, most of the estimates are over 10 million, and they are 20 million under the high sex activity assumption. These results suggest that changes in sexual behavior, even using an assortative mixing pattern, will be important determinants of HIV spread in the future.

Conclusions

Uncertain population dynamics in China could have a profound impact on the spread of HIV. There is a large variation in China in estimates of fertility rates, sex ratios at birth, and the numbers of youth. Differences in sexual mixing between different sexually active classes could also influence the spread of HIV and other sexually transmitted infections. Rapid economic development, rural to urban migration, and continuing socioeconomic inequalities are also expected to drive the spread of sexually transmitted infections, including HIV infection. More research is needed to characterize how changes in population levels changes could affect the spread of HIV infection.

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Chapter 2
Migration and Gender in China's HIV/AIDS Epidemic

M. Giovanna Merli, Jack DeWaard, Feng Tian and Sara Hertog

Introduction

China today is considered to be a low HIV prevalence country. In 2007 there were an estimated 700,000 HIV cases corresponding to 0.1% of the adult population. HIV infections tend to be concentrated in relatively well-defined population subgroups, such as injecting drug users (IDUs), former plasma and blood donors, and female sex workers (FSWs) and their clients. Despite this low HIV prevalence, the Chinese HIV epidemic is considered to be in the stage of "rapid spread" (Grusky et al. 2002; Qian et al. 2005 cited in Hong and Li 2008), and concerns about a growing epidemic through heterosexual contact persist. Injecting drug users and former commercial blood and plasma donors currently comprise about 55% of all infections, while 44% of infections are among female sex workers, their clients and partners. In 2005, 49% of new cases were attributed to heterosexual contact (MOH, UNAIDS and WHO 2006).

The extent to which HIV will spread through heterosexual transmission in China's general population depends largely on the levels and distribution of sexual activity in the population. Results from an empirically grounded compartmental mathematical model used to explore the implications of the observed Chinese regime of sexual relations for the progression of HIV/AIDS (Merli et al. 2006) suggested that levels of sexual activity must cross a certain threshold for a given input to have a sizeable impact on the simulated epidemic curve. In China, overall levels of sexual activity

M.G. Merli (✉)
Terry Sanford Institute of Public Policy at Duke University, Durham, NC, USA
e-mail: giovanna.merli@duke.edu

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identified by the rate of partner change and the fraction of the population with multiple sexual partners would have to be significantly higher than those currently observed for the model to simulate HIV prevalence well above 1% at any time during a 50-year projection cycle.

The potential for a shift toward a higher rate of partner change and widespread adoption of high-risk behaviors now and into the future cannot be ignored given ongoing transformations in sexual norms and behaviors in the context of China's rapid pace of social and economic change. That the number of people engaging in risky sexual behaviors is growing is suggested by soaring sexually transmitted disease (STD) prevalence in China. Following the virtual eradication of STDs under Mao (Cohen et al. 2000; Gong et al. 2002; Chen et al. 2007), China today reports a nationwide primary and secondary syphilis incidence of 5.7 cases per 100,000, substantially higher than the 2.7 cases per 100,000 in the U.S. (Chen et al. 2007). Similarly, an analysis of data from the first nationwide sexual behavior survey ever conducted in China, the China Health and Family Life Survey (CHFLS), revealed a prevalence of Chlamydia in urban areas that is as high as or higher than urban populations levels in developed countries(Parish et al., 2003). The resurgence of other sexually transmitted diseases and changing sexual norms that accompany China's rapid pace of social and economic change (Farrer 2002; Sigley and Jeffreys 1999) suggests that the potential exists for a growing number of HIV and STD cases in China through the adoption of risky sexual behaviors and co-morbidities between STDs and HIV as the presence of STDs enhances the infectiousness of HIV.

Chinese internal migration is frequently cited as a factor of special concern for the spread of HIV and other STDs because of its magnitude and the well established association between mobility and the spread of HIV in other societies (Brockerhoff and Biddlecom 1999; Quigley et al. 1997; Wawer et al. 1994; Lagarde, Pison and Enel 1996; Hunt 1989; Pison et al. 1993; Nunn et al. 1995; Decosas et al. 1995; Lurie et al. 1997; Lurie et al. 2003). Geographic mobility raises the prevalence of HIV in a population both by connecting geographically separated areas with different HIV prevalence rates and changing the interaction between infected and susceptible persons and by leading individuals to adopt risky sexual behaviors upon migration (Coffee et al. 2007).

Chinese male and female migrants have been identified as likely reservoirs of high risk behaviors and as potential bridges of HIV infection between urban and rural populations (Anderson et al. 2003; du Guerny et al. 2003; Gill et al. 2002; Hong et al. 2006; Kaufman and Jing 2002; Tucker et al. 2005; Yang and Xia 2006; Zhang and Ma 2002). But the patterns differ for male and female migrants. Migration in China, in addition to other demographic conditions such as unbalanced sex ratios at birth and the age

structure of the population (Merli and Hertog 2007), is expected to alter the market for sexual partners and produce male surpluses in destination communities, a condition which may lead male migrants to adopt HIV-related risk behaviors such as multiple partnerships and patronage of commercial sex (Tucker et al. 2005). Structural conditions such as gender inequality and gender segregation in the urban labor market (Fan 2000, 2003) may lead female migrants to adopt risky sexual behaviors, by disproportionately driving them into occupations which expose them to the risk of engaging in prostitution (Yang and Xia 2006), a trend which has been well documented in the growing economies of Southeast Asia where employment opportunities for poorly educated and unskilled women are limited (Lim 1998).

In this chapter we explore the potential implications of male and female migration in China for the spread of HIV with a mathematical compartmental model of the spread of HIV. Although mathematical simulation models are largely unsuccessful at accurately reproducing HIV/AIDS epidemics (Leclerc and Garenne 2007) and are not adequate for forecasting the course of the Chinese epidemic (Merli et al. 2006), they are useful for understanding the temporal dynamics of the spread of HIV in a population (Aral et al. 2005) and the dynamic relationship between structural, population, and individual level factors in fueling the progression of HIV (Diez-Roux and Aiello 2005). We use this model to examine the role of migration, a macro-demographic factor, in changing the dynamics of HIV transmission by altering population patterns of exposure to the risk of infection and HIV prevalence rates among population subgroups and by creating the conditions that lead individuals to acquire infection.

Migration and HIV-Risk Behaviors in China

Following the gradual relaxation of restrictions in the late 1980s which had kept individuals tied to their place of residence through the household registration system (Wang 1997), urban economic reforms and the development of a market oriented economy have attracted a growing number of rural migrants to Chinese cities. According to the 2000 census, there were 79 million floating migrants (i.e. those without a legal permanent household registration in the receiving community) in China,[1] which is double

[1] This census figure does not account for migrants who resided in the receiving community for less than 6 months, nor does it account for the large number of short-distance movers, e.g. those who moved within the same county or city (Liang and Ma 2004). The official estimate of China's total number of rural migrants in urban areas in 2003 was 140 million, equivalent to 30% of the rural labor force (Huang and Zhang 2005).

the estimate for 1995 and four times that for 1990 (Liang and Ma 2004). The sex ratio of migration recorded in the 2000 census, 109 males per 100 females, still favors men, but women are increasingly active in migration (Fan 2000).

Most analyses of migration and HIV/STD risk behaviors in China focus on male rural-to-urban migrants. Male migrants are framed both demographically and sociologically within a context of surplus men in the marriage and sexual partnership market. The massive flows of labor migration from the countryside into cities and towns, which are disproportionately masculine, tend to exacerbate China's male surplus in the receiving communities. In fact migration is only one of three demographic factors responsible for an oversupply of males in the partnership market, the others being increasingly unbalanced sex ratios at birth since the mid-1980s, and the age structure of the population, given the social norms that males should be older than their female partners (Goodkind 2006; Hudson and den Boer 2004; Merli and Hertog 2007; Tuljapurkar et al. 1995).

As a result of the unavailability of suitable female partners, long separations from their families and primary social networks, experiences of social exclusion, economic marginalization, and institutional barriers that tend to keep them in the position of second class citizens (Solinger 1999; Yang and Xia 2006; Yang and Xia 2008), male migrants are expected to adopt such risky sexual behaviors upon arriving in their urban destinations, as multiple sexual partnerships and patronage of commercial sex.

The link between gender imbalances in the sexual partnership market associated with migration and a market for commercial sex is posited by economic models of marriage and prostitution which portray mate selection as a market process (Edlund and Korn 2002). These models assume that women seek wealth from their partners, men value traits associated with female fertility, that the cost of reproductive sex for men is higher than that of commercial sex, and that wives and prostitutes are drawn from the same pool of female partners available to men. These models imply that prostitution is linked to the surplus of males in two ways. First, a masculine sex ratio tends to make prostitution more profitable relative to marriage. With a smaller pool of women in the marriage market relative to men, reproductive sex becomes scarcer and sex with prostitutes more desirable. Second, a rise of the male-female sex ratio in a locale is linked to a high concentration of "men in transit" who participate in the commercial sex market while away from their home communities. Without competition from wives, prostitution becomes more profitable and the supply of commercial sex increases as a result of an increasing concentration of male migrants.

The empirical record with respect to HIV/STD risk behaviors associated with migration in China is mixed. Studies of Chinese rural migrants'

adaptations to experiences of social isolation have found multiple sexual partnerships, patronage of commercial sex, especially among the most mobile migrants (Li et al. 2004), injecting drug use (Yang, Derlega and Luo 2005), and a higher vulnerability to STD infection among rural migrants compared with their urban peers (Li et al. 2004; Yang 2005). Yet, according to data from the China Health and Family Life Survey, male migrants to urban areas seem to show levels of risky sexual activity that are only marginally higher than those displayed by their urban non-migrant counterparts (Parish et al., 2003). Of 986 sexually active male migrants in Shanghai, 11.5% reported ever having sex with a commercial sex worker, but only 3.2% reported engaging in commercial sex since migration to Shanghai (He et al. 2006). A study of male migrants and native urban workers in East China failed to find any significant difference in the prevalence of syphilis between the two groups (Hesketh et al. 2005). In a large population-based sample in Southwest China, Yang, Derlega and Luo (2005) found that rural migrants had a significantly higher prevalence of HIV-related risk behaviors than urban residents, both sexual and drug using, but no difference was found between rural migrants and urban residents in prevalence of HIV/STDs.

The almost exclusive focus on male migrants and HIV/STD risk behaviors in the Chinese context has resulted in little if any attention given to the role played by female migrants in linking migration to risk behaviors. A recent analysis of data from a population-based survey of sexual behavior conducted in Southwest China (Yang and Xia 2006) noted that the difference in prevalence of risk behaviors between rural migrants and urban residents is due to a disproportionately high prevalence of casual and commercial sex, compared to both urban residents and male migrants, and a concentration of this risk behaviors among temporary female migrants employed in the service industry or unemployed.

The ways in which female migration interacts with prostitution to affect the progression of HIV needs to be better understood. Because of inequalities in education and job training, female migrants are usually at an economic disadvantage in cities and do not fare as well as their male peers in the urban labor market (Huang 2001). Female migrants are channeled overwhelmingly into low-status occupations and are disproportionately concentrated in the assembly, service and entertainment industries or remain unemployed (Fan 2000, 2003; Roberts 2002). The opportunities for unemployed women or women employed in service and entertainment to engage in prostitution or to experience conditions which force them into prostitution are many (Liao et al. 2003). In Yang and Xia (2006)'s sample of migrants in Southwest China, female migrants who worked in the service sector displayed by far the highest prevalence level of risk behaviors: 37.3% reported engaging in commercial sex in the month prior to the survey and 33% in

casual sex; These percentages compare with 23.7 percent and 25.1 percent among the unemployed. Wang et al. (2004) found that female migrants in Beijing and Nanjing working in entertainment establishments (e.g. barbershops, massage parlors, bathhouses, dance halls, nightclubs and bars) were twice as likely to engage in risky sexual behaviors than female migrants working in other types of service establishments (e.g. restaurant, hotel, retail shop, stall, construction and domestic service). FSWs are susceptible to acquiring HIV and sexually transmitted infections (STI) as well as transmitting them to others (Morris et al. 1996). In China, like elsewhere, prostitution is associated with a high prevalence of STDs or reports of STD history (Lau et al. 2002; Ruan et al. 2006; Zhong et al. 2002; Ding et al. 2005) because of high rates of partner change, higher risk of exposure to infected clients, low rates of condom use and incomplete knowledge of risk behaviors (van den Hoek et al. 2001; Chen et al. 2005; Hesketh et al. 2005; Xia and Yang 2005; Wang et al. 2005).

The implications of migration for the spread of HIV depend heavily on several factors: the distribution of risky behaviors among both male and female migrants relative to non-migrants; the extent to which structural conditions lead female migrants into prostitution rather than into other forms of sexual behaviors characterized by lower rates of partner change; the transition of female sex workers in and out of prostitution; and male and female migrants' patterns of marriage and return migration which often place their partners and home communities at risk. The model we employ and the information we use to empirically ground the input parameters are adequate for exploring the mechanisms through which migration influences HIV acquisition and transmission, e.g. by changing the population sex and age composition of destination communities, altering the market for sexual partners, and creating the conditions which lead to the adoption of HIV/STD risk behaviors. Nevertheless, the model and our data do have important limitations. For example, they are less adequate for representing the complex ways in which structural factors such as economic inequalities, gendered cultural norms and the structure of the urban labor market interact with geographic mobility and prostitution to affect the temporal dynamics of the spread of HIV, to represent differences in sexual behavior profiles of migrants and non-migrants, and the contact rates between migrants and their partners in their home communities.

Inputs driving our simulations include demographic (e.g. fertility, mortality and migration) and behavioral considerations governing the spread of the epidemic (e.g. the rate of partner change, condom use, etc.), and these are drawn from a wide range of existing data, including China's most recent census completed in 2000 and the China Health and Family Life

Survey (CHFLS), the first nationally representative survey of adult sexual behavior to have been conducted in China. Input parameters associated with migrants' adaptations upon migration are informed by hypotheses formulated in the literature on the linkages between Chinese migration and the risk of HIV/STDs.

The Model

We use an existing deterministic compartmental model. It was originally developed by Palloni and Lamas (1991) to describe the course of the HIV/AIDS epidemic in Sub-Saharan Africa. It was later modified by Merli and her colleagues (2006) to represent the Chinese regime of sexual relations, to accommodate multiple scenarios of sexual activity and sexual mixing (see, Hertog 2007) and to more fully describe China's demographic dynamics, including migration flows between rural and urban areas, and the effects of surplus males on the spread of HIV (see, Merli and Hertog 2007).

The model is a two-sex cohort component population projection with three compartments (Healthy, HIV-infected but asymptomatic, and Symptomatic AIDS) and reflects the transitions between these states and from each to death (see Fig. 2.1). Transition rates are determined by a set of demographic, biological and behavioral parameters and are described by a set of differential equations, presented in detail elsewhere (Palloni and Lamas 1991; Palloni 1996). The model first defines four distinct populations: urban males, urban females, rural males and rural females. It then defines a given fraction of the urban (city and town) female population as prostitutes who do not have regular non-commercial partners but with whom men may seek contact in addition to their relationships with non-prostitute partners. After these five populations have been defined, the model allocates males and non prostitute females into homogenous "sexual activity classes" defined by the average number of non-prostitute partners acquired in a year. The model considers only two sexual activity groups, monogamous and

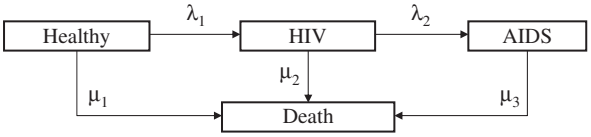

Fig. 2.1 States and flows in the Palloni and Lamas macrosimulation model

non-monogamous, and it further allows for partnerships with prostitutes for both monogamous and non-monogamous men.

The number of people in each of the simulated population subgroups, as well as the changes in the size of the groups over time, are updated with each projection cycle according to the transition rates between states. The current specifications of the model do not allow us to separately represent migrants' and non migrants' sexual behaviors. Following migration, migrants are absorbed into the general population with each projection cycle and are set to acquire the behavioral profile of non-migrants. Population renewal occurs in each new projection cycle when new entrants (births) are allocated into sexual activity classes according to the distribution specified at the outset, and does not take into consideration the tastes and preferences of parental generations.

The biological and behavioral factors underlying the heterosexual spread of HIV act primarily through their influence on the rate of transition from the Healthy state to the HIV-Infected but asymptomatic state, denoted λ_1 in Fig. 2.1. When heterosexual transmission is the sole route of HIV spread, λ_1 is a function of the proportion of infected individuals in each sexual activity class, the sexual activity of each class (the rate of sexual partner change, coital frequency and contacts with prostitutes), as well as the probability of infection per coital act (determined by the distribution of the HIV-infected population by duration of infection, prevalence of co-morbidities that enhance infectiousness of HIV and/or susceptibility to HIV infection, and condom use) and the degree of sexual mixing between partners of different ages and between members of the two sexual activity classes. Infection occurs as a result of multiple sexual acts, each carrying a constant probability of infection from the infected to the uninfected partner. To account for changes in infectiousness associated with HIV progression, those in the HIV and AIDS states are further subdivided according to duration (years) since infection.

The shape of the probability distribution of urban females entering into prostitution with each projection cycle is drawn from a Coale-McNeil marriage function; the proportion of a female cohort who will eventually become prostitutes can be approximated by the proportion of prostitutes in the female population. In the current model, prostitution is an absorbing state, that is, women do not transition back into the general population of non-prostitute females, nor is it possible to represent female migrants' transition in and out of prostitution. While we recognize that this may be a somewhat unrealistic representation of the lives of women who engage in commercial sex – some women will work as prostitutes for only a limited period of time, while others will cycle in and out of prostitution as their economic circumstances change – we do not yet have a set of rules to realistically depict

the often temporary, cyclical nature of prostitution in women's lives and the ways in which prostitution characterizes the interaction between gender and migration.

Model Inputs

Baseline parameter values are presented in Tables 2.1 and 2.2. In the simulation scenarios, we vary the demographic parameters associated with the intensity of migration flows, the supply of female sex workers, and behavioral parameters associated with the rate of partner change, the proportion of men who seek the services of sex workers, and the frequency of contacts with sex workers.

Demographic Inputs

In Table 2.1, the baseline population is defined according to the age and sex-specific population distributions in China's rural and urban areas as enumerated in the 2000 Census. There were 1.24 billion inhabitants counted in China's 2000 national population census. Almost two-thirds resided in rural areas, while the remainder lived in China's cities and urban towns, which we have combined to comprise the "urban" population in the simulation model.

Table 2.1 Model inputs: Demographic

	Urban (city and town)	Rural
Population[a]		
Total	458,770,983	783,841,243
Males	235,264,707	405,011,262
Females	223,506,276	378,829,981
Total Fertility Rate (TFR)[a]	0.94	1.43
Sex Ratio at Birth (SRB)[a]	116.5	121.7
Life Expectancy at Birth (years)[a]		
Males	74.0	69.0
Females	78.3	72.4
Annual migration rate from (%)	0.66	0.87
Median age at sexual debut[b]		
Males	22	22
Females	22	22
Mean age difference b/w partners (years)[b]	1.8	1.8
Women who are prostitutes (%)[c]	6,000,000	–

[a] Unadjusted rates from 2000 census
[b] From CHFLS
[c] Horizon Market Research and Future Group Europe 2002; Yuan et al. 2002

Table 2.2 Model inputs: Behavioral and biological

	Sexual activity class	
	Monogamous	Non-monogamous
Parameters that vary by sexual activity class		
Percent of adult population in class (age 20–49)		
Males	89.5	10.5
Females	97.4	2.6
Mean number of non-prostitute partners per year	1	2.29
Mean coital acts per non-prostitute partner	85	89
Percent of coital acts condom protected	10.3	14.0
Percent of men who patronize prostitutes	0.01	37.7
Mean num. of prostitutes per man who patronizes prostitutes	1.0	1.4
Percent of coital acts with prostitutes condom protected	20.6	28.0
Percent infected with Chlamydia		
Men	2.9	2.0
Women	3.1	1.3
Prostitutes	32.0	na
Parameters that do not vary by sexual activity class		
Percent of adults infected with HIV at baseline		
Men	0.1	
Women	0.1	
Prostitutes	0.1	
Mean incubation from HIV to AIDS – Adults (years)	8	
Mean incubation from HIV to AIDS – Infants (years)	2	
Mean survival with AIDS – Adults (years)	1	
Mean survival with AIDS – Infants (years)	1	
Probability of vertical transmission (%)	30	
Condom efficacy (%)	80	
Per-contact transmission probability (%)		
Male-to-female	0.15	
Female-to-male	0.09	
Chlamydia cofactor	2.25	
Increased infectiousness if recently infected of symptomatic	3	

Sources: CHFLS; UNAIDS 2004b; van den Hoek et al. 2001; Downs and De Vincenzi 1996; Ambroziak and Levy 1999; Bracher et al. 2003; Fleming and Wasserheit 1999; Chau et al. 2003; Churat et al. 2000.

Demographic rates, including fertility and age- and sex-specific non-AIDS mortality are assumed to be constant throughout the simulation period and are based on the *unadjusted* population data in the 2000 census.[2]

To project sex imbalances in the availability of sexual partners, we assume constant fertility, a constant sex ratio at birth (116.5 in urban areas and 121.7 in rural areas), constant non-AIDS mortality, and an age schedule of sexual debut drawn from the CHFLS. We assume an enduring social norm that males be two years older than their female partners on average, according to the age differences between sexual partners reported in the CHFLS. This gap is consistent with the average age difference between partners indicated by the singulate mean age at marriage (SMAM) in 1999 of 24.8 years for men and 23.1 years of age for women (PRED Bank 2006), and with the SMAM for those marrying by age 30 in 2000 of 25.2 years for men and 23.2 years for women, an age difference at peak marital ages which has endured over the 1990s (Goodkind 2006).

We simulate population movements between rural and urban areas to be driven by the annual rural-to-urban and urban-to-rural migration rates based on information on destination for 78,756,500 floating inter-county migrants and on information on origin and destination for 65,634,248 intra-county migrants as enumerated in the 2000 census. In the five years leading up to the 2000 census, approximately 0.66% of the total urban (city and town) population migrated annually to a rural area, while 0.87% of the total rural population migrated to an urban location each year.[3] The age and sex distribution of migrants corresponds to that reported in the 2000 census micro

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[2] Our decision not to adjust the 2000 census data could be readily disputed. Some believe that China's TFR recorded in the 2000 census (short form) of 1.35 children per woman (it is 0.938 in urban areas and 1.43 in rural areas) is too low. Adjusted estimates range between 1.4 and 1.8 (Retherford et al. 2005). Reasons for accepting the unadjusted rates and their potential influence on the simulation results are discussed elsewhere (Merli and Hertog 2007).

[3] These rates were calculated by dividing the migration flows from urban to rural areas and from rural to urban areas by the total population in the area of origin (PCO 2002, Tables 7-1(a, b, c) and 1-7). These census tables are believed to most accurately represent the actual rural-urban migration flows in 2000 (Zai Liang, personal communication, July 17, 2007). Because the published census tabulations present the distribution of intercounty migrants by place of destination but not by place of origin, we applied the published distribution of intracoutny migrants by place of origin to the destination row totals of intercounty migrants. We also know from other sources (Liang and Ma 2004, Table 4) that, of the 78.7 million intercounty migrants, only 58.8 million migrated to their destination between 1995 and the 2000 census. Since the published tabulations of the 2000 census do not contain information which allows apportioning intercounty migrants by duration, we assumed that all intercounty migrants have migrated in the five year leading to the 2000 census.

data as presented by Liang and Ma (2004). The sex ratio of floating migrants in the Chinese census is 109 male migrants per 100 female migrants. Female migrants tend to be younger than male migrants; 63% of female migrants in the 2000 census were between the ages of 15 and 29, compared to 52% of male migrants (Liang and Ma 2004).

We set the number of female sex workers aged 15–39 in China at 6 million (Horizon Market Research and Futures Group Europe 2002). This widely cited estimate lies in the middle of a range of estimates of between 1 and 10 million female sex workers in China (Huang et al. 2004; Schafer 2003; Yuan et al. 2002). In our model, female sex workers are only found in urban areas (cities and towns). Urban areas provide a more conducive context for the existence of commercial sex because of higher population density, greater degree of economic and social activity, and the presence of urban social spaces that facilitate partnering between individuals of different population subgroups (e.g. Boisier et al. 2004; Pettifor et al. 2005; Fylkesnes et al. 1997). This number corresponds to about 5.4% of the urban female population between ages 15 and 39, to 2.2% of the total female population in that age group, and 1% of the *total* female population of all ages. The latter figure falls in the middle of a range given by Lim (1998) who estimated that in Indonesia, Malaysia, the Philippines and Thailand between 0.25 and 1.5% of the *total* female population work as prostitutes. The 15–39 age range of prostitutes in our simulations is slightly wider than that taken from a review of studies based on samples of venue-based sex workers in China, where the mean age of FSWs ranged between 23 and 25 years, with female sex workers' ages concentrated in the late teens and early to mid- twenties (Hong and Li 2008). The broader width of our simulated age range of FSWs is informed by a few studies based on sampling designs which were intended to reach non-venue based sex workers. These reveal significant heterogeneity in FSWs' age and work place with the ages of women working on the streets, in parks and in lower-tier venues, encompassing the upper thirties and early forties (Huang et al. 2004; Ding et al. 2005).

Behavioral Inputs

The sexual behavior inputs are drawn primarily from the CHFLS[4] (Table 2.2). In our simulated scenarios, membership in a sexual activity class is determined by the number of non-prostitute partners drawn from two groups:

[4] For a detailed description of this survey and evaluation of data quality, see Parish et al., 2003 and Merli et al. 2006.

individuals in the monogamous class reported only one non-prostitute partner in the year leading up to the survey, while individuals assigned to the non-monogamous class reported more than one partner in the previous year (2.29 partners on average). According to the CHFLS, 10.5% of adult males and 2.6% of adult females belong to the non-monogamous class. Non-prostitute partners are assumed to be selected from the pool of available partnerships in the population, without regard to sexual activity class (i.e., proportionate mixing between classes) (Garnett and Anderson 1993).

Other behavioral inputs derived from the CHFLS include the annual average per-partner coital frequency and the average proportion of an individual's coituses that are condom protected. Condom use was more frequent when the number of partners was high, which is consistent with more frequent condom use with non-regular partners compared with regular partners.

Commercial sex is very rare among monogamous men in the CHFLS, with only 0.01% of monogamous men reporting a prostitute partner in the year leading up to the survey. Among men with more than one non-prostitute partner in the year, 37.7% reported having purchased the services of a prostitute. Unfortunately, because information on condom use with prostitutes is missing for about 80% of men who reported having paid for sex in the previous year, we assume the proportion of condom protected sexual acts with prostitutes to be twice that with non-prostitute partners, to reflect typically higher condom use with prostitutes than with regular partners.

Biological Inputs

The biological inputs which drive the simulations are shown in the lower section of Table 2.2. At the outset of the simulation, we seed the Chinese population with 650,000 HIV cases according to the age distribution of HIV cases recorded for the Thai population. This number corresponds to the 2006 estimate for China, and is equivalent to an adult prevalence rate of 0.1%. The population of prostitutes is similarly seeded with HIV according to the same low HIV prevalence. Except for the very small fraction infected, the remainder of the simulated population begins the simulation period with no HIV and is introduced to the risk of infection during the simulation period only through heterosexual contacts with infected partners.

We assume a default baseline per-coitus probability of male-to-female HIV transmission of 0.0015 and a probability of female-to-male transmission of 0.0009. These are the frequently cited probabilities of transmission of HIV per single unprotected coitus estimated from a highly controlled study design of 525 HIV-discordant European couples (Downs and De Vincenzi 1996). Infectivity of HIV is higher among infected individuals who

have recently acquired HIV or in individuals who have symptomatic AIDS because of the higher viral load in these two stages (Ambroziak and Levy 1999; Pilcher et al. 2004). We posit that HIV is trebly infectious during the first year after seroconversion and again after progression to AIDS (Mastro and de Vincenzi 1996; Ambroziak and Levy 1999).

The model also accounts for infection by chlamydia, as reflected in the CHFLS and epidemiological studies of prostitute populations (van den Hoek et al. 2001), which influences HIV infectivity (Fleming and Wasserheit 1999). In our simulated population, HIV is 2.25 times more infectious in individuals with chlamydia (Merli et al. 2006).

Condom use and condom efficiency protect against HIV and STDs by reducing infectivity per sexual act (Saracco et al. 1993; Seidlin et al. 1993; Ahmed et al. 2001).

Results

To illustrate the unique implications of migration for the spread of HIV in China, we place migration within a framework of demographic gender imbalances and simulate its contribution to the sexual partnership market under different patterns of migration and in the absence thereof. We then model the spread of HIV in the absence and presence of migration and migration-associated sexual risk behaviors, such as a rise in migrants' rates of partner change. We then consider the sensitivity of the simulation outcomes to other types of adaptive behaviors such as a rise in the patronage and frequency of contacts with prostitutes and changes in the supply of prostitutes. Results are shown for urban and rural areas separately.

Figure 2.2 illustrates the gender imbalance in the urban and rural partnership markets under four migration scenarios, as follows: (A) a baseline

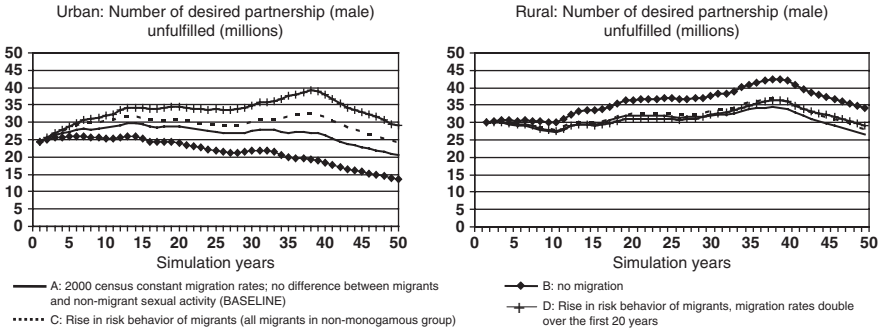

Fig. 2.2 Number of desired male partnerships unfulfilled due to various migration patterns and other demographic factors

scenario in which migration rates are held constant at the level recorded in the 2000 census and migrants display the same sexual risk behavior profile as non-migrants of the same age; (B) in the absence of migration, (C) with migration associated risk behaviors and (D) with double migration coupled with migration-associated risk behaviors.

Migration affects the supply of available female partners for males by replenishing or depleting the pools of potential partners in places of origin and destination. Because the sex ratio of migration is masculine, and migration flows are more intense from rural to urban areas than in the opposite direction, migration relaxes the rural partnership squeeze but tends to tighten the partnership market conditions for males in urban areas (Scenario A). With migration removed from the model (Scenario B), the sex ratios at birth and the population age structure are solely responsible for the gender imbalance in the partnership market; they are much greater in rural areas because of historically high sex ratios at birth and shrinking cohorts as a result of a very rapid fertility decline. Scenario C simulates the partnership market and the spread of HIV if all male and female migrants increased their rate of partner change following migration with 2.29 partners per year on average. In this scenario, migrants are effectively absorbed into the general population upon migration and elevate the fraction of the population assigned to the non-monogamous group with each simulation cycle, thereby raising the number of partnerships desired by men relative to partnerships made available by women and to the baseline scenario (A). It is not unrealistic to posit that China's internal migration rates will increase over the coming years (Landoni 2006). In Scenario D, we introduce a linear annual increase in migration rates which stabilize at twice their initial values in the 20^{th} year of the simulation and remain constant thereafter. Because we continue to assign migrants to the most sexually active group following their move, the partnership market for males in urban areas further tightens.

The leading role of migration in constraining the urban partnership market is evident in Fig. 2.3 which plots the proportionate contribution of migration to the number of desired partnerships unfulfilled for males in urban areas and the contribution of other demographic conditions, e.g. the sex ratios at birth and the population age structure. Since a growing number of migrants are assigned to the non-monogamous group (Scenario C and D), migration contributes an increasingly larger share of the foregone partnerships for urban men.

Figure 2.4 evaluates the implications of these patterns of migration and migration associated risk behaviors for the spread of HIV. With low rates of partner change as reported in the CHFLS, simulated adult HIV prevalence associated with scenario A remains low over the course of the 50-year simulation period, below 1% in both the urban and rural populations.

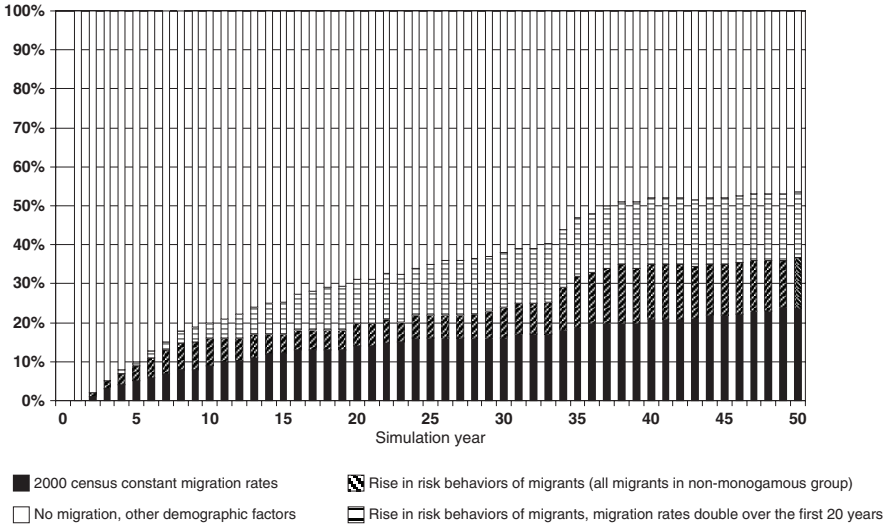

Fig. 2.3 Proportionate contribution of migration and other demographic factors to the simulated number of urban unfulfilled male partnership under various migration scenarios

Under these low rates of sexual partner change, migration alone (Scenario B) does not play a significant role in spreading infection. Migration does not elevate HIV prevalence unless it is compounded by migrants' adoption of high risk behaviors following their move. A higher overall rate of partner change and a higher fraction of individuals with multiple partners, as migrants' sexual activity increases following migration, drive urban prevalence up to above 4%, while rural prevalence reaches 3% by the end of the simulation period. The doubling of migration over the first 20 years coupled with migration associated higher rates of partner change produce urban and rural epidemics five and four times higher, respectively, compared to those driven by baseline demographic and behavioral inputs. Prevalence rates reach as high as 5 and 4% respectively in urban and rural areas. Yet, again, the doubling of migration alone is not enough to sustain a large epidemic. As suggested by a comparison of simulation outcomes under scenarios of double migration with and without a rise in the rates of partner change of migrants (results of the latter scenario not shown), it is the increase in risk behaviors which accompany migration, not the linkage of geographically isolated epidemics provided by migration, which fuels the spread of HIV.

Figure 2.5 explores additional mechanisms of migration-influenced transmission by focusing on adaptive risky behaviors adopted by surplus men. In Scenario E, urban surplus males, unable to attain their desired number of

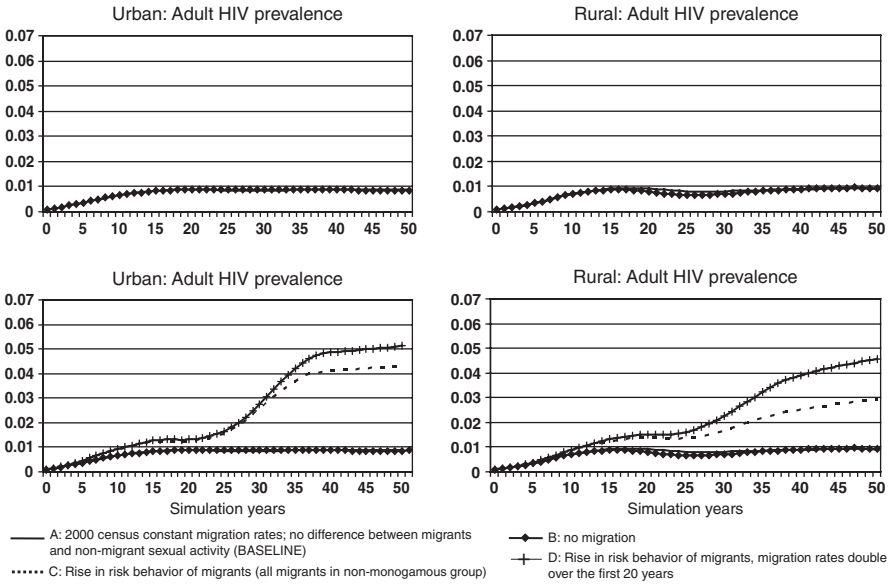

Fig. 2.4 Simulated adult HIV prevalence under various migration scenarios: A: China's 2000 census constant migration rates; B: No migration; C: Rise in risk behavior of migrants (all migrants become non-monogamous after migration); D: Migration rates double

regular partnerships, replace them with prostitute partners with whom they have sex twice per month, in line with the results of a behavioral surveillance study conducted in China's Yunnan and Sichuan provinces among 818 men aged 20–50 recruited through fixed-position interception on streets with high levels of pedestrian traffic (Horizon Market Research and Futures Group Europe 2002). In scenario F, urban surplus males' frequency of contacts with prostitutes is elevated to the same frequency as with non-prostitute partners, at seven contacts per month. A much higher frequency of contacts with prostitutes produces an explosive urban epidemic. In the face of an unchanging supply of prostitutes and a growing demand for their services, sexual contact between urban prostitutes and their clients in settings where prostitutes have many concurrent partnerships will place more susceptible men, together with their regular partners, at increased risk of infection from highly infectious prostitutes. With the massive urban epidemic fueled by high contact rates with prostitute partners, infections spread to rural areas through infected urban men moving there from urban areas. Thus, under conditions of widespread prevalence of adaptive risky behaviors, migration becomes an important vehicle of HIV transmission between geographically separated areas with different prevalence rates.

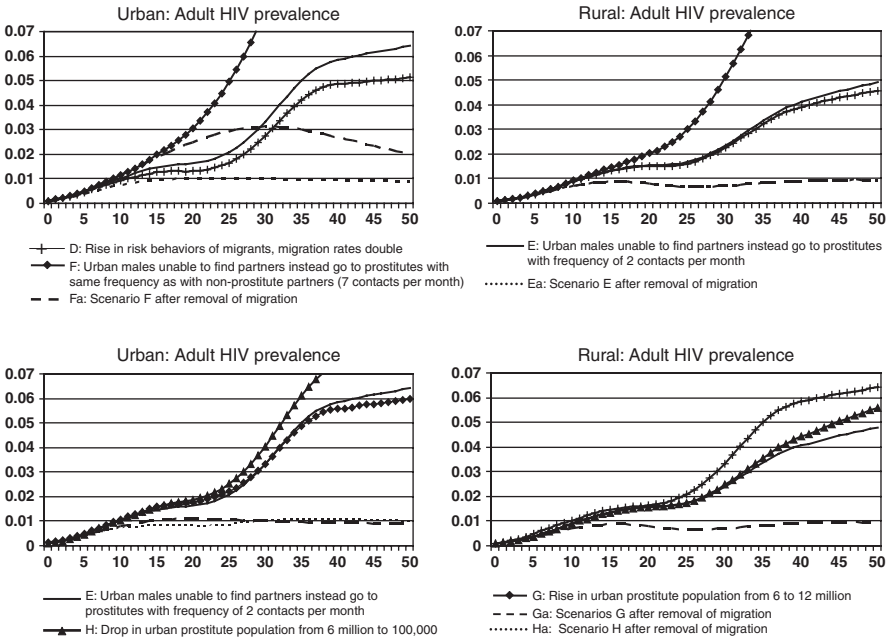

Fig. 2.5 Simulated adult HIV prevalence associated with variations in frequency of sexual contacts with prostitutes and in supply of prostitutes in response to a rise in patronage of prostitution by unattached urban males before and after the removal of migration

In scenario G, a high concentration of migrants in urban areas makes prostitution more profitable. An increase in the prostitute population to twice its original size with whom surplus men have two contacts per month tends to decelerate the speed of the epidemic relative to scenario E where the size of the prostitute population was set at the baseline level of 6,000,000 urban women. Conversely, a hypothetical extreme reduction in the number of urban prostitutes from 6 million to 100,000 (Scenario H) will produce a larger epidemic. When the supply of prostitutes is abundant, infection rates in urban areas taper off at around 6%. But when prostitutes are scarce, prevalence rises to 8.7% by the end of the simulation period. With a small supply of prostitutes, the probability of infection for susceptible men is raised by contacts with members of a small prostitute population that becomes saturated with HIV infections.

To isolate migrants' contribution to the spread of HIV through their risky adaptations to a dearth of suitable non-prostitute partners from those of other surplus males, Fig. 2.5 also plots HIV prevalence curves consistent with scenarios which describe the behavioral adaptations explored above in the absence of migration (dotted lines). Removing migration from Scenarios E

and F removes migrants from the pools of surplus men. With a frequency of contacts with prostitutes of two contacts per month, urban HIV prevalence rates at the end of the simulation period are respectively 6 and 1% with and without migration. With a frequency of contacts of seven contacts per month, they are 11 and 2% in urban areas, and this gap is even greater in rural areas, 12.8 and 0.9%. Similarly, with migration removed from the model, simulation outcomes are no longer sensitive to changes in the supply of female sex workers and prevalence remains at around 1% throughout the simulation period (Scenarios Ga and Ha). The absence of migration also keeps rural areas isolated from urban males' risk behaviors associated with prostitution, and the rural prevalence curve does not rise above 1%.

To more precisely quantify the role of migration in the spread of HIV under the behavioral adaptations scenarios explored in Figs. 2.5 and 2.6 plots the ratios of the annual HIV prevalence values for each pair of the simulations with and without migration. The magnitude of the ratios reflects the different degrees of sensitivity of simulation outcomes in the presence and absence of migration to the adoption of risky behaviors involving prostitution in urban areas. When migration is modeled to increase the rate of partner change, simulation outcomes are most sensitive to variations in behavioral parameters associated with patronage of commercial sex, frequency of contacts with female sex workers, and the size of the prostitute population as differences in the ratios of the explored behavioral scenarios with and without migration indicate. Under these behavioral adaptations scenarios, migration plays a very important role in the spread of HIV by connecting geographically separated urban and rural areas. When frequency of contacts with urban prostitutes is set at 7 contacts per month, the role of migration in bridging urban and rural infections is evidenced by the very high ratios in rural areas.

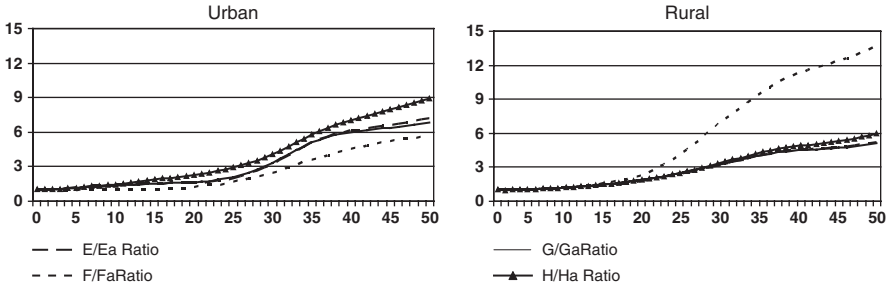

Fig. 2.6 Ratio of adult HIV prevalence rates with and without migration by simulation year

Conclusions

The extent to which HIV will spread through heterosexual transmission in China depends significantly on the levels and distribution of sexual activity and the prevalence of risk taking behaviors in the population. Owing to their inability to find suitable female partners, migrants are presumed to add to the share of individuals who display risky sexual behaviors that expose them to greater risk of HIV infection. Migration may impact the sexual partnership market and the spread of HIV by altering the sexual risk taking behaviors of migrants, by increasing patronage of commercial sex and the frequency of contacts with prostitute in response to a dearth of suitable female partners in areas of migrants' destination. Migrants may also fuel HIV transmission by linking geographically separated areas with differential HIV prevalence and by exposing previously unexposed populations in their home communities to the risk of HIV.

We employ a deterministic compartmental model of the spread of HIV/AIDS informed by the best available data on China's demographic and behavioral characteristics to assess the potential implications of behavioral adaptations spurred by migration for the spread of HIV. Model parameters are extracted from diverse data sets including China's most recent 2000 census and the Chinese Health and Family Life Survey (CHFLS), the first nationally representative survey of adult sexual behavior ever conducted in China. By utilizing inputs that are specific to the Chinese context in a macrosimulation model that describes the heterosexual spread of HIV in a population, we are able to evaluate the effects of migration as a macro-demographic condition on the sexual partnership market, and its potential implications for the adoption of sexual behaviors associated with HIV transmission and spread.

The model indicates that if migration induces behavioral change by increasing the share of individuals with multiple partnerships, it will have a significant impact on HIV prevalence. Additional mechanisms of migration-influenced HIV transmission explored here revealed the potentially massive implications for the spread of HIV of migrants' adaptations to the dearth of suitable female partners, e.g. patronage of commercial sex upon their move to urban areas where the market of prostitution is thriving, combined with high frequency of contacts with prostitutes. However, under the low rate of sexual partner change, as based on data obtained in the CHFLS, mobility flows alone do not play a significant role in spreading infection. Under the tightening conditions of the sexual partnership market in urban areas, the role played by migration in connecting geographically separated areas with different HIV prevalence rates and accelerating the epidemic in the rural areas of origin became evident as migrants replaced foregone partnerships

with their regular partners with prostitutes with the same frequency as with non-prostitute partners. Thus for migrants to become bridges of infection to rural areas, they would need to replace their foregone regular partnerships with prostitutes while maintaining the same frequency of sexual contacts.

Migration is a complex phenomenon, and Chinese migrants' sexual partnering patterns are not fully understood. Although the literature on the consequences of migration for the spread of HIV infection in China is large and growing, it still relies on stylized demographic facts to presume individual behavioral adaptations. Most information available is not sufficient to establish whether Chinese migrants adopt sexual behaviors that put them at risk of HIV and STD infection upon reaching their destination, and/or whether they are a selected group with respect to risky sexual behavior. Although several studies observe differences in sexual behaviours between Chinese rural migrants and their urban counterparts, these comparisons do not necessarily extend to migrants' sedentary peers in the communities of origin, limiting one's ability to understand the connection between migration and sexual behavior. Studies which collect comparable information on migrants and their non-migrant peers in the sending communities have been conducted mainly in Sub-Saharan Africa (Lagarde, Pison and Enel 1996; Lurie et al. 2003). They show that migrant men are more likely to display risk behaviors than their non-migrant peers in rural areas. Few studies, however, have examined migrants' behavioral adaptations to the experience of migration with a longitudinal research design. A rare longitudinal survey of Mexican migrants to the U.S. at origin and destination illustrates significant changes over time in individual sexual behaviors accompanying migration with marked differences by gender and marital status. For men, sexual practices such as patronage of commercial sex and secondary partnerships increased significantly with migration, while among single women, migration facilitated the formation of short term relationships (Parrado and Flippen 2006).

In China, more research is needed to understand how migrants differ from non-migrants at both origin and destination in terms of sexual behavior and other behaviors that are associated with increased risk of HIV transmission. Research on migration, sexual behaviors and HIV in China would benefit from following migrants, despite the obvious difficulties to prevent losses at follow-up entailed by any survey design which seeks to follow mobile populations (Thomas et al. 2000).

We have simulated behavioral changes among migrants upon arrival at destination that are consistent with the expectations formulated in a literature which overwhelmingly focuses on male migrants. Findings from a recent survey conducted in Southwest China suggest that there are important differences between male migrants and female migrants with respect to

behaviors linked to HIV risk. The implications of female migration for the spread of HIV may vary depending on whether female migrants, upon arrival to their destination, transition into prostitution because of gender inequality and structural constraints in the labor market rather than into other forms of sexual behaviors characterized by lower rates of partner change. The model we employed only enabled us to explore changes in the prostitute population and their implications for the spread of HIV, and did not allow us to represent the interaction between migration and prostitution. Other plausible scenarios which directly simulate female migrants' behavioral adaptations to new conditions at destination should be explored through modification of model structure and specifications. Knowledge about the determinants of commercial sex work in China and the motivations for prostitution will, in future work, inform a more dynamic modeling of the prostitute population which will enable modeling the process of population renewal and the cycling of women out of this population.

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Part II
China's Surplus Males and HIV/STD

Chapter 3
China's Unbalanced Sex Ratio at Birth: How Many Surplus Boys Have Been Born in China Since the 1980s?

Dudley L. Poston and Li Zhang

Introduction

In recent decades China has experienced an extremely rapid fertility reduction from more than six children per woman in the early 1960s to just over 1.6 children per woman in 2005 (Fig. 3.1). This fertility transition has resulted since the 1980s in significantly more boys being born each year than girls.

This demographic event has occurred, and China's demographic destiny has been determined. This event has important and relevant implications for China's marriage market starting around the year 2000. In this chapter we estimate that there will be over 31 million boys born between 1978 and 2005 in China who will not be able to find Chinese brides. We address the cause of this demographic shift is China's fertility transition. We discuss this phenomenon of many more boys being born each year than girls and its implications for China.

China's Fertility Transition and the Increasing Sex Ratio at Birth

China is now completing its demographic transition from high rates of fertility and mortality to low rates. Since the early 1960s, a rapid fertility decline has occurred in China, culminating in a total fertility rate in 2005 of just over 1.6 children per woman (see Fig. 3.1). Poston and Glover (2006) trace the history of population dynamics and fertility change in China from 1949,

D.L. Poston (✉)
Department of Sociology at Texas A&M University, College Station, TX, USA
e-mail: d-poston@tamu.edu

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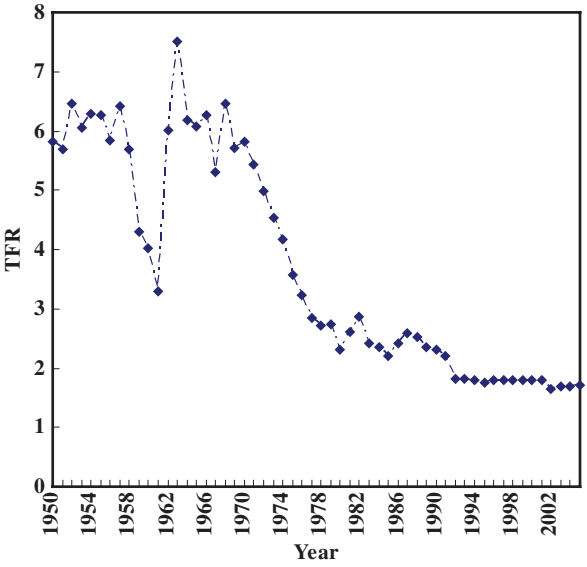

Fig. 3.1 Total Fertility Rates (TFRs): China, 1950–2005

when Mao Zedong and the Chinese Communist Party took power, through the first years of this new century. They note that the fertility reduction from 6 children per women to 1.6 children per women is one of the most dramatic fertility reductions in recorded demographic history. The rapid decline in the TFR since the mid-1960s and the 1970s has resulted in many extra baby boys compared to baby girls, being born in China every year since the 1980s, a demographic occurrence that has determined China's future (Poston and Glover, 2006).

Most societies have sex ratios at birth (SRBs) of around 105, that is, around 105 boys are born for every 100 girls. This is believed to be an evolutionary adaptation to the fact that females have higher survival probabilities than males. Since males have higher age-specific death rates than females at every year of life, around 105 or so males are required at birth for every 100 females for there to be roughly equal numbers of males and females when the groups reach marriageable age.

In Fig. 3.2 we show time-series data for the SRB for China and the United States, from 1980 to 2005. The SRB in the U.S. is invariant, at about 105 for every year. This is expected when there are no human interventions operating to disturb biology. In contrast, whereas in 1980 China had an SRB only slightly above 107, it began to increase in the late 1980s, reaching a value of 115 by 1990, a value of 120 in 2000, and 118 in 2005. Since the 1980s, the SRBs in China have been significantly above normal levels.

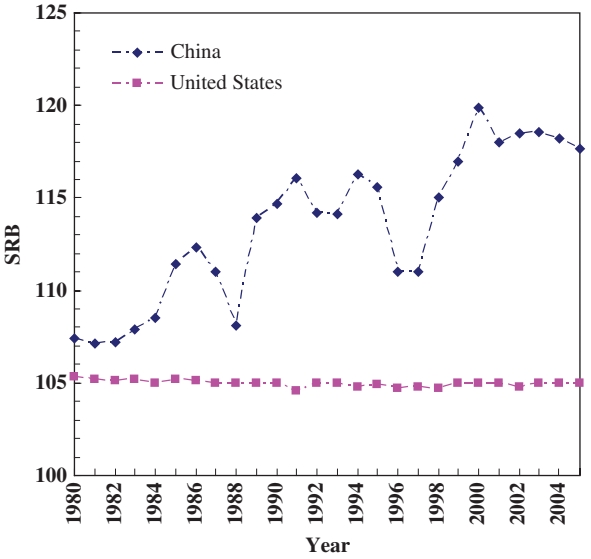

Fig. 3.2 Sex Ratios at Birth (SRBs): China and U.S., 1980–2005

If there are no human interferences with the biological processes, the SRB will range from 104 to 107, with an average of around 105. What are the kinds of human interventions that might disturb the biological processes?

China, as well as Taiwan, South Korea, India and several other Asian countries, have been reporting abnormally high SRBs since the 1980s (Arnold and Liu, 1986; Gu and Roy, 1995; Goodkind, 1996, 2002; Kim, 1997; Poston et al., 1997; Eberstadt, 2000; Hudson and Den Boer, 2002, 2004; Jha et al., 2006; Sheth, 2006). What are the immediate causes of these abnormally high SRBs? China and the other countries just mentioned are all showing, in varying degrees, the same kinds of intervention leading to abnormally high SRBs, namely, prenatal sex identification followed by gender-specific abortion (Hull, 1990; Johansson and Nygren, 1991; Chu, 2001; Banister, 2004; Jha et al., 2006).

Why would the Chinese resort to an intervention that would produce higher than biologically normal SRBs? We already noted that the immediate cause is China's dramatic fertility decline. Why would a rapid fertility reduction in China lead to abnormally high SRBs?

One reason is that China has a Confucian patriarchal tradition where son preference is strong and pervasive (Arnold and Liu, 1986; Gu and Roy, 1995; Kim, 1997; Park and Cho, 1995; Poston et al., 1997). Confucianism is a philosophy and way of life based on the writings of a sage, Confucius, and his disciples (Ruan, 1991). The Chinese name of the sage (in Pinyin) is *Kungfuzi* (551-479 B.C.), translated as Master Kung. Jesuit missionaries

in China in the seventeenth century Latinized his name as Confucius (Gernet, 1996: 87).

Female subordination is a major characteristic of Confucianism and was exemplified in such behaviors as female foot-binding (from the 10th century forward) and the modification of feminine clothing (1126–1279). Foot-binding is one of the most remarkable practices of female subordination in human history. The practice existed for around 1,000 years, and in that time more than 1 billion Chinese women had their feet bound, frequently to the preferred length of three inches.

The Book of Songs (*Shi Jing*) (Waley, 1996) is one of the seminal works of Chinese civilization and was written centuries before the time of Confucius. It is believed, however, that Confucius edited the *Songs* into their present form. One of the *Songs* illustrates well the importance of sons:

> When a son is born
> Let him sleep on the bed,
> Clothe him with fine clothes
> And give him jade to play with.
> How lordly his cry is!
> May he grow up to wear crimson
> And be the lord of the clan and the tribe.
>
> When a daughter is born,
> Let her sleep on the ground,
> Wrap her in common wrappings,
> And give her broken tiles for playthings.
> May she have no faults, no merits of her own.
> May she well attend to food and wine,
> And bring no discredit to her parents.

A preference for sons is a part of China's long history and culture. But when fertility was high, the chances that a boy would be born were good (Pison, 2004). When Chinese women were having six children on average, the probability was very low (less than 2%) that none of the six children would be male. By comparison, when women have two children, the probability that neither will be a son is much higher (around 25%). And when women have only one child, the probability that it will not be a son is just under 50%.

Birth planning policies, as well as social, economic, and industrial transformations in China, have been responsible for the number of babies born per woman falling below replacement levels, and doing so quickly (Poston, 2000). Couples now have fewer children than they had just a couple

of decades ago. However, the deeply-rooted cultural influences of son preference still make it important for many families to have at least one son. Thus, many families implement strategies and interventions to ensure that they will have a son (Gu and Roy, 1995; Zeng et al., 1993).

Since the late 1980s, ultrasound technology enabling the pre-natal determination of sex has been widely available. Recently, China proposed a ban on the practice and launched a "pro-girl" media campaign to help mediate the strong son preference (China Daily, 2004). This campaign, however, is not believed to have had much of an impact.

There is little evidence of female infanticide causing the high SRBs (Zeng et al., 1993; Eberstadt, 2000: 228; Chu, 2001; Banister, 2004). The human interventions that disturb the SRB are mainly due to norms and traditions among Chinese families to have sons, within a more recent policy as well as a normative context to have fewer births.

Are the reported SRBs for China the true values of the SRB? The higher than biologically normal sex ratios at birth in China are being registered in the context of a birth registration system that is not 100% complete (Eberstadt, 2000: 228;Goodkind, 2002). As a consequence, most of the reported SRB data for China come from other sources, including sample surveys and censuses. But the reported SRB data are often higher than SRB data for the same years collected in 945 Chinese hospitals in 29 provinces covering over 1.2 million birth records (Zeng et al., 1993; Goodkind, 2002). The hospital SRB data are complete, but are they representative of the SRBs in the country as a whole?

The hospitals may well be reporting SRB data that are biased downwards. As Goodkind (2002: 4) has noted, "this could occur if the hospitals tended to be located in (urban) areas where son preferences are less strong and sex-selective abortion less common. ... A second potential bias ... could occur if parents choosing sex selective abortion were more likely to have their births away from hospitals."

On the other hand, the national SRB data may be biased upwards, because of the underreporting of the births of girls. The underreporting of female births is acknowledged to occur because parents are usually able to avoid the penalties normally imposed under one-child policy if they do not report the births of girls (Goodkind, 2002: 4).

Some demographers are unsure whether the national, often survey-based SRB data are more valid than the more limited, often urban-based hospital SRB data (Goodkind, 2002). Data from the 2000 census, however, provide an SRB value for the year 2000 of 119.9 (State Council and State Statistical Bureau, 2002). This value, although high, is much more consistent with the trends in the SRB based on the national-level data than those based on the hospital-level data. Thus, it is likely that the national-level SRB data are

reliable. First, the SRB data based on the 2000 census, unlike the SRBs for earlier years based on surveys, are virtually 100% complete. Second, it is more difficult in census reporting in China to underreport (i.e., hide) a newborn baby girl than is the case in the more selective and less representative surveys. Banister (2004) has written that the shortage of girls in China is real and not due to the undercounting of girls.

It was noted earlier that the SRB is biologically normal at about 105 because this excess number of males generally guarantees near equal numbers of males and females when the groups reach marriageable ages. For decades, the U.S. has had a balanced sex ratio at birth of around 105 (see Fig. 3.2). Figure 3.3 shows sex ratios in the U.S. for 1990 and for 2000 for every 5-year age group. The sex ratio is around 105 at age zero and drops to below 100 for the ages 25–34, when American men and women typically marry.

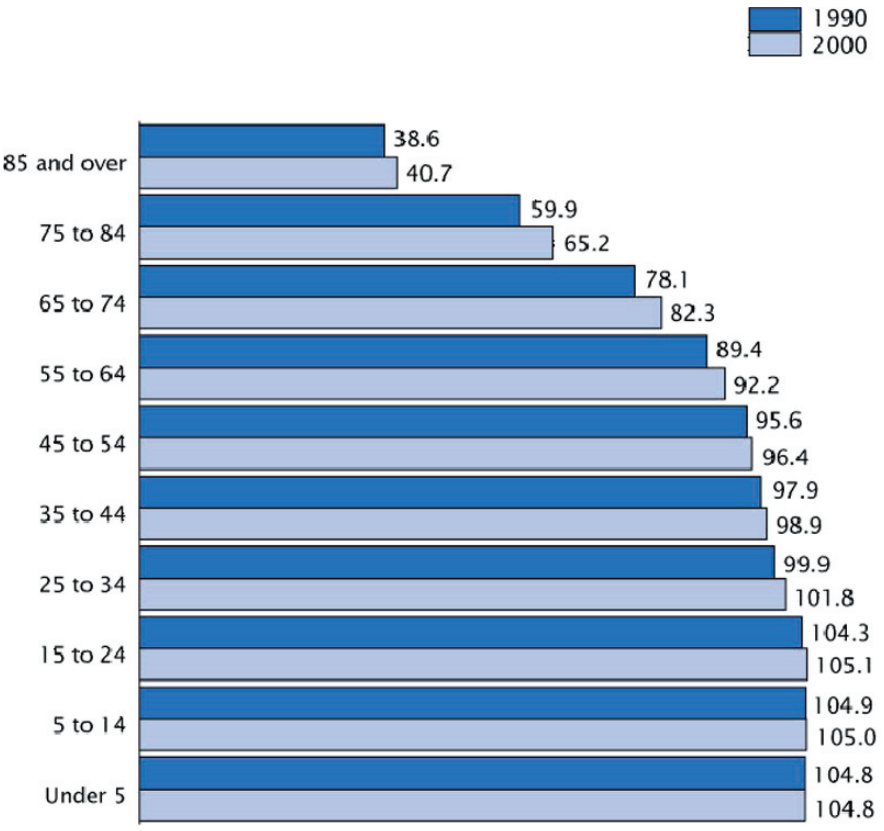

Fig. 3.3 Sex ratios by age: U.S., 1990 and 2000
Source: U.S. Census Bureau, Census 2000 Summary File 1; 1990 Census of Population, *General Population Characteristics: United States* (1990 CP-1-1).

Abnormally high SRBs, however, will disturb this balance. In China, starting around the year 2000 and continuing until around 2025, there will be many extra boys of marriage-age who will be unsuccessful in seeking females to marry. How many excess Chinese boys will there be in China who will be unable to find Chinese brides?

For every year from 1978 to 2005, we have gathered data on China's total population size, the crude birth rate, and the sex ratio at birth. With these data it is easy to calculate the numbers of males and females born every year; these are shown in Fig. 3.4. Using "l(x)" data from China life tables for males and for females based on 1989–90 death data (Huang and Liu, 1995: Tables 2-6-1 and 2-6-2), the boys born each year are then survived to age 25, and the girls born each year to age 23 (see Fig. 3.5). These are the "encouraged" ages at first marriage for men and women in China (China Population Information and Research Center, 2003). For each year starting in the year of 2000 through the year of 2025, the numbers of females survived to age 23 are subtracted from the number of males survived to age 25. Given an approximate two year difference in the ages of males and females at first marriage, each year the females of age 23 will comprise the pool of potential brides for the males of age 25.

The numbers of marriage-age males and marriage-age females appearing in 2000 were born in 1975 (males) and in 1977 (females). It is estimated there was a surplus in 2000 of over 300,000 males. In 2004 the male surplus is estimated to be almost 1.6 million. In the years of 2011, 2012, and 2013, the numbers of excess males are estimated to be 2.3, 2.7, and 2.1 million,

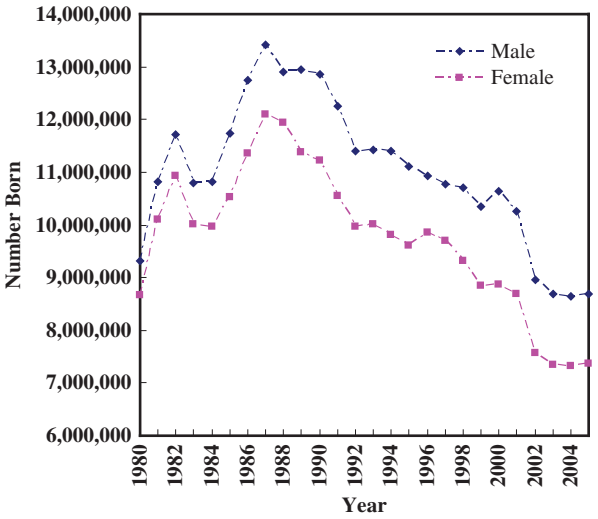

Fig. 3.4 Males and females born in China: 1980–2005

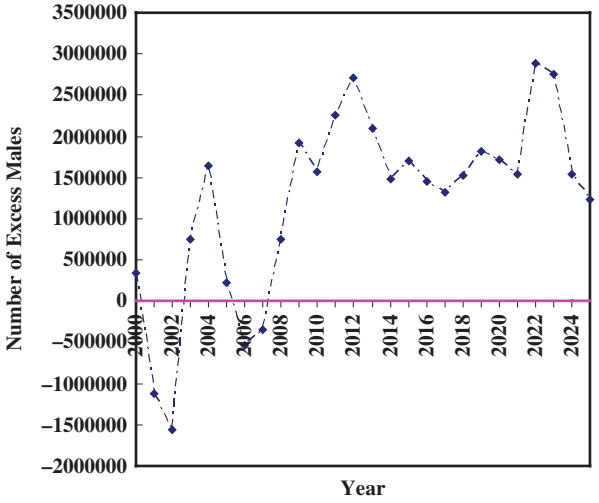

Fig. 3.5 Number of excess males at marrying age of 25: China, 2000–2025

respectively. There are a few years (2001, 2002, 2006, and 2007) when there will actually be deficits of males. In all, between the years of 2000 and 2025 we estimate there will be a surplus of more than 31.6 million surplus males looking for wives. There will not be enough Chinese women in the marriage market for them to marry.

We may also estimate the numbers of surplus boys by altering the first marriage ages of the males to, say, 27 or 29, and the females to, say, 25 and 27. But no matter to which ages the males and females are survived, there will be a large excess number of marriage-age males, over 30 million, who will not be able to find women to marry who are two years younger than they. This will occur in a society where marriage is nearly universal. What will these many millions of young men do when they cannot find brides? We explore some of the implications in the final section of this chapter.

Implications

The analysis undertaken in this chapter indicates that the unbalanced sex ratios in China since the 1980s have resulted, and will result, in the existence between 2000 and 2025 of over 31 million more marriage-age males than marriage-age females. These males are known in Chinese as *guang gun*, translated as "bare branches" or "bare sticks." Few Chinese know what will happen to the *guang gun*. Eberstadt (2000: 230) references a 1997 essay published in the Chinese magazine *Renmin Luntan* that predicted that "such

sexual crimes as forced marriages, girls stolen for wives, bigamy, visiting prostitutes, rape, adultery ... homosexuality ... and weird sexual habits appear to be unavoidable."

We now discuss some of the implications of this excess number of young marriage-age males (also see Poston and Morrison [2005] and Poston and Glover [2006] for more discussion). Of the various scenarios that could occur in China in the next few decades as the country's demographic destiny caused by over 31 million excess males is realized, some may be more probable than others. We do not expect that China will have an easy time adapting and adjusting. For while it is true that throughout history, especially in Western Europe, "bachelorhood was an acceptable social role, and the incidence of never-marrying bachelors in the total population was high" (Eberstadt, 2000: 230; Hajnal, 1965), historically China has never been characterized as such. Eberstadt (2000: 230) may well be correct in his remark that "unless it is swept by a truly radical change in cultural and social attitudes toward marriage in the next two decades, ... China (is) poised to experience an increasingly intense, and perhaps desperate, competition among young men for the nation's limited supply of brides."

China could well turn to a more authoritarian form of government and slow down its progress toward democracy. China could try to handle the potential unrest of the *guang gun* by sending them to public works projects thousands of miles away from the big cities, e.g., the natural gas pipeline from the western provinces to Shanghai, the railroad to Tibet, and the Three Gorges Dam. There is also historical precedent for dispatching Chinese to the countryside. In 1960 at the end of the Great Leap Forward (1958–60), nearly 14 million city residents were systematically and involuntarily shipped to the rural areas and remained there for years. During the Cultural Revolution (1966–76) millions of young unmarried males and females were involuntarily sent to the countryside to work with and to "learn from," the peasants; their stays sometimes lasted for a decade or more (Fairbank, 1992; Thurston, 1987).

China is already co-opting young and poor unmarried males into the People's Liberation Army and into the paramilitary People's Armed Police. Indeed, many of the armed personnel who participated in the crushing of the Tiananmen pro-democracy movement and rebellion in 1989 were poor, uneducated, unmarried males from isolated rural areas of China. In the next few decades there will be many millions more such males available for recruitment into these and similar kinds of roles.

One unlikely solution to the problem is the immigration to China of Chinese women from Hong Kong, Singapore, Indonesia, Thailand, and other countries with large populations of Chinese (Poston et al., 1994; Poston, 2003). Marriage migration is not new to China. There is ample evidence

of the internal migration of brides from provinces hundreds and thousands of miles away to other provinces for the purpose of marriage. But there is little evidence of brides immigrating to China from other countries to marry Chinese men (Yang, 1991; Xu and Ye, 1992; Davin, 1998; Fan and Huang, 1998). Moreover, many of the excess males will be poor rural workers and not able to afford "mail order brides" (Eberstadt, 2000: 231; Dean, 2000).

Polyandry is another possibility (Cassidy and Lee, 1989). There is actually some limited evidence of its existence among a few of China's minority populations (Zhang, 1997; Johnson and Zhang, 1991). But it is deemed unlikely throughout most of China.

An even less likely solution would be increases in levels of homosexuality. This is not really an alternative since much scientific evidence on the origins of homosexuality argues in favor of a biological foundation (LeVay, 1991, 1996; Masters et al., 1994; Pinker, 2002; also see Stein, 1999, and Murray, 2000, for other views and arguments). It is unlikely that when Chinese males are unable to find females to marry that they would turn to long-term homosexual relationships.

The most likely possibility is that these Chinese bachelors will never marry. They will re-settle with one another in "bachelor ghettos" in Beijing, Shanghai, Guangzhou, Tianjin and the other big cities in China, where commercial sex outlets are prevalent. There is also historical precedent behind this expectation. In the 19th century many thousands of young Chinese men immigrated to the United States to work in the gold mines and to help build the railroads. When the work projects were completed, most stayed in the U.S. and re-settled in Chinese bachelor ghetto areas in New York, San Francisco and a few other large U.S. cities (Lee, 1960; Kwong, 1987; Zhou, 1992). The sex ratios of the Chinese in these areas were extraordinarily high. In 1850 the sex ratio of the Chinese living in San Francisco was almost 40,000 (787 males and a mere 2 females) (Tsai, 1986: 2). In 1900, the then very small Chinatown in New York City had a sex ratio of over 11,000 (about 4,000 men and only 36 women). In the same year, the state of New York had a Chinese sex ratio of almost 5,000 (7,028 men and only 142 women) (Zhou, 1992).

A major issue of concern with these *guang gun* settling in bachelor ghettos is the potential for an HIV/AIDS epidemic of a scale previously unimagined. This will especially be the case if China's commercial sex markets in the big cities expand to accommodate the millions of surplus males (Parish et al. 2003; Tucker et al. 2005).

If these men do not marry, they will be more prone to crime than if they were married (Mazur and Michalek, 1998; Horney et al., 1995; Sampson and Laub, 1990). Research has shown that banditry, violence, and revolutions are

likely to occur in areas with large numbers of excess males (Hudson and Den Boer, 2002). This is a real implication of China's demographic destiny.

No one, of course, knows what this excess number of young Chinese males will do. Several possibilities have been entertained. However, it is known for certain that there have already been born over 31 million more baby Chinese boys than there will be Chinese girls for them to marry. These "bare branches" are China's demographic destiny. Their presence is beginning to be felt in China's marriage market and will continue to be felt, at least until 2025, perhaps longer.

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Chapter 4
Bare Branches, Prostitution, and HIV in China: A Demographic Analysis

Avraham Y. Ebenstein and Ethan Jennings

Introduction

The alarming rise in China's reported HIV cases in the last decade has caused concern among government officials and public health researchers. The increase in reported HIV cases is especially worrying because the majority of new cases are not observed in traditional high risk populations (such as intravenous drug users and recipients of former plasma donors), but are sexually transmitted. This chapter analyzes the demographic patterns in China that may be an important determinant of the increase in sexually transmitted HIV infections. High sex ratios, numbers of men relative to numbers of women, in young cohorts of Chinese men and women contribute to the increasing failure of Chinese men to marry. These men, referred to as bare branches (*guang gun*) since they will be unable to extend the family tree, are more likely to migrate to regions with more favorable marriage markets, and may be more likely to purchase sex. This behavior in turn increases men's risk of sexually transmitted infections, including HIV. We also analyze how further increases in sex ratios among Chinese men and women of marrying ages may affect migration patterns, commercial sex demand, and the spread of HIV.

We begin the analysis in the second section with a brief history of HIV in China during the last two decades. In the third section, we present forecasts for demographic changes in China in the 21st century, describing how the entry of cohorts with highly skewed sex ratios into the marriage pool may result in large numbers of males marrying late, or failing to marry. In the fourth section considers how the imbalanced sex ratios and socio-economic

A.Y. Ebenstein (✉)
Robert Wood Johnson Health Scholar Program at Harvard University, Boston, MA, USA
e-mail: aebenste@rwj.harvard.edu

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trends may promote an outmigration from rural to urban areas in search of wives and jobs. Such groups of young, poor, single men may have increased sexual risk compared to their rural counterparts. In the fifth section we present evidence that areas within China with large numbers of unmarried men are associated with higher reported rates of purchasing sex among men, and explore via simulation how the failure of men to marry may increase STI and/or HIV incidence in the future. The sixth section discusses the actions currently being taken by the Chinese government to reduce sex ratios at birth and to curb the spread of HIV in high risk populations. We conclude in the seventh section with a brief discussion of China's policy options in light of the results of our analysis.

The Spread of HIV in China

While this article focuses primarily on the spread of HIV among sex workers and their clientele, new reported HIV cases during the 1990s were concentrated among IVDU and blood transfusion recipients. During the mid-1990s, however, HIV spread to new regions and populations previously not considered at risk. Sexual transmission has recently overtaken IVDU as the

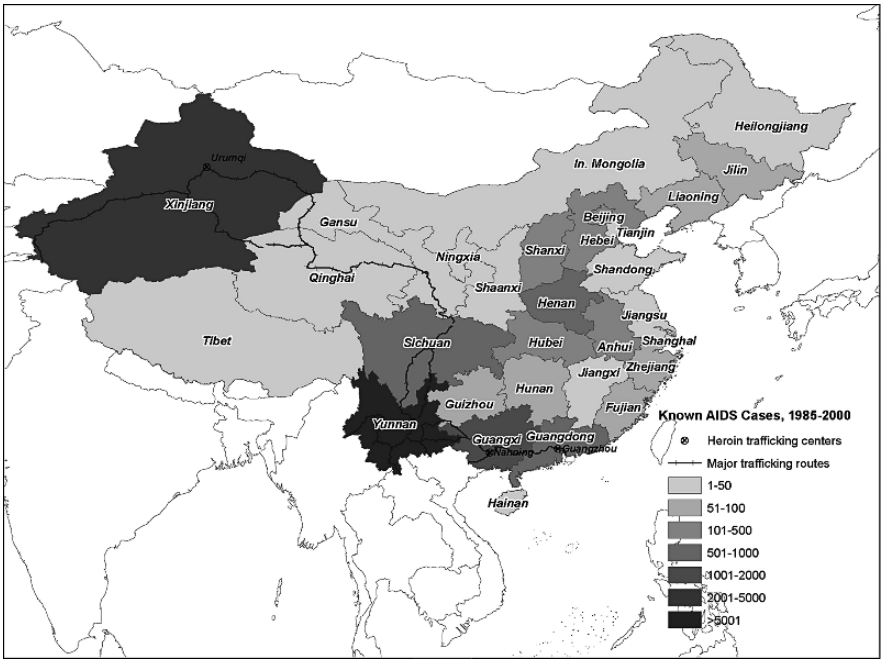

Fig. 4.1 AIDS cases and the Heroin trade, 1985–2000
Source: Hesketh et al., 2002; Beyrer et al., 2000.

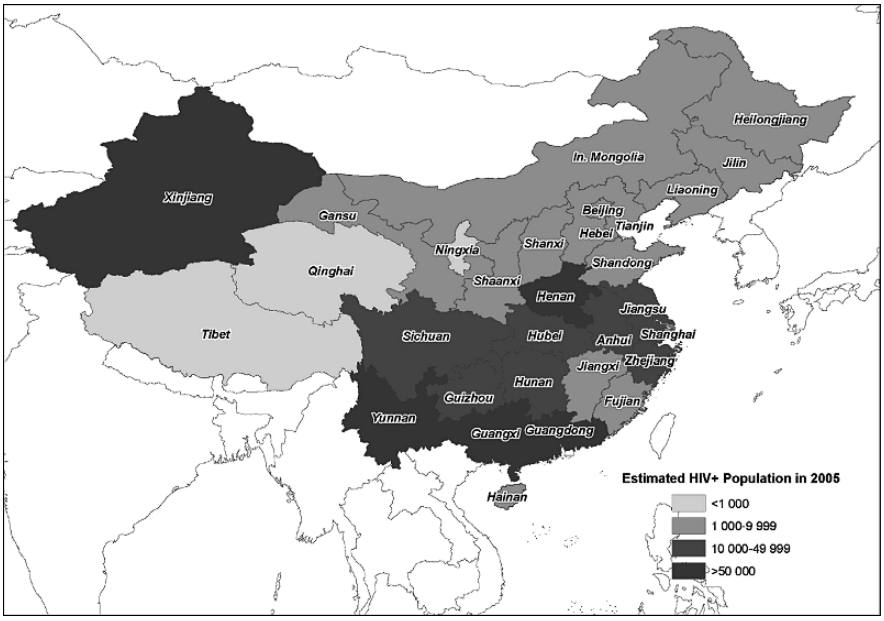

Fig. 4.2 HIV+ population in China, 2005
Source: Lu et al., 2006.

most common route of HIV transmission in China. High risk sexual activities between traditional high risk groups and the general population have promoted the spread of HIV beyond traditional high risk groups and across a wider area in recent years (Fig. 4.1, 4.2).

In the early 1990s, over 80% of identified HIV cases were located in the southern province of Yunnan; many of these cases represent non-Han Chinese farm laborers who were intravenous drug users. A significant proportion of the world's heroin in the 1990s and early 2000s was produced in the Southeast Asian countries of Myanmar, Laos, Vietnam, and Thailand, collectively known as the Golden Triangle. From border towns in Myanmar, heroin is transported by road to Kunming, a major city in Yunnan Province. The heroin then continues east by road or air via the city of Nanning to markets in Hong Kong. In the mid-1990s, the rapid growth in the HIV positive population in Guangxi Province was likely related to high levels of intravenous drug use in towns along the transport route between Kunming and Nanning. HIV also spread among cities in Guangxi province bordering Vietnam by intravenous drug users procuring heroin from Vietnam.

The northwestern province of Xinjiang also had a large HIV positive population during this period. Studies using molecular epidemiology to trace the path of illegally trafficked heroin have found that heroin arriving in Kunming is also diverted north and west to Ürümqi, a city in Xinjiang Autonomous

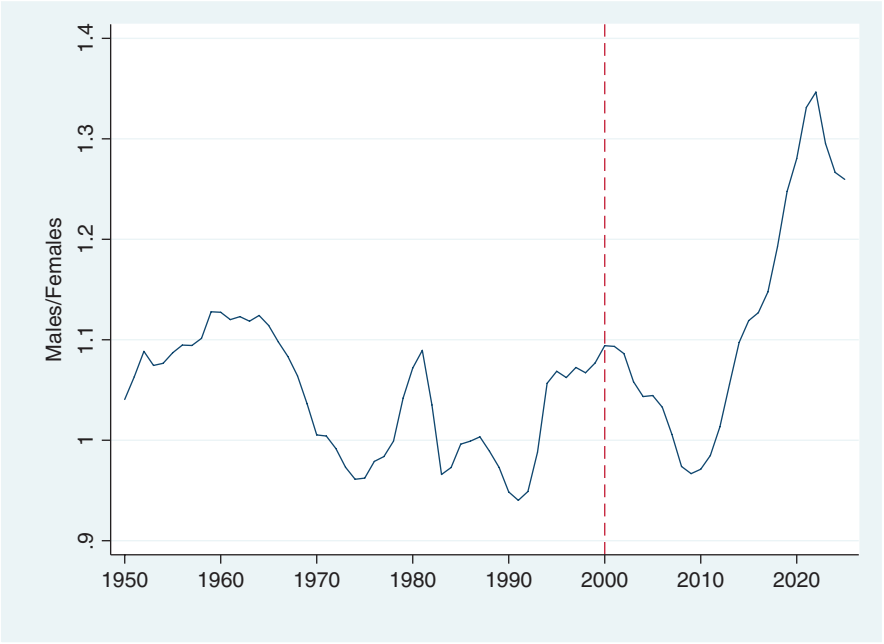

Fig. 4.3 Sex ratio of the marriage market in China, 1950–2050
Notes: The marriage market is defined as men ages 22–32 and women ages 20–30. The sex ratio for each year is calculated using data from the 2000 census, modeling population changes with age-sex-year specific mortality rates. The population is simulated forward from 2000 using baseline case fertility assumptions (explained in greater detail below) and a sex ratio at birth of 1.09 from 2005 and beyond. The vertical dotted line indicates the year 2000.
Source: China 2000 Census; authors' calculations.

Region, via Chengdu in western Sichuan Province (Beyrer et al., 2000). Xinjiang Autonomous Region is close to the world's largest heroin producing region, the Golden Crescent, which includes Afghanistan, Iran, and Pakistan. As heroin production increases in this region, documented surges in the traffic of opiates from Afghanistan, Iran, and Pakistan to western China via Ürümqi pose an even greater threat to HIV prevention and the public's health (Xinhua News Service, 2007).

Not only is HIV spread among intravenous drug users via sharing infected needles, but drug users may also engage in high risk sexual behaviors. Such IVDU may transmit HIV infection or other STIs to their long term partners or commercial sex partners. (Li et al., 2000). Several studies support that a subset of IVDU with increased sexual risk have a higher prevalence of HIV and syphilis infection (Ruan et al., 2004), and results from a study of female heroin users found that HIV-related risk behaviors are common (Wang & Lin 2003).

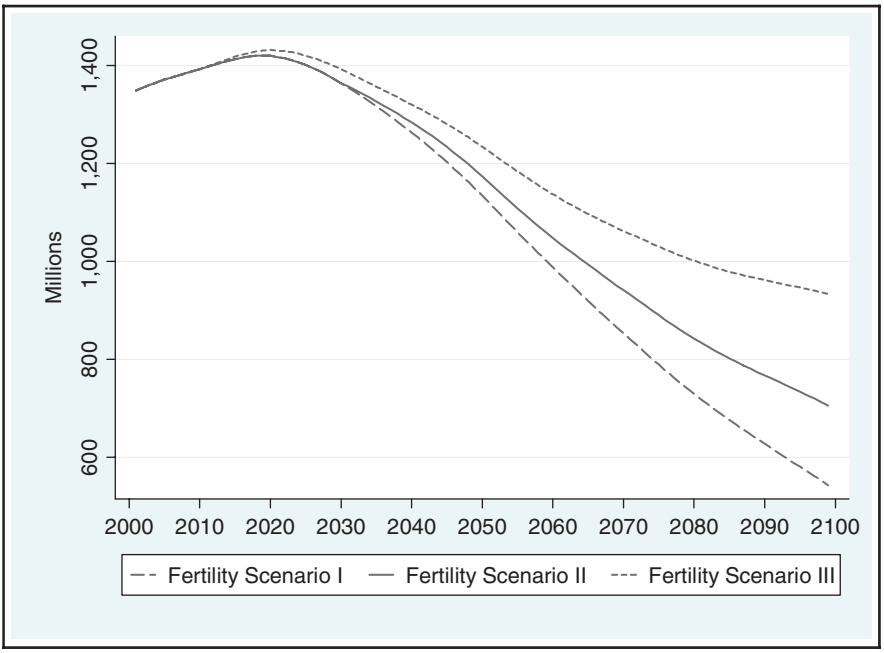

Fig. 4.4 Population of China during the 21st century
Notes: The simulations assume mortality rates documented in Hill and Banister (2004). The age-specific fertility rates for years 2000–2004 are determined from the published rates for 2004 (total fertility rate = 1.45). The scenarios vary by their assumptions for the predicted total fertility rate in China, and are described in the text.
Source: China 2000 Census; author's calculations.

The spread of HIV through central China in the 1990s was not primarily due to intravenous drug users, but was caused by unsafe blood collection and transfusion practices (Yang et al., 2005a). In Central China, impoverished farm workers in rural areas supplemented their income by donating blood plasma, and donors were frequently not tested for HIV infection. In areas such as Henan and Sichuan Provinces, many individuals contracted HIV from these unsafe medical practices. While these unsafe practices contributed to the spread of HIV, limited research suggests that blood donors and plasma donation recipients are not more likely than others to have unsafe sexual practices or multiple partners, limiting the spread of HIV from these individuals to others via sexual activity (Wu et al., 2001; Ji et al., 2006). In response to this problem, the government has improved collection and transfusion practices, routinely tests blood donors for HIV, and has shut down many unlicensed blood collection centers. As a result, HIV transmission due to blood transactions has been effectively halted in the central region. Unfortunately, as indicated on the map above, the estimated number of HIV

Table 4.1 HIV infections in China by transmission source

Intravenous Drug Users	Sex Worker[1]	Infected Partner[2]	Homosexual Sex[3]	Commercial Blood[4]	Mother to Child
44.3%	19.6%	16.7%	7.3%	10.7%	1.4%

[1] Sex Worker refers to prostitutes and their clients.
[2] Infected Partner refers to those living with HIV who contracted it from their partner.
[3] Homosexual sex refers to men who have sex with men.
[4] Commercial blood refers to blood and plasma donors who were infected through donation or transfusion.
Source: China Ministry of Health, People's Republic of China (2005).

positive individuals in this region has been growing rapidly during the later 1990s and early years of this decade.

Currently, the number of HIV-positive individuals who contracted the disease through sexual contact is as large as the number who were infected through intravenous drug use, and HIV positive individuals who contracted the virus from sexual activity represented 50% of all new cases in 2005 (Qian et al., 2005). The HIV positive population can be broken down into four groups (see Table 4.1). Intravenous drug users represent 44.3% of the total estimated HIV population, and those who were infected through sex represent 43.6% of HIV infections. Of those who were infected via sexual contact, 19.6% of cases were directly contracted from sex with a sex worker, 16.7% were from an infected partner, and 7.3% were attributed to men having sex with men. The third population, those who donated or received blood from commercial blood donors, represent 10.7% of the total estimated HIV population, and the remaining cases (representing 1.4% of the total HIV positive population) are those infected via mother-to-child transmission. Because HIV infection is growing most rapidly among those who contract the disease from sexual contact, identifying the groups most at risk in this population is of crucial importance.

Missing Girls and Unmarried Men

Subsets of single, poor, young men in China may be able to afford a commercial sex worker, but not a wife. Compared to their rural married counterparts, such groups of single men may have increased risk for STI and HIV infection. As demographic trends in China lead to larger imbalances between numbers of men and women (Fig. 4.3), increasing numbers of men will delay marriage and ultimately remain unmarried. For cohorts born between 1980 and 2000, there are 22 million more men than women. This phenomenon of missing girls implies that roughly 10.4% of the men in these cohorts can be

expected to fail to ever marry.[1] Since many unmarried men may have higher rates of unprotected sex, it is important to predict the extent to which the unmarried male population in China will grow in the future.

The failure of men in China to marry due to a shortage of females is not an entirely new phenomenon. High sex ratios in China can be observed even in the 19th century, when missionaries reported that women interviewed indicated very high rates of female infant mortality (Coale and Banister, 1994). Data on men born between 1935 and 1945 from China's 1982 census show that 5.9% of the men failed to marry, while only 0.18% of the women failed to marry (see Table 4.2). Marriage prospects for men born between 1945 and 1955 were only slightly better, with 5.5% of men failing to marry.[2] Given the stigma attached to those who remain single, it is unsurprising that in

Table 4.2 Marriage rates in China

	Cohorts born 1935–1945		Cohorts born 1945–1955		Cohorts born 1955–1965	
	Men (%)	Women (%)	Men (%)	Women (%)	Men (%)	Women (%)
Share Never Married	5.88	0.18	5.49	0.29	3.82	0.38
Share Illiterate, Ever Married Men	20.8	–	7.7	–	1.1	
Share Illiterate, Never Married Men	48.6	–	33.3	–	12.7	

Source: Calculations derived from .1% 1982 Census, 1% 1990 Census, and .1% 2000 Census.

[1] Percentage projected using data from China's 2000 Census. Factors that will affect the share who men fail to marry, such as net migration and the flexibility of individuals to marry a spouse of a very different age (Bhrolchain, 2001), will be addressed in this section.

[2] One surprising finding is that the marriage rate was very high for cohorts of men born between 1935 and 1944 (almost 95%), in spite of the high sex ratio in these cohorts. As shown in Table 4.2, the ratio of men to women was roughly 1.14 to 1, so we might expect that more men would fail to find a spouse. One explanation for the high marriage rate among these men is that the sex ratios of cohorts entering the marriage market in the 1960s were falling. Many of the men from previous cohorts delayed marriage and married women from these younger cohorts. Intuitively, the observed increase in the age gap in spouses of a full year implies that on average men delayed marriage one year, and thus had an additional cohort of women to choose from (given that women do not generally marry men their age or younger men). Men's ability to marry women in younger cohorts has the potential to mitigate sex ratio distortions in any particular cohort. Such adaptation was also observed in England following World War I, and in other contexts where people feared a collapse in the marriage market and none ensued (Bhrolchain, 2001).

Table 4.3 Comparative statistics regarding condom usage and prostitution

	China		United States	
	Always or usually	Never or rarely	Always or usually	Never or rarely
Respondents use condoms during sexual intercourse	26.02%	73.98%	35.09%	64.91%
Respondents admit having paid for sex	12.13%		8.99%	

Notes: Samples restricted to men between the ages of twenty and thirty. Chinese statistics are calculated from the China Health and Family Life Survey (CHFLS), and United States statistics are calculated from the Chicago Health and Social Life Survey (CHSLS). The Chinese survey asks questions regarding condom usage in long-term-, short-term-, and paid-sex relationships, while the American survey asks questions regarding condom usage with a respondent's two most recent sex partners. Though it is expected that recent sex partners of the CHSLS respondents are primarily long-term or monogamous partners, comparability between the China and United States statistics is maintained by the fact that short-term and paid-sex relationships make up only a small fraction of the CHFLS responses.

Source: China Health and Family Life Survey (CHFLS); Chicago Health and Social Life Survey (CHFLS). Remove the following text from the "Notes": "Chinese statistics are calculated from the China Health and Family Life Survey (CHFLS), and United States statistics are calculated from the Chicago Health and Social Life Survey (CHFLS)."

each cohort unmarried men have lower literacy rates than men who marry. Concern over the "bare branches" is partly due to the distributional consequences of this phenomenon, since the men who have the worst economic prospects will generally be forced to bear the burden of remaining single.

Relative to earlier cohorts, the situation improved for men born during China's baby boom of the 1950s and 1960s. Higher fertility rates were associated with less distorted sex ratios, since parents were able to have a son without resorting to sex selection. Men's marital prospects were improved by this population growth, which allowed them to select brides from a larger group of younger women. Data on these cohorts reflect the relative success of these men: for cohorts born between 1955 and 1965, the rate of failure to marry was only 3.8% for men and 0.3% for women. As a result, unmarried men from these cohorts represent an even more disadvantaged group. Among those who married, 1.1% of men were illiterate, but among those who failed to marry, roughly 13% were illiterate.

Unfortunately, China is on the cusp of a dramatic deterioration in the marital prospects for men. As shown in above figure, the sex imbalance between potential spouses is forecast to be at its worst by 2025, as the cohorts with the

highest sex ratios born under the One Child Policy reach adulthood. What are plausible estimates of the number of unmarried men in China in the years to come? Such estimates depend on the sex ratios of future cohorts and the growth rate of the population. In the remainder of this section, we describe the derivation and results of population simulations which capture the anticipated effect of high sex ratios on the number of unmarried males over the course of the 21st century.

Projected declines in fertility may exacerbate the impact of the sex ratio imbalance on the marriage market, since future cohorts of men will be unable to find brides in younger and smaller cohorts, but current and future fertility rates in China are still a matter of scholarly debate.[3] The effect of varying assumptions about fertility on projection of the total population of China is significant (Fig. 4.4). In the above figure, we present three potential scenarios for the fertility rate in China during the next century. For the years 2000 to 2005, we assume a total fertility rate (TFR) of 1.45 based on China's National Bureau of Statistics estimate from 2004 survey data.[4] The first scenario assumes that the TFR remains stable at 1.45 for the duration of the century, which leads to a massive population decline. The second scenario assumes a phased-in increase in the TFR, reaching the replacement rate of 2.1 in 2030. The third variant assumes that the One Child Policy is immediately abandoned and the TFR increases to the replacement rate in 2010. The intermediate scenario is used in the simulations as the baseline case throughout the paper.

The potential trajectories for the sex ratio at birth (SRB) in China from 2006 to 2100 are summarized by four scenarios. The first scenario assumes an immediate correction in the sex ratio at birth to 1.06, which is overly optimistic but represents a lower bound for our analysis. The second scenario assumes that the government's policy is effective at stabilizing the SRB at 1.09, a level identified as a government target (Li, 2007). The third scenario assumes that the SRB in 2005 of 1.18 persists indefinitely, and the fourth scenario assumes a further deterioration of the situation and a SRB of 1.25.

The simulations are executed using age-specific mortality rates reported by Banister and Hill (2004), and essentially assume no improvement in life expectancy from the year 2000 onward. The marriage rule assumes that men marry all available women who are in nearby birth cohorts, until the supply

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[3] Data from the 2000 census indicate a total fertility rate of 1.22 children in the prior year, but some argue that a number of parents mislead census officials out of a fear of punishment due to violations of the One Child Policy (Retherford et al. 2005). Retherford et al. estimate that the TFR in China in 2000 was roughly 1.5. The CIA Factbook estimate for 2007 is 1.75.

[4] This is based on the Sample Survey on Population Changes (2004), and is available online at http://www.allcountries.org/china_statistics/.

of females is exhausted and the remaining males fail to marry. The details of the algorithm generating the projections are described in the section, "Technical Assumptions."

The results of the simulation are presented in Fig. 4.5. Note that the fraction of men age 25 and older who fail to marry will exceed 5% by 2020. As the cohorts born in recent years enter the marriage market and some fraction inevitably fail to match, the size of the "bare branch" population will rise well beyond this level. In 2035 and beyond, the currently unborn cohorts of males will begin to enter the marriage market and contribute to the population of unmarried males. In the most optimistic scenario, where the sex ratio returns to normal immediately in 2006, the share of men who fail to marry in 2060 will stabilize just below 10%. In the second scenario, unmarried men will represent roughly 10–12% of the men aged 25 and older. In the third and fourth scenarios, where the SRB persists at either 1.18 or 1.25, the share of men who fail to marry will peak above 15% and 20%, respectively.

In light of the large number of men who are anticipated to become *guang gun*, we now focus on two issues that are particularly relevant to the impact

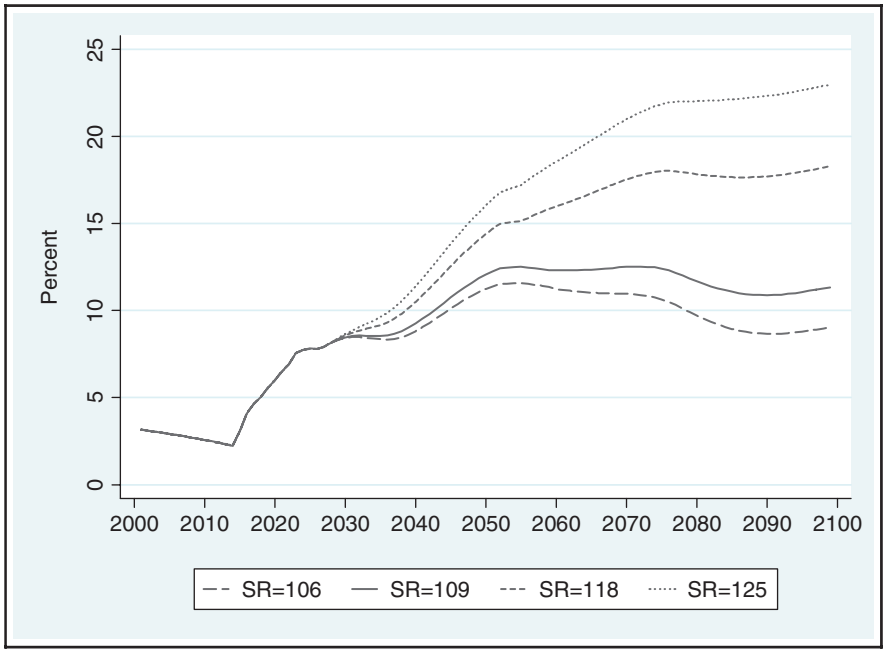

Fig. 4.5 Share of men age 25+ who fail to marry
Notes: The technical assumptions underlying marriage formation for the simulation are outlined in detail in the section, "Technical Assumptions." The shares of unmarried males are evaluated for 4 different possible trajectories for the sex ratio at birth, ranging from an immediate correction to 1.06 to a further deterioration to 1.25.

of high sex ratios on HIV prevalence: STI/HIV risk and migration, and HIV transmission via commercial sex activity.

Bare Branches and Rural-Urban Migration

The potential for an increase in HIV infection rates fueled by unmarried males has attracted the attention of many researchers. Tucker et al. (2005) present compelling evidence that increasing rates of sexually transmitted infection (STI) in cities are due to the sexual practices of migrant workers, who are demographically similar to the men who are predicted to fail to marry: poor, uneducated, and single. Chen et al. 2008 analyze HIV rates among a sample of patients at clinics being treated for sexually transmitted infections and conclude that "China's imbalanced sex ratios have created a population of young, poor, unmarried men of low education who appear to have increased risk of HIV infections".[5] The authors perform a multivariate analysis of factors that affect HIV status, and report an odds ratio of 1.7 for single individuals relative to those who are married, and 1.4 for men versus women.

In order to determine how migration might affect HIV transmission, it is helpful to examine current and future expected migration patterns. Figure 4.6 displays the geographic distribution of sex ratios among 20–30 year olds in the year 2000, identifying counties where there exist large imbalances in marriage markets. The lack of women in the interior counties contributes to the migration of unmarried men to areas with more favorable sex ratios. Migration is currently occurring from areas with high sex ratios to areas with lower sex ratios, places where there are more favorable marriage markets and more economic opportunities. These locations, predominantly coastal cities, are also attractive to young men because of the available employment in industries with low barriers to entry, such as the construction sector. These cities have also attracted high numbers of female migrants of marrying age because of the recent explosive economic growth and ensuing competitive labor markets, further contributing to their more favorable sex ratios.

Unfortunately, these young men are migrating from poorer areas with higher rates of HIV infection. As shown in Fig. 4.2, areas with high sex ratios among individuals of marrying age tend also to have higher HIV prevalence, likely due to the higher incidence of intravenous drug use and unhygenic plasma donation practices. Moreover, it is unlikely that the supply of

[5] This survey was conducted in Guangxi province at 14 clinics which provide screening and medical care for sexually transmitted infections.

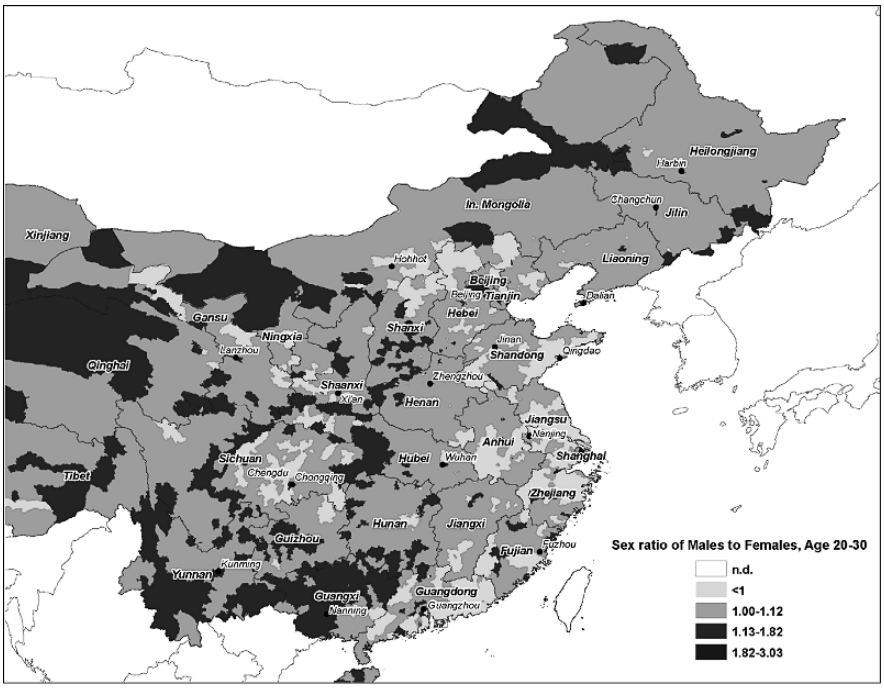

Fig. 4.6 Sex ratio of the marriage market, age 20–30
Source: China 2000 Census.

marriageable women in these areas will keep pace with demand from inmigrating men, which implies that a large number of these men may purchase sex. As young single adults migrate from the countryside to cities, they can either bring HIV with them, or be more likely to engage in risk taking behaviors that increase the likelihood of HIV transmission in urban settings. The migration process may thus exacerbate the spread of HIV from rural counties to urban areas and vice versa. Since migration in China encompasses hundreds of millions of individuals, it is impossible to predict what the net effect of this human movement will be on HIV and STI epidemics.

This pull of young, single men from rural to urban areas will likely worsen over time. Figure 4.7 shows the geographic dispersion of sex ratios at birth, and identifies areas where the sex ratio at birth is highly skewed in favor of male offspring. Comparing this figure to Fig. 4.6, it is clear that the regions with imbalanced marriage markets will experience worsening marriage markets and will have higher numbers of men unable to find marriage partners in the future. In this way, the continuing process of migration may contribute to epidemics of HIV in China's growing urban centers.

A further increase in the trafficking of women to supply sex to unmarried males is another potential consequence of the forecasted rise in migration. There are now an estimated 3 million sex workers in China, and a

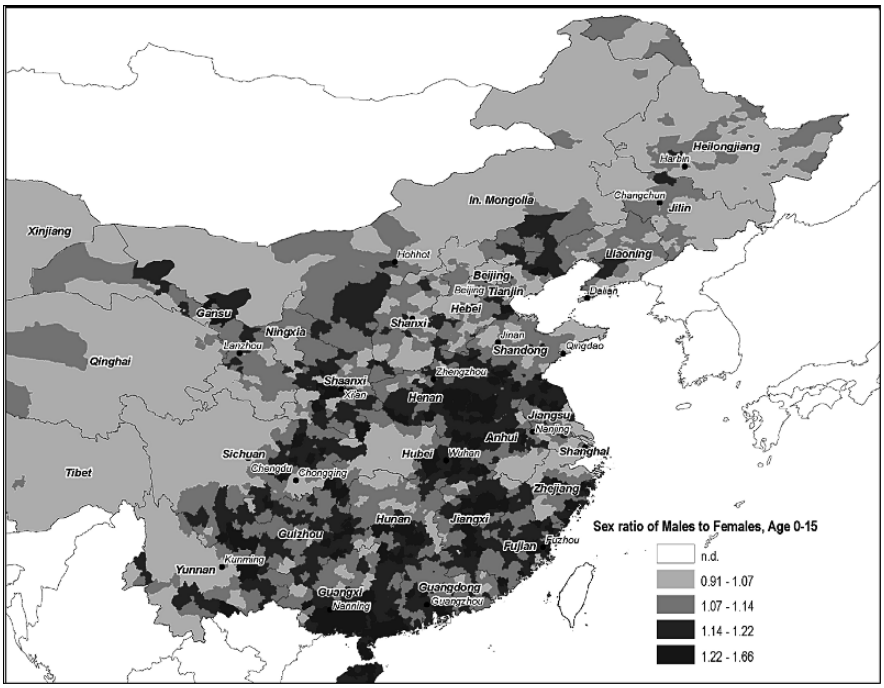

Fig. 4.7 Sex ratio of children, age 0–15
Source: China 2000 Census.

large number of these are thought to be migrants (Settle, 2003). Traffickers are exploiting increasingly sophisticated networks that span international boundaries, and China represents a potentially lucrative destination for these involuntary migrants (Hodge and Lietz, 2007). China has experienced an increase in the trafficking of women for both prostitution and marriage, and some have linked this migration to the rising sex ratio (Zhao et al., 2003). These trends indicate that the negative welfare consequences of high sex ratios can also be borne by women. Casual observers often predict an increase in the status of women in response to their scarcity, but this presumes that women have agency over their life circumstances. In many circumstances, the women who engage in sex work are illiterate, impoverished, and misled into participating in commercial sex (Hodge and Lietz, 2007).

Unmarried Men and Sex Workers: Incidence and Projections

As outlined in the previous section, the increase in commercial sex activity and incidence of sexually transmitted infection is in part driven by economic reforms that have enabled workers to migrate more easily from economically

depressed areas to growing areas. As cohorts of younger men fail to marry, these economic and demographic changes may fuel an increase in prostitution. The connection between marriage markets, prostitution rates, and HIV transmission is complex, but it is clear that these factors are all responsible for increasing HIV rates in China. This section models the relationship between these factors and estimates predictions for HIV infection rates in China in the years to come.

Considering the impending demographic pressures as heavily male birth cohorts enter adulthood and encounter shortages of marriageable women, relatively little is known about factors that influence the total number of sex workers in a population. In the 1980s and 1990s, sex workers represented a small share of the population. However, prostitution has expanded rapidly during the decades since 1980. At present, estimates range from 1 million women whose primary income comes from commercial sex up to as many as 10 million women engaging in paid sex of some kind (Yang et al. 2005b).[6] The data also indicate that young Chinese men are more likely to have visited a prostitute than older men: 12.6% of those aged 21–30 and 8.8% of those aged 31–40 have been to a prostitute.[7] While it is difficult to accurately measure HIV prevalence in such groups, the HIV prevalence rate among sex workers in Yunnan, Guangxi and Guangdong provinces was as high as 11% in 2000,[8] and it seems reasonable to assume that the risky sexual practices of illegal sex workers place them at higher risk of exposure.[9]

While not all single men will patronize sex workers, and married men will also pay for sex, documenting the relationship between failure to marry and commercial sex activity is important, as the population of single men will grow in the years to come. Moreover, identifying specific groups of men who are more prone to patronize sex workers is important, because of the need to target public health interventions at the groups who are most at risk. Construction workers represent a population of young, mobile men who are particularly likely to pay for services from low-cost female sex workers, and are less likely to be educated about sexually transmitted infections and condom use (Garfinkel et al., 2005).

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[6] See also Fan, M. 2007. Oldest Profession Flourishes in China. Washington Post Foreign Service August 5, 2007 and Schafer, S. 2003. Not just another pretty face. Newsweek Magazine. October 13th, 2003.

[7] Authors' calculation from CHFLS.

[8] This calculation is based on sex workers in detention centers, since prostitution is illegal in China (Settle 2003).

[9] See Merli et al. (2006) for an epidemiological model of sexual transmission of HIV in China.

In order to analyze the relationship between percentages of men in high risk groups and commercial sex activity, six regions are identified from the pooled responses to questions addressing paid sex in the China Health and Family Life Survey (CHFLS), and the prevalence of commercial sex activity is indicated by the borders in the figure above. Survey respondents were classified into groups by gender, marital status, and their response to the question of whether they had ever paid for sex. The results for all single males and for male construction workers, respectively, are displayed in Figs. 4.8 and 4.9. Paying for sex was most commonplace in the coastal southern region, encompassing the provinces of Guangdong and Fujian, followed by the coastal eastern region including Shanghai, Jiangsu, and Zhejiang provinces, and the far northeastern provinces bordering Korea and Russia. With the exception of Inner Mongolia, Tibet, and Xinjiang provinces (for which data on commercial sex activity are unavailable), the majority of counties with high percentages of single men tend to be located in regions where a high percentage of men report having paid for sex.

There exists a similar and more pronounced relationship between the percentage of men employed in the construction industry and the prevalence of commercial sex activity. The urban provinces of Guangdong, Fujian,

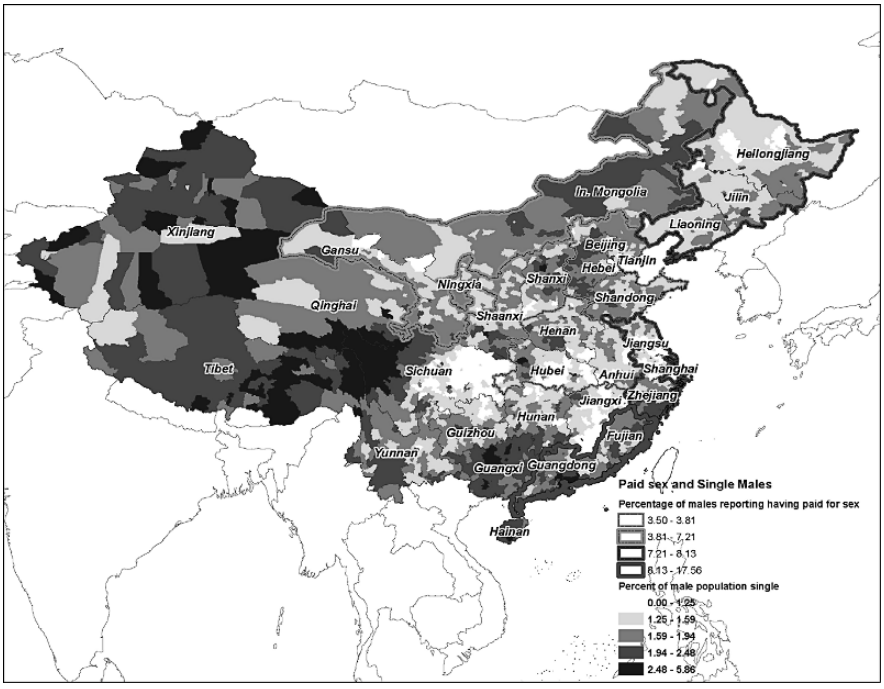

Fig. 4.8 Paid sex and single males
Source: CHFLS.

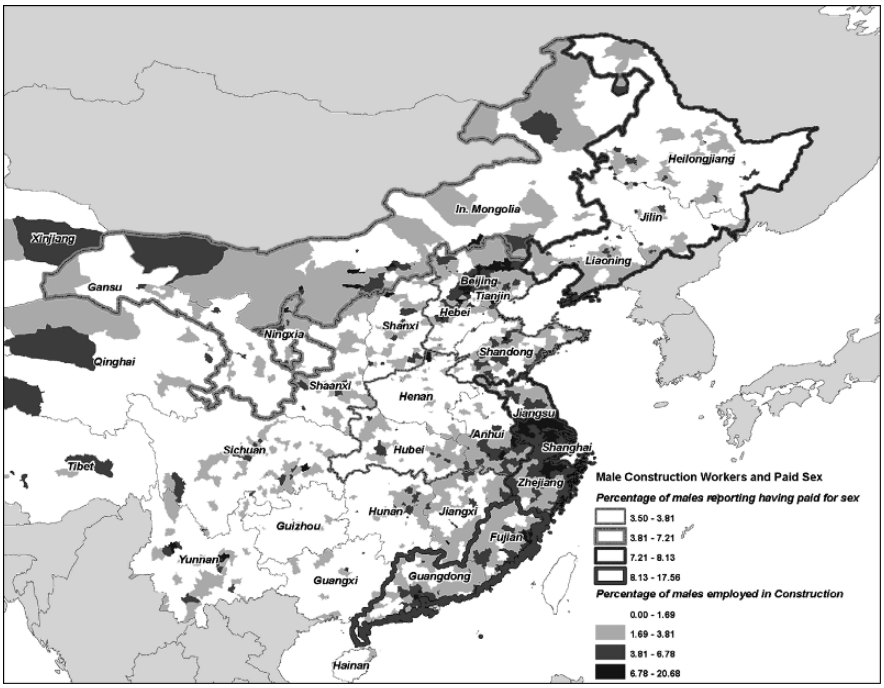

Fig. 4.9 Male construction workers and paid sex
Source: CHFLS.

Zhejiang, Shanghai and Jiangsu merit particular attention, as the percentage of males reporting having ever paid for sex exceeds 7% in these areas. These and other areas of dense concentration in the construction industry, such as northern Shangdong province and the counties surrounding Beijing, merit particular attention as potential public health problems.

Given that there exists a correlation between percentages of unmarried men and commercial sex activity, how will the increase in sex ratios and the ensuing failure in marriage markets affect markets for sex? In order to model how the incidence of prostitution might evolve, we present the results of a simple simulation in Fig. 4.10. The simulation projects the share of men who have paid for sex, assuming that the gender, marital status, and age specific rates of having paid for sex found in 2000 persist during the 21st century. Using the China Health and Family Life Survey, we observe that 14.7% of single men and 7.3% of married men admit to having paid for sex in 2000.[10] We also observe the age profile of commercial sex activity

[10] These percentages are derived from a regression of an indicator for having paid for sex on several demographic control variables, including marital status. The average fitted value for single men is 14.7% and for married men is 7.3%.

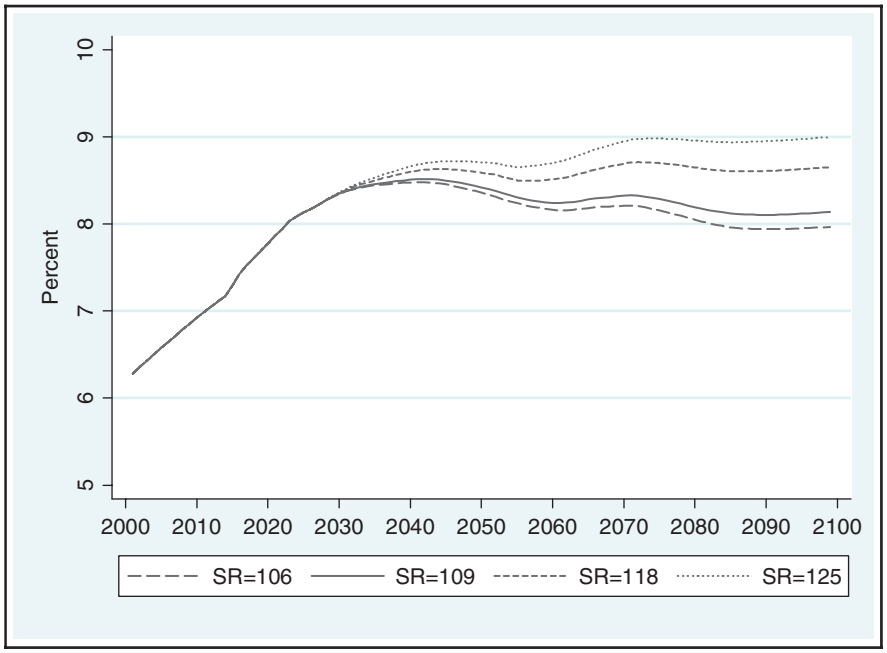

Fig. 4.10 Share of men age 25+ who have paid for sex
Notes: The simulations assume that the infection rate is determined by the age, sex, and marital status of the population. The rates of having paid for sex in these groups is imputed using the China Health and Family Life Survey (2000).

and can calculate a hazard rate of the chance of attending a prostitute over the life cycle. While this calculation is admittedly imprecise, insofar as the current rates of having paid for sex represent a lower bound on the future prevalence of prostitution (due to increased levels of future migration and possible increases in human trafficking), we expect to see an increase in demand for sex work among Chinese men. The simulations indicate that almost immediately, demographic change will contribute to a rising share of men who have paid for sex, from roughly 6% to almost 9% in the next 30 years, or from 25 million men in 2005 to almost 37 million in 2035.

In Fig. 4.11, we present results that attempt to assess how demographic change will affect China's HIV infection rate in the 21st century. We assume in these calculations that the unknown hazard rate for HIV infection by age and sex generates 650,000 cases when applied to the population age 22–40 in 2006, according to estimates by WHO (2007). Then, the HIV-positive share is imputed to each cohort by sex, age, and marital status using the aforementioned odds ratios from Chen et al. (2008). Thus, these simulations attempt to model how HIV infection rates will change solely driven by changes in the demographic structure of China as cohorts with higher percentages of

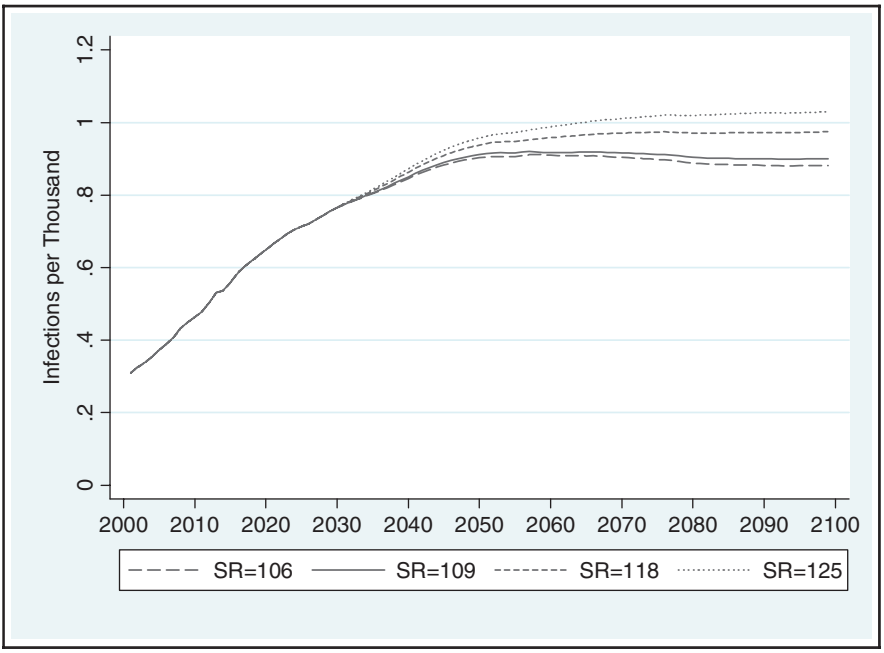

Fig. 4.11 Simulated HIV infection rate in China
Notes: The simulations assume an HIV infection odds ratio of 1.4 between men and women and a 1.7 odds ratio between single and married individuals (Chen et al., 2008).

single males enter their sexually active years. The results indicate that the infected population will increase precipitously over the next 30 years, and stabilize at a higher rate of infection.

While these predictions for the spread of HIV do not incorporate any increases in the probability of contracting the disease, they also do not assume any changes in prevention behaviors. Since the Chinese government has launched many comprehensive HIV prevention and treatment initiatives, there is reason to hope that these predictions are overly pessimistic.

The Government's Response

The alarming increases in sex ratios at birth revealed in the 2000 census spurred the Chinese government to address one of the underlying demographic problems contributing to the spread of HIV (Li, 2007). The government's response can be classified into two primary strategies: one on increasing the value of girls in the minds of parents, and the second focusing on decreasing the availability of sex selection technology. The "Care

for Girls" campaign identified 24 counties with extremely high sex ratios, and provided incentives to reduce the female deficit, including free public education for female children. The preliminary indication is that these programs are having an effect. In a joint venture of the Ford Foundation and UNICEF, the "Chaohu Experimental Zone Improving Girl-Child Survival Environment" was established in 2000 and succeeded in decreasing the sex ratio at birth from 125 in 1999 to 114 in 2002. The government is currently attempting to expand the "Care for Girls" campaign to a national initiative. In 2004, President Hu Jintao declared that the campaign was a top national priority and the government would strongly attempt to stop the country's sex ratio at birth from increasing any further in 3 to 5 years (Li, 2007).

The second strategy employed by Chinese officials is a concerted effort to crack down on sex-selective abortion. The government has passed several legislative initiatives aimed at curbing this practice and has vowed to punish offenders. In 2006, the New York Times reported the closure of several fertility clinics in violation of the policy.[11] However, for all these efforts, the sex ratio at birth in China in 2005 was 1.18, near the all-time high, possibly related to more stringent enforcement of the One Child Policy in recent years.

Public health officials have also acknowledged that the increasing prevalence of prostitution represents a risk factor for the spread of HIV from infected high risk groups to the general population. The central government and local authorities show signs of recognizing the growing role of sex workers in HIV transmission, and several pilot projects promoting safer sex (practices such as condom use) are in place in Hubei, Yunnan, Jiangsu, Fujian, and Beijing.

Unfortunately, such programs face relatively low rates of condom usage by Chinese men. As reported in the Chinese Health and Family Life Survey, Chinese men are more likely than American men to report ever having paid for sex, and are less likely to use condoms during sex (see Table 4.3). As a result, unsafe sex practices have grown from accounting for just 10% of Chinese HIV infections in the 1990s to as many as 30% of infections in the years since 2000 (Xinhua News Service, 2005).

In light of this threat, the Chinese government has launched a widespread campaign to promote condom use and safe sex practices in the last several years. The national budget for HIV–AIDS grew from approximately $12.5 million in 2002 to about $100 million in 2005 and about $185 million in 2006. With these funds, the government is also treating more cases of HIV,

[11] http://www.nytimes.com/2006/06/01/world/asia/01briefs-brief-003.ready.html?pagewanted=print

with efforts such as the China Comprehensive AIDS Response (CARES) campaign (Gill et al., 2006). This program, initiated in 2003, aims to supply free domestically-manufactured anti-retroviral AIDS medication to those who contracted the disease through contaminated blood plasma transfusions. The effectiveness of such efforts will be critical to containing the virus, as the sex ratio rises and the percentage married falls among the sexually active population.

Conclusion

The Chinese government's recent actions to provide contraception and care to those infected with HIV are promising developments, but future actions to contain the spread of the disease must focus on the large and growing number of unmarried men who may be at increased risk for STI/HIV. The future course of Chinese policy is yet to be determined, and discussions on revising the policy have begun (Feng, 2005). The results presented here outline some of the potential negative welfare consequences to having large numbers of males who fail to marry. Many scholars have identified clear linkages between the One Child Policy and the high sex ratio at birth during the last 20 years (Johansson and Nygren, 1991; Ebenstein, 2007), and so an associated benefit of allowing higher fertility could be a mitigation of the costs of high sex ratios presented here.

China's legacy of missing girls will have a dramatic effect on several aspects of Chinese society in the 21st century, and increased migration and an increase in the demand for commercial sex seems highly probable. It is unlikely that government action can effectively reduce the prevalence of commercial sex activities, and so policy must be directed to making this activity less risky. Policy efforts in this area should be directed towards increasing awareness of the risk of contracting HIV, and the availability of condoms, with a particular focus on geographic regions that attract unmarried men. Although China's HIV rates are still low, failure to act soon may prove costly, and the spread of HIV may be difficult to contain once these single young *guang gun* are infected.

Technical Assumptions of the Simulations

The simulation model used in this paper is based on a one per 1,000 sample of the national population census of China (Long File) in the year 2000. Age-specific mortality rates from Banister and Hill (2004) are attributed to the population, and applied to reduce the population at the start of each

simulation year. After applying mortality rates, a cut-off age of 110 years old is applied to remove the residual population above age 109. Age-specific fertility rates (ASFRs) are attributed to the population based on published data from the Sample Survey on Population Changes (2004), resulting in a Total Fertility Rate of 1.45. The ASFRs used in the present study do not vary over time or by marital status; thus, all women contribute to total fertility.

The true TFR in year 2000 is likely within the range of 1.45–1.8, and the simulation can be adjusted to allow the TFR to vary in specific years or to grow over time. The results presented in this paper use a starting TFR of 1.45 in year 2000 and a phased-in increase in ASFRs that reaches replacement-level TFR of 2.1 in 2030. The number of new births is calculated and the quantity of births by sex is determined by the input sex ratio at birth. For years prior to 2006, the known SRB of 1.18 boys to 1 girl is applied. Between 2006 and 2100, the simulation uses an input SRB (the paper contrasts four scenarios: 1.06, 1.09, 1.18 and 1.25) to divide the new births by sex. The fecund population used in the calculation of the General Fertility Rate is defined as all females 15–49. Crude birth rate is also calculated at this juncture.

The population of males 25 and older and females 22 and older are married according to a rule. The population counts are divided into married/unmarried categories, and as many unmarried men age 25 as exist unmarried women age 22 are moved from the counts of unmarried and added to the married counts. The women are also moved to married counts, indicating that they have been removed from the marriage market. The process is repeated for men age 26 and women age 23, until all men have been given the first opportunity to marry women three years younger than themselves. Because past fertility differentials across three years may have resulted in larger cohorts of women of marrying age than males, any remaining unmarried men aged 25 and over are then given the opportunity to marry any remaining unmarried women two years younger than themselves, and the process is iterated until single men have been married to any available

Table 4.4 Example marriage model in 2001

Round	Males	Females	Round	Males	Females	Round	Males	Females
1	25	22	2	25	23	7	25	28
1	26	23	2	26	24	7	26	29
1	27	24	2	27	25	7	27	30
...	...	...	...	...	...	...	...	...
1	109	106	2	109	107	7	106	109

Notes: The marriage rule is executed in a macro model where the males and females in each round are married to each other in the following manner until the number of available females reaches zero. The leftover males are recorded as those who fail to marry.

women up to three years older than themselves. After year 2001, the marriage model is applied except apply only to men between ages of 25 and 30 (and women 22–33). This marriage model, because it uses the ever married population, inherently assumes that widowed spouses and divorced couples do not remarry. The advantage of this interpretation is that the marital status indicator can be seen as a proxy for the population that is most likely to have borne children.

After the marriage model has been run, the sums of unmarried men age 25 and over as well as those age 65 and over are counted. Additionally, the percentage of 30 year old males who did not find a marriage partner is recorded each year. These populations are indexed to the total mid-year population and the total population of the same age groups as appropriate. The population age 22–40 is used to calculate HIV+ incidence. Using a known population of 650,000 HIV+ cases in China in 2006 and odds ratios of 1.4 for men to women and 1.7 for married to single from Chen et al. (2005), four HIV+ populations are calculated: married males; married females; single males; and single females. The sum of these populations divided by the total adult population is defined as the HIV+ rate.

After calculating these variables, the population is aged by 1 year and the calendar year is advanced. A new population age 0 is added using the birth statistics calculated above.

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Part III
HIV/STD Risk in China for Males and Females

Chapter 5
Gender, Migration, and Unprotected Causal and Commercial Sex: Individual and Social Determinants of HIV and STD Risk Among Female Migrants

Xiushi Yang and Guomei Xia

Introduction

With 840,000 people in China officially estimated to be living with Human Immunodeficiency Virus (HIV) and/or Acquired Immune-Deficiency Syndrome (AIDS) in mid 2003, China is experiencing a rapidly growing HIV epidemic. It has started to spread from high risk groups in isolated areas to the general population nationwide (Ministry of Health (MOH) and UNAIDS, 2003). Although the main route of HIV transmission is still needle sharing in the process of injecting drugs, heterosexual transmission of the AIDS virus is on the rise, increasing from 5.5% in 1997 to 10.9% in 2002.

Widespread commercial sex and increasing risky sexual behavior associated with HIV and Sexually Transmitted Infection (STI) transmission among China's 1.3 billion population (van den Hoek et al., 2001; Parish et al., 2003; Pan et al., 2004; Yang et al., 2005a) will likely continue to fuel the heterosexual transmission of HIV in the country. Also on the rise are infections among women; this has occurred in conjunction with the increase in the male/female ratio among the newly infected, from 5 to 1 in 1997 to 4 to 1 in 2002. Consequently, women in China, like women elsewhere, have become the fastest growing population newly infected with HIV (MOH and UNAIDS, 2003).

X. Yang (✉)
Department of Sociology and Criminal Justice at Old Dominion University, Norfolk, VA, USA
e-mail: xyang@odu.edu

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The combination of increasing heterosexual transmission of HIV and infection among women underscores the need to study and understand the causes of the spread of unprotected casual and commercial sex and women's vulnerability in these sexual relationships. Recent studies in China (Anderson et al., 2003; Yang, 2004; Smith and Yang, 2005) have highlighted migrants' vulnerability to HIV risk sexual behavior. Particularly at risk are the hundreds of thousands of young women who have migrated from the rural areas to the cities who have experienced disproportionate increases in unprotected casual and commercial sex. This is a clear demonstration of the relationship between migration and the incidence of STIs (Yang 2006) and indicates the potential interaction between gender and migration rendering female migrants particularly vulnerable to risky sexual behaviors.

However, while the potential link between migration, casual/commercial sex, and HIV or STIs has received much attention in the media and the literature, potentially gendered behavioral change and HIV/STI risks associated with migration have been overlooked until recently in studies of both migration and HIV in China. In this chapter, we focus on the role of gender and gender related inequalities in studies of risky sexual behavior among female migrants, asking specifically the following: (1) if and to what extent does the interplay of gender and migration contribute to female migrants' increased exposure to casual and commercial sex? and (2) what are the individual and social/contextual determinants of female migrants' failure to consistently use condoms in such sexual relationships? Our findings could have important public health implications. Female migrants may not only be at a significant risk of acquiring HIV or STIs while in cities. Indeed they may also be a potentially important bridge population in the spread of the diseases when they return home to their rural villages, and unknowingly pass HIV or STIs to their sexual partners (Lau and Thomas, 2001; Hirsch et al., 2002; Anderson et al., 2003; Lurie et al., 2003).

Background

The linkages between migration, casual/commercial sex, and the spread of HIV and STIs are well established. There is general agreement that migrants are more vulnerable to HIV and STI risky sexual behavior than non-migrants (Skeldon, 2000; UNAIDS, 2001; Anderson et al., 2003; Li et al., 2004). In general, migrants' riskier sexual behavior can be attributed to migration selectivity, spousal or partner separation, and post migration exposure to new social and economic environments (Brockerhoff and Biddlecom, 1999). Migrants' post migration milieus are believed to be particularly conducive to risky sexual behavior (Wolffers et al., 2002; Yang, 2006).

When separation from one's spouse is frequent and lengthy, it tends to disrupt migrants' regular sexual relationships. Together with post migration economic marginalization and social isolation, this may lead to a more promiscuous lifestyle as a way to escape loneliness, bury anxieties about family and work, and release sexual frustration (Jochelson et al., 1991). Being away from home also means being away from family supervision; this results in a social control vacuum whereby migrants feel less constrained by social norms mainly because their families and friends back home are unlikely to find out what they do while they are away from home (Yang, 2006). Consequently, a more anonymous lifestyle and easier access to commercial sex in the city may help migrants break away from social norms of morality and sexual fidelity and encourage them to seek casual sex.

However, the migration and HIV and STI literature often fails to address the way in which gender is involved in this relationship. Although migration in China, as in other developing countries (Chant, 1992), has been recognized and studied as a gendered process (Davin, 1999; Fan, 2000; Gaetano and Jacka, 2004), little research has studied this process with regard to behavioral change and consequential risk of migration for HIV and STIs. We know little about whether women and men experience the same behavior changes and HIV and STI risk as a result of migration. This neglect in migration and HIV research is striking, particularly since women in China are almost as active as men in migration (Fan, 2000; Liang and Chen, 2004; Liang and Ma, 2004), and since their share in new HIV infections has been on the rise (MOH and UNAIDS 2003).

Meanwhile, studies of women's vulnerability to HIV and STIs have increasingly called attention to gender-related inequalities, particularly unequal power in sexual relationships, as well as cultural norms about gender and sexuality (Browning et al., 1999; Tang et al., 2001; Wingood and DiClemente, 2002). According to theories of gender and power (Connell, 1987; Wingood and DiClemente, 2002), women's heightened vulnerability to HIV and STIs tends to be a function of gender inequalities that are rooted in the sexual divisions of labor and power and the gendered structure of social norms. The sexual division of labor limits women's access to the labor market and creates economic inequalities, which lead to women's economic dependence on men and increase women's "economic exposure" to HIV and STIs. The sexual division of power leads to gender inequalities that result in men's control in relationships, which renders women vulnerable to sexual or physical abuse and increases their "physical exposure" to HIV and STIs. The gendered structure of social norms tends to generate gender-specific norms that restrict women's sexual expression and command the submission of women to men in sexual relationships. This often discourages open discussion within relationships and limits women's access to information, thereby increasing women's "social exposure" to HIV and STIs.

Together, economic inequalities, unequal power in relationships, and gender-specific cultural norms all tend to have a critical influence over women's sexual behavior, resulting in formidable barriers to women in initiating and insisting on condom use in sexual relationships (Amaro and Raj, 2000). The process of migration may further aggravate the gender inequalities and increase female migrants' economic and physical exposure to unprotected casual and commercial sex. For example, due to gender inequalities in education and job training, female migrants are in a disadvantaged position in cities and do not do as well financially as their male counterparts (Huang, 2001; Fan, 2003; Liang and Chen, 2004). The market transition in China has further weakened the institutional support for gender equality and has increased the level of gender segregation in the labor market for migrants. Consequently, female migrants are channeled overwhelmingly into low status occupations, perpetuating and reinforcing their inferior and subordinate statuses (Fan, 2000, 2003). Being heavily concentrated in the personal service and entertainment industries where jobs often carry social stigmas, female migrants often become marginalized socio-economically. In their struggle for survival, many of these female migrants may be forced to exchange sex for money or to enter into sexual relationships in the hope of securing economic and emotional support.

Migration likely contributes to the channeling of female migrants into jobs that increase their exposure to casual and commercial sex, along with economic hardships, lack of social support networks in cities, and dependence on their partners; this may thus lead to the diminishment of female migrants' power in exercising personal control in such sexual encounters. Social stigma against female migrants, particularly those who work in the entertainment industry (*Fuwu Xiaojie*), along with the criminalizing of commercial sex, may further alienate female sex workers (who are mainly migrants), limit their access to information and services, exacerbate power imbalances in commercial sex, and make them vulnerable to sexual and physical abuses by clients and/or pimps (Gil et al., 1996; Kaufman and Jing, 2002; Wang, 2000). In other words, economic, together with relational, and social/cultural factors unique to female migrants may render women powerless in casual and commercial sex, reducing their ability to initiate and insist on condom use (Liao et al., 2003; Xia and Yang, 2005; Yang et al., 2005b).

Unfortunately, the literature on gender and HIV vulnerability is near silent with respect to the issue of migration and migration-gender interaction. In this chapter, we argue that female migrants in China are subject to the double jeopardy of migration and gender; we thus focus on the migration-gender interaction and social/contextual risk factors of unprotected casual/commercial sex among female migrants. In particular, we argue that the interplay of migration and gender is the key for understanding

female migrants' elevated HIV and STI risk through sexual behavior. Instead of focusing only on individual factors, we also look at the particularly precarious socioeconomic environments in which female migrants find themselves. These factors also contribute to female migrants' increased exposure to casual and commercial sex and also present formidable barriers to condom use in such sexual relationships.

Data and Methods

The data used in the analysis conducted in this chapter are from two sources. The first is a large population based survey conducted in 2003. The survey was part of a study of migration and HIV risk through drug use and sexual behavior covering an entire province in southwestern China and included both migrants and non-migrants. The sample selection followed a three-stage sampling procedure. First, eight counties were selected, giving priority to places with higher concentration of HIV and drug use and considering geographical representation of the province. Second, all rural townships and urban neighborhoods in the selected eight counties were ranked according to estimates of HIV prevalence, number of drug users, and number of temporary migrants. From the ranked list in each county, five townships and neighborhoods were selected, giving priority to places with higher concentrations of HIV infection, drug users, and temporary migrants. This resulted in a total of 40 townships and neighborhoods as the primary sampling units (PSUs).

In each PSU, all individuals between the ages of 18 and 55 were ordered in sequence into one of four categories: HIV positive, drug users, temporary migrants, and nonmigrants. A target random and probability sample of about 150 individuals was selected in each PSU via disproportionate probability sampling (Bilsborrow et al., 1997; Kalton, 1993), leading to a total initial sample of 5,687. Of the 5,687 sampled, 5,499 individuals consented to participate in the study and completed a face-to-face interview, which took place in private at the respondents' homes or at safe places away from their homes, if they so preferred.

The other main source of data is a prospective pilot study conducted among female migrants working in entertainment establishments in Shanghai in 2004. Sample selection started with identifying 18 entertainment establishments in one of Shanghai's 19 administrative districts. Although not random, the selection of establishments paid close attention to representation by different size and type of entertainment establishments in the district. The research staff then visited the selected establishments, explained to the owners the purpose of the study and the procedures to protect their business privacy and identities, and requested their participation in the study.

Owners of 15 of the 18 selected establishments agreed to participate. Of the 15 participating establishments, six were hair/beauty salons, three were bathing/massage centers, and six were karaoke TV bars.

To enroll the study participants, the research staff made a second visit to all participating establishments. With the cooperation of the establishment owners, the research staff approached individually all those working in the establishment, explained to them the purpose of the study, the institutions conducting the study, and how the information would be used. Potential participants were informed of their roles in the study and were given compensation for their time. They were assured of absolute confidentiality and were shown the procedures to protect their privacy. They were informed of the right to refuse to participate, to answer any particular questions, or to withdraw from the study at any time with no adverse consequences. Verbal consent to participate was obtained. In total, 297 female entertainment workers consented to participate and complete a face-to-face interview. Of them, 259 completed a second interview at the 6-month follow up.

The statistical analyses are divided into two parts. The first part uses data from the survey in Southwestern China to examine whether and the extent to which the interplay between migration and gender inequalities renders female migrants vulnerable to casual and commercial sex. Bivariate comparisons are made between (1) temporary migrants and non-migrants by gender, and between (2) female migrants and male migrants to highlight the concentration of female migrants in the entertainment/service industries and their increased exposure to casual/commercial sex. To take advantage of the population based probability sampling of the survey, all the bivariate comparisons adjust for population weights and PSU design effects.

The second part of the analysis uses the data from the pilot study in Shanghai to focus on individual and social/contextual risk factors of unprotected casual sex among female entertainment workers, who are mainly migrants. Data from the baseline and the 6-month follow-up surveys are combined in the analysis. Logistic regression equations are estimated to focus on whether and the extent to which individual cognitive and social/contextual factors explain the likelihood of unprotected casual/commercial sex among study participants in the month prior to the baseline or the follow-up survey. The dependent variable is the log odds of having unprotected casual sex in the 30 days prior to the survey. The independent variables include socio-demographic characteristics and individual and social/contextual factors.

Except for individual socio-demographic characteristics, which are self-explanatory, all individual cognitive and social/contextual measures are composite scales and indexes. All scales/indexes are constructed from multiple questions/ statements in the survey questionnaire by first obtaining

the mean score using the "alpha" method, and then multiplying the mean by the number of items included in the scale (Stata Corp, 2005). For items/questions that appear negatively correlated with the scale, their original scores are reversed before they are used in the construction of scales. We next provide summaries of each scale and its statistical qualities.

For individual cognitive measures, we focus on HIV information, motivation to prevent HIV and the behavioral skills necessary to take protective measures as specified in the information-motivation-behavioral skills model of HIV risk behavior (Fisher and Fisher, 1992; Misovich et al., 1998).

An HIV information scale was based on respondents' answers (1 correct and 0 incorrect) to 26 statements about HIV and its transmission and prevention (e.g., HIV cannot be transmitted by mosquito bites; HIV can be transmitted by eating food prepared by people infected with HIV; and if used correctly, condoms can greatly reduce the risk of HIV transmission). The higher the scale, the more knowledgeable the respondent; Cronbach's alpha for the scale is 0.72.

Motivation to prevent HIV was measured by two composite scales: negative attitudes toward condom use and perceived vulnerability. Both scales were constructed from respondents' ratings on a five-point scale (1 strongly disagree to 5 strongly agree) on multiple statements. The first was based on answers to 10 negative statements about condom use (e.g., condom use is troublesome; condom use can destroy the natural feelings of sex; and you cannot give yourself completely to your partner if a condom is used). The second was based on 4 statements about perceived HIV risk (e.g., I am sure I will not get HIV; some of my partners may be already infected; and I feel I am at risk of HIV). The higher the scale, the more the respondents felt negatively about condom use and perceived personal risk to HIV Cronbach's alphas are 0.88 for the negative attitudes toward condom scale, and 0.73 for the perceived vulnerability scale.

Behavioral skills were measured by a perceived self-efficacy scale in condom use. The scale was constructed from respondents' ratings on a five-point scale (1 very difficult or unable to 5 very easy or completely able) on 21 statements about preventive behaviors related to condom use (e.g., I discuss condom use before sex; I convince my partner to only have safe sex; and I refuse to have sex if my partner refuses to use a condom). The higher the scores, the easier and more capable the respondents felt in taking protective measures in sex; Cronbach's alpha is 0.85.

For social/contextual measures, we used two scales focusing on gender power in their sexual relationship and working environment, respectively. Gender power focuses on power in sexual relationships, using an adapted version of the Sexual Relationship Power Scale (Pulerwitz et al., 2000). Respondents were asked to rate on a five-point scale (1 strongly disagree to

5 strongly agree) 11 statements about control and dominance in their sexual relationship (e.g., we have sex in the way my partner wants; if my partner refuses, we will have sex without using a condom; and if I demand condom use in sex, he will become violent). Answers were summed to create the lack of relationship power scale; Cronbach's alpha is 0.80. The higher the scale, the less control/dominance the respondent felt in sexual relationship.

Working environment refers to the practice of the establishment and management regarding support for the reduction of risk behaviors. Respondents were asked to answer on a five-point scale (1 very untrue to 5 very true) six statements about policies, attitudes, and management support for AIDS prevention and condom use in the establishment where they worked (e.g., my establishment always provides condoms; my establishment's management requires and supports the use of condom; and if the client refuses, the manager/owner will stand by me). The responses were summed to create the establishment support scale; Cronbach's alpha is 0.77. The higher the scale, the more supportive the establishment was in HIV risk reduction and prevention.

Results

Overall, males and females did not differ in level of education. But temporary migrants were on average significantly less educated than non-migrants: only 12% of temporary migrants had a senior high school or higher education compared to almost 24% of the non-migrant residents (Table 5.1). Data on gender-by-migrant status in the lower two panels of the table further show that differences in education between temporary migrants and non-migrants were greater and more significant among females than among males, suggesting that the educational disadvantage was more pronounced among female than male migrants.

For occupation, the data in Table 5.2 show that, taking the sample as a whole, males were more likely to work in factories (9.3% vs. 5.5% for males and females, respectively), construction and transportation (8.0% vs. 2.3%), and the government sector (15.7% vs. 11.9%), while females had greater shares in the agricultural (55.0% vs. 50.1%) and service sectors (11.5% vs. 3.4%). When comparisons were made between temporary migrants and non-migrants, the former had a higher percentage (2.6%) than the latter (1.2%) not in the labor force. Among those who were in the labor force at the time of the survey, temporary migrants were overwhelmingly in the non-agricultural sectors (93.8%). By contrast, more than half (57.9%) of the working non-migrants were in agriculture. But non-migrants were more likely (15.1%) than temporary migrants (3.5%) to work in governments, schools, hospitals, and state-owned enterprises.

Table 5.1 Educational attainment (%) by gender and by temporary migrant status

Gender/Migrant Status	Educational attainment			Unweighted Sample size
	Less than Junior high	Junior high	Senior high or more	
Gender:				
Males	38.0	38.9	23.1	3,460
Females	38.2	39.6	22.2	2,002
Migrant status:				
Temporary migrants	43.4**	44.6**	12.0**	1,620
Non-migrant residents	37.7	38.4	23.9	3,813
Gender by migrant status:				
Male temporary migrants	40.8*	44.7*	14.5*	928
Male non-migrant residents	37.9	37.9	24.2	2,500
Female temporary migrants	46.2**	44.6**	9.1**	681
Female non-migrant residents	37.5	38.9	23.6	1,297

* $p < 0.05$; ** $p < 0.01$.
Statistical significance tests are conducted in each pair-wise comparison and are based on Pearson's chi-square test of difference in proportions further corrected for survey design and converted into F statistics using Stata's "svy" cross-tabulation analysis (Stata Corp, 2005).

While both male and female temporary migrants had moved away from agriculture, their main occupations after migration were strikingly different. Female temporary migrants were overwhelmingly concentrated in the service sector (63.2%). But male migrants were, except for the government sector, more evenly distributed among the non-agricultural sectors with higher proportions working in factories (22.6%), self-employed (22.9%), and in construction and transportation sectors (15.9%). Clearly, male and female temporary migrants were employed in quite different jobs after migration.

Interestingly, overall, males and females did not seem to differ significantly in the likelihood of having casual or commercial sex in the month prior to the interview (Table 5.3). However, temporary migrants were significantly more likely than non-migrants to have had casual and/or commercial sex. In fact, the prevalence rate of having casual sex with non-stable partners for temporary migrants (13.8%) was almost five times that for non-migrants (2.8%); the prevalence rate of having commercial sex among temporary migrants was more than seven times that among non-migrants.

What is more interesting and supportive of our expectation is the significant difference between males and females in sexual behavior change as a result of temporary migration. While male migrants did not differ from non-migrants in the likelihood of having casual or commercial sex in the month prior to the interview, female migrants had prevalence rates of casual sex (24.3%) and commercial sex (23.9%) that were more than 14 times and

Table 5.2 Employment distribution (%) by gender and by temporary migrant status[a]

Gender/migrant status	Employment sector[b]								Unweighted sample size
	0	1	2	3	4	5	6	7	
Gender:									
Males	1.3**	50.1**	9.3**	7.1**	3.4**	8.0**	5.2**	15.7**	2,945
Females	1.3	55.0	5.5	7.6	11.5	2.3	4.9	11.9	1,661
Migrant status:									
Temporary migrants	2.6**	6.0**	14.3**	17.7**	34.5**	10.9**	10.5**	3.5**	1,387
Non-migrant residents	1.2	57.2	6.8	6.2	4.3	4.6	4.5	15.1	3,813
Gender by migrant status:									
Male temporary migrants	2.2**	7.3**	22.6**	22.9**	11.7**	15.9**	12.5**	4.9**	820
Male non-migrant residents	1.2	54.8	7.8	5.3	2.4	6.9	4.5	17.1	2,094
Female temporary migrants	3.1**	4.1**	4.0**	11.3**	63.2**	4.6**	7.9**	1.8**	557
Female non-migrant residents	1.1	59.8	5.6	7.3	6.4	2.1	4.6	13.1	1,082

$p < 0.05$; ** $p < 0.01$.

[a] Statistical significance tests are conducted in each pair-wise comparison and are based on Pearson's chi-square test of difference in proportions further corrected for survey design and converted into F statistics using Stata's "svy" cross-tabulation analysis (Stata Corp, 2005).

[b] Employment sectors included in each category are: 0 unemployed and incarcerated; 1 agriculture; 2 factory workers; 3 self-employed, petty retail, and temporary worker/laborer; 4 commerce, food service, hotel, entertainment (dancing hall, beauty salon, massage), and other service industry; 5 construction, transportation, and communication; 6 office worker, accounting/finance, and insurance; and 7 government official, school, medical, and state-owned industry.

Table 5.3 Prevalence of casual/commercial sex (%) in the 30 days prior to survey by gender and by temporary migrant status

	Casual sex			Commercial sex		
Gender/migrant status	Yes	No	Unweighted sample size	Yes	No	Unweighted sample size
Gender:						
Males	3.9	96.1	3,465	3.4	96.6	2,973
Females	3.8	96.2	2,007	2.3	97.7	1,763
Migrant status:						
Temporary migrants	13.8**	86.2**	1,620	13.9**	86.1**	1,305
Non-migrant residents	2.8	97.2	3,822	1.8	98.2	3,404
Gender by migrant status:						
Male temporary migrants	4.7	95.4	928	5.2	94.8	735
Male non-migrant residents	3.9	96.1	2,504	3.3	96.7	2,209
Female temporary migrants	24.3**	75.7**	681	23.9**	76.1**	559
Female non-migrant residents	1.7	98.3	1,302	0.3	99.7	1,183

** $p < 0.01$.

Statistical significance tests are conducted in each pair-wise comparison and are based on Pearson's chi-square test of difference in proportions further corrected for survey design and converted into F statistics using Stata's "svy" cross-tabulation analysis (Stata Corp, 2005).

almost 80 times the corresponding prevalence rates for their non-migrant counterparts.

Are the sharp differences in the prevalence of casual and commercial sex between male and female temporary migrants due mainly to differences in what they do after migration? The data clearly suggest they are. While temporary migrants as a whole had weighted mean prevalence rates of 13.8% and 13.9% for casual and commercial sex, respectively, those in the service sectors had prevalence rates of casual (28.0%) and commercial sex (30.0%) that were more than double the means. Temporary migrants who were not in the labor force had the second highest prevalence rates of casual (17.1%) and commercial sex (15.1%).

As discussed earlier, female temporary migrants were overwhelmingly in the service sectors (63.2% compared to 11.7% for male migrants). Also, unemployed was the only other category in which female temporary migrants reported a higher percentage than male migrants (see Table 5.2). Taken together, these results suggest that the interplay of migration and gender lead to a higher unemployment rate among female temporary migrants, and among those who were employed to an overwhelming concentration in

the service sectors, which in turn increased significantly female temporary migrants' rates of casual and commercial sex.

While female temporary migrants experienced disproportionate increases in casual and commercial sex after migration, few stated they used condoms consistently in such sexual encounters. Data from the pilot study of the female temporary migrants working in the entertainment establishments in Shanghai show that only about 14% of study participants reported that they had always used a condom in casual and commercial sex in the month prior to the interview.

What then are the individual and social/contextual risk factors of unprotected casual and commercial sex among female migrants? Using the data from the pilot study in Shanghai, Table 5.4 presents both bivariate and multiple logistic regression analysis data of the log odds of consistent condom use in casual/commercial sex among female entertainment workers. In the bivariate analysis, none of the demographic characteristics seemed to predict

Table 5.4 Logistic regression analysis of individual and social/contextual predictors of the odds of always using condoms in casual and commercial sex among female entertainment workers

		Multiple regression		
Independent variables	Bivariate regression	1	2	3
Demographic Characteristics:				
Age	1.05	1.01	1.06	1.02
Junior high school	1.73	1.99	1.86	1.98
Senior high school	1.98	1.85	1.79	1.78
Single	1.01	0.79	1.05	0.81
Temporary migrant	0.78	0.73	0.77	0.74
Individual Cognitive/Affective Factors:				
HIV information	1.03	1.01	/	1.00
Negative attitudes about condoms	0.95**	0.97	/	0.98
Perceived vulnerability	0.90*	0.94	/	0.95
Behavioral skills	1.05**	1.04**	/	1.03**
Social/Contextual Factors:				
Lack of relationship power	0.95**	/	0.95**	0.97
Supportive working environment	1.08**	/	1.07**	1.05*
Model χ^2		36.15**	24.50**	40.42**
Sample Size		537	527	515

*$p < 0.05$; **$p < 0.01$.

The reference category for junior/senior high school education, single, and temporary migrant dummy variables are less than a junior high school education, currently married, and non-migrant resident, respectively. All other independent variables are continuous variables.

the likelihood of consistent condom use. However, except for HIV information, all the other individual cognitive factors were statistically significant in predicting condom use behavior of the study participants. Both the social and contextual variables were also significant predictors of the log odds of consistent condom use.

When all individual cognitive factors are examined together in the multiple logistic regression (Table 5.4, model 1), only the measure of behavioral skills is statistically significant. The higher the respondent scored on the behavioral skills measure, the more likely (odds ratios = 1.04) she had always used a condom in casual and commercial sex in the month prior to the interview. When the two social/contextual factors are examined together in the multiple logistic regression (Table 5.4, model 2), both are statistically significant. In fact, the odds ratios for the two variables are almost the same in the bivariate and the multiple regressions, suggesting that the two variables influence the participants' odds of consistent condom use independently. As expected, the lack of relationship power significantly reduced the odds while a supportive working environment significantly increased the odds of consistent condom use among the participants.

Finally, we regressed the likelihood of consistent condom use on both the individual cognitive and social factors together. The results (Table 5.4, model 3) show that the behavioral skills measure is highly significant, indicating that its impact on condom use is largely independent of the two social factors. But the measure of lack of relationship power is no longer significant and that of supportive working environment also loses some of its statistical significance (from 1% to 5%) in predicting independently the odds of consistent condom use. It seemed that the influences of social/contextual factors on condom use may be mainly mediated by behavioral skills, as were the influences of the other individual cognitive factors.

To test the indicated important mediating role of behavioral skills, we then regressed the measure of behavioral skills on the other three individual cognitive variables and the two social factors, respectively. The results (not shown) indicate clearly that all other individual cognitive and social/contextual variables are significant predictors of behavioral skills, confirming the important mediating role of behavioral skills.

Discussion and Conclusions

Although the link between migration, casual/commercial sex, and HIV and STIs has received much attention, little research has addressed the issue of gendered behavioral change and the HIV and STI risks of migration in China. We argue in this chapter that owing to gender inequalities, female

temporary migrants may be particularly disadvantaged in cities and at a particularly elevated risk of unprotected casual and commercial sex and consequently of HIV and STIs. Using data from two unique surveys, we endeavored to assess quantitatively whether female and male temporary migrants differentially experience sexual behavior change, as well as the main risk factors of female migrants' unprotected casual and commercial sex.

The results suggest a clear interaction between gender and migration; female temporary migrants experienced disproportionate increases in casual and commercial sex after migration. We found that a higher unemployment rate among female migrants and the overwhelming concentration of working female migrants in the service and entertainment industries were the main contributing factors of their particularly elevated participation in casual and commercial sex. Although gender inequalities in education and occupational training may have contributed to gendered labor force experiences of temporary migrants in cities, post-reform urban labor markets in China in general have not been equally accessible for female migrants (Huang, 2001; Fan, 2003; Liang and Chen, 2004). Further, the market transition has tended to weaken the institutional support for gender equality and increase gender segregation in the labor market. Consequently, female temporary migrants are channeled mainly into low status service and entertainment jobs, increasing their exposure to casual and commercial sex.

Moreover, increased gender segregation in the labor force seems to perpetuate and reinforce migrant women's inferior and subordinate status in cities (Fan, 2000, 2003). This may well leave them with little control of their casual or commercial sex encounters and result in their being unable to resist pressures for unprotected sex. Lack of relationship power and of supportive working environment may further limit their ability in initiating and insisting on HIV and STI preventive measures. The results from our pilot study in Shanghai revealed that only about 14% of female migrants working in entertainment establishments reported being able to always use a condom in casual and commercial sex in the month prior to the interview. A combination of a high prevalence of casual and commercial sex and a low prevalence of condom use in such sexual encounters puts female temporary migrants at a high risk of acquiring and subsequently transmitting HIV or STIs.

Our results regarding risk factors of unprotected sex suggest that both individual cognitive and social factors are important for understanding the failure of female migrants to consistently use condoms in casual and commercial sex. Of all the variables examined, the measure of behavioral skills related to condom use was found to be the most proximate and significant predictor of consistent condom use. This is likely because these skills likely assist in the translation of HIV information and prevention motivation into the actual HIV and STI preventive behavior of consistent condom use (Fisher

and Fisher, 1992, 2000). Our analysis further suggests that behavioral skills also help to mediate the influences of relationship power and working environment on individual condom use behavior. In other words, HIV information, protection motivation, and social influences of relationship power and working environment all work together to contribute significantly to individual's self-efficacy (skills) in condom use. This in turn affects female temporary migrants' ability to insist on condom use during their casual and commercial sexual encounters.

In addition to its indirect influence that was mediated by behavioral skills, a supportive working environment was found to exert an additional positive effect on the condom use behavior of female migrants. This finding attests to the importance of social support for female condom use in the work place. It is likely that a supportive work environment can empower female migrants in their sexual relationships and promote condom use as a behavioral norm in casual and commercial sex.

The main policy implication of the findings in this chapter is that effective HIV/STD prevention intervention is urgently needed among female temporary migrants in China and, moreover, that such intervention needs to emphasize behavioral skills and self-efficacy training in risk reduction behavior. Further, to be effective, skills or self-efficacy training will have to go beyond individual techniques and know-how to also address issues of relationship power and social support for HIV and STI preventive behavior in the work place. As our results clearly suggest, knowing what (information), whether (motivation), and how (skills) may not be sufficient for actual risk reduction among female temporary migrants, whose ability to insist condom use in casual and commercial sex may be constrained significantly by factors beyond their control or cognition. So, in addition to training in techniques and know-how, it is critical for prevention intervention programs to also work to boost the self-esteem and self-assurance of female temporary migrants by refuting negative attitudes about women and the social stigmas and blame directed against them, by giving them their individual rights in society and in sexual relationships. Prevention interventions will also need to work to promote a working environment supportive of condom use. The goal is to promote HIV and STI risk reduction as a behavioral norm and to make female migrants aware that condom use is not only acceptable, but is expected behavior by their peers and fellow workers in the work place.

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Chapter 6
Heterosexual Male STI/HIV Risk in China

Joseph D. Tucker and Tianfu Wang

Introduction

Gender inequality is one of the core factors mediating HIV risk. Biological and cultural influences have been found to increase the risk of HIV among women, a topic extensively reviewed in the literature (DeLay, 2004; Quinn and Overbaugh, 2005). The increased heterosexual HIV risk to women derives largely from the high risk behaviors of their male partners (Fig. 6.1).

However, analyses of male heterosexual STI/HIV risk are few and have been obscured by problems identifying high risk males. In this chapter we review the main reasons why a better understanding of male heterosexual risk is important and useful in the context of China; "In this chapter we review the main reasons why a better understanding of male heterosexual risk is important and useful in the context of China. We also assess the current data describing male heterosexual risk in China and consider methodologies to advance this research agenda." we also assess the current data describing male heterosexual risk in China; finally, we consider useful methodologies for surveying male sexual risk.

Several lines of argument show the utility of studying male heterosexual risk in the context of China. In terms of STIs and heterosexual HIV prevention, the male condom is the single most common method of preventing STIs. Despite this, sexual health interventions among heterosexuals have tended to focus on females in the United States (Seal and Ehrhardt, 2004). A review of current interventions in China and southeast Asia among

J.D. Tucker (✉)
Division of Infectious Diseases at Massachusetts General Hospital,
Boston, MA, USA
e-mail: jtucker4@partners.org

J.D. Tucker, D.L. Poston (eds.), *Gender Policy and HIV in China*, The Springer Series on Demographic Methods and Population Analysis 22, DOI 10.1007/978-1-4020-9900-7_7,

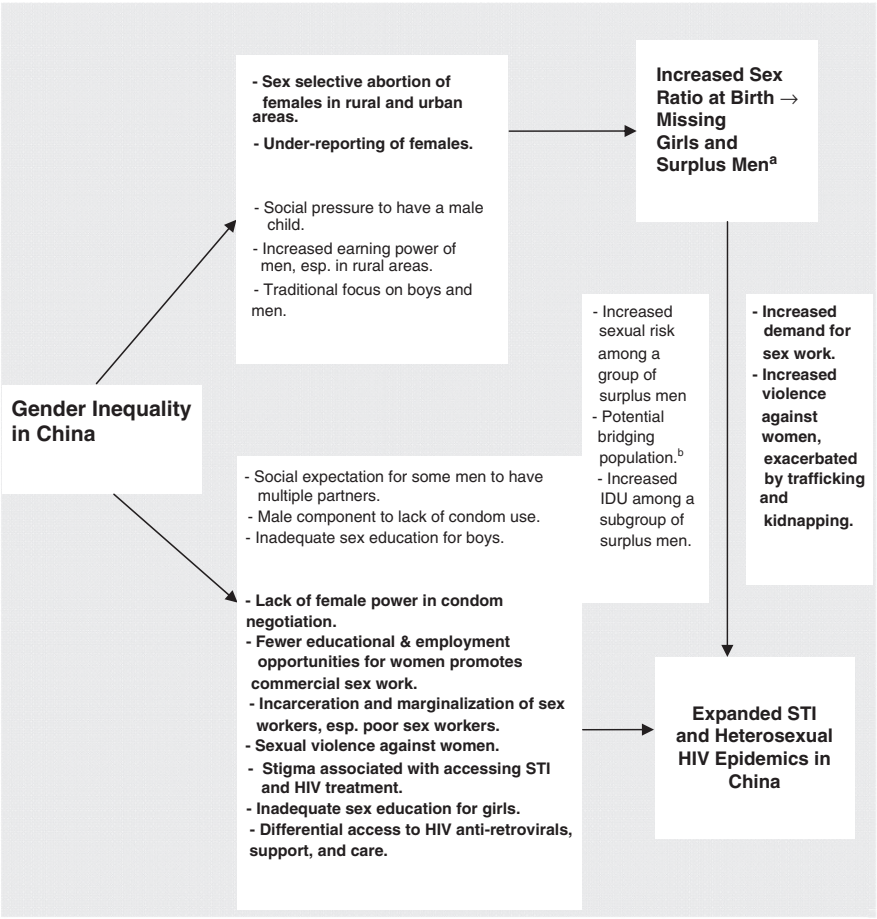

Fig. 6.1 Schematic overview of how gender inequality exacerbates the spread of STIs and HIV in China. Gender factors involving men are central and not bolded; female factors are peripheral and bolded

[a] Surplus Men. A surplus man is a young, unmarried, poor man who often migrates from rural to urban areas. Analyses of similar groups in addition to census and behavioral data predict an increased sexual risk which will likely impact the future of STI and HIV epidemics in China.

[b] Bridging population. A bridging population engages in unprotected sex with both low risk groups (usually girlfriends or wives) and high risk groups (sex workers). This is the most important group circumscribing the threshhold between a concentrated and a generalized HIV epidemic.

heterosexual populations would likely produce a similar finding. In a broad sense, biological and social arguments can be used to justify the formal investigation of male heterosexual risk in China. The biological reasons include a high baseline STI incidence among sex workers using condoms, high rates of female to male HIV transmission in the developing world, and the potential for males to act as a bridging population.

Biological Justification for Investigating Male Heterosexual Risk

Commercial sex workers (CSW) in China have a high STI incidence, even among groups of women with high reported condom use rates. This is supported by a prospective cohort study of commercial sex workers in China (Ma et al., 2002). A high rate of re-infection from either the CSW's stable partners or from their clients would explain this finding, but such a connection has not been shown in the literature. Difficulties following up with commercial sex workers in China make addressing this issue challenging, but the China Integrated Program on Research for AIDS (CIPRA) program's epidemiology project may shed some light on this topic. The high STI incidence among Chinese CSWs could be explained by the sexual behaviors and practices of their male partners, including both clients and non-clients.

HIV transmission among bridging populations increases the need for studying heterosexual male HIV risk. The efficacy of female to male HIV transmission may be different in the developing world. Some have proposed that high rates of female to male transmission in the developing world warrant more analyses of heterosexual males at risk for HIV and STIs (O'Farrell, 2001).

While CSWs have are known to be high risk, little is known about the subset of men that could act as a bridging population to the general population (Ghys et al., 2001). Male clients in Cambodia (Gorbach et al., 2000) and Benin (Lowndes et al., 2000) have been implicated as bridging populations between high and low risk groups. Another behavioral study suggests that CSWs in Kenya have a smaller number of steady male partners who may be at increased risk of STI/HIV (Voeten et al., 2002). CSW's sexual partners include their clients, stable partners, boyfriends, and perhaps "pimps" or other managers who protect them. A better understanding of how men act as a potential bridging population would be extremely important in understanding whether China's concentrated HIV epidemic will become generalized in some regions.

Social/Cultural Justifications for Studying Heterosexual Men

Beyond the biological reasons justifying the study of male heterosexual risk, there are social and cultural reasons mandating such research. Research in other settings has shown that sexual violence increases HIV risk, though this has yet to be investigated in China. A recent South African study found that women with violent or controlling male partners were at an increased risk of HIV infection (Dunkle et al., 2004). Haitian research has also shown that women with increased gender inequality and socioeconomic vulnerability are more likely to be involved in forced sex (Smith et al., 2005). The gender and power dimensions of heterosexual relationships need to be explored in greater detail. While the South African and Haitian contexts should not be generalized to China, there are similar gender-mediated power dynamics relating to men which likely affect HIV transmission risk.

China has major demographic changes underway that could impact the future of STI and HIV epidemics. Since the introduction of ultrasound technology in the 1980s leading to the selective abortions of female fetuses, China has had increasing numbers of unmarried men. Although there are many different estimates for the size of this population (see Poston and Zhang's chapter in this volume), demographers agree that China in the next few decades will have many millions of unmarried men. In order to understand China's unmarried men, a brief review of the sex ratio at birth is necessary.

The sex ratio at birth, or SRB, refers to the number of men per 100 women born in a period of time. In settings without female infanticide, sex selective abortion, or under-reporting of females, the SRB is approximately 106. However, China's sex ratio at birth since the 1980s has substantially increased, and in recent years has been between 115 and 120 (PCO & DPSSTS, 2002). Even after adjusting for the under-reporting of females, China is likely to have many millions of unmarried men.

It is not necessarily only the unmarried Chinese men who are at increased sexual risk, especially compared to their married counterparts, given that many married Chinese men have extra-marital sex (Parish et al., 2003). Given what is known about patterns of marriage and migration in China, a subset of unmarried men may have an increased risk of STIs and HIV. Wealthy unmarried men in rural and urban China will find brides, have access to health resources, and will not likely represent a group with increased sexual risk. Among the poor unmarried in China, many will not have the resources to complete secondary education, making the process of finding a stable job difficult. In order to find jobs (and possibly also to find brides), these unmarried poor men will migrate from their rural homes to cities.

"Surplus men" is a term referring to the poor, unmarried rural to urban migrants in China (Tucker et al., 2005). Since surplus men are working away from their home environments and often at quite a distance from their significant others, they may visit women from one of China's growing population of sex workers. China's commercial sex industry has flourished in recent years, and low cost sex workers can be found attached to factories and as street walkers in poor neighborhoods (Huang et al., 2005). Both the expansion of low cost sex workers and China's changing demography may work to spread STI and HIV epidemics (Tucker et al., 2005).

Heterosexual Male HIV/STI Literature

In preceding paragraphs, we have justified the investigation of heterosexual male populations. We now examine some of the existing literature on heterosexual male risk in China. First, the sentinel surveillance system of the China Centers for Disease Control and Prevention (CDC) will be reviewed. Then the STI/HIV risk of community migrants and subsets of migrants will be considered in greater detail.

China CDC Male HIV Sentinel Surveillance

By the end of 2004, a total of 253 national HIV sentinel sites collected serum for public health surveillance purposes, including serum from STI clinic attendees, detained CSWs, detained IDUs, long distance truck drivers, pregnant women, and men who have sex with men. Twice a year blood samples and demographic and behavioral information are collected from at least 400 people per site (China, 2004). In China female heterosexual HIV risk is gauged via antenatal clinic, STI clinic testing, and detained commercial sex workers. Since between one third and one half of Chinese men with STIs may not receive their health care at STI clinics, HIV surveillance in these facilities does not adequately represent the population of men who have increased sexual risk (Detels et al., 2003). While clients of commercial sex workers are sometimes detained by the police and several local Centers for Disease Control have tested these men for STIs/HIV, there is currently no routine mechanism to assess heterosexual male HIV/STI risk in China.

While other nations (most notably Cambodia and Thailand) have male military HIV sentinel surveillance sites, China lacks this type of specific male heterosexual HIV/STI risk information. China's current HIV surveillance system reasonably describes female heterosexual risk, but fails to delineate male heterosexual risk with equal rigor.

Community Male Heterosexual HIV Risk Data

Since China's national surveillance infrastructure does not assess male heterosexual risk as well as it is assessed in some nearby Asian nations, community samples are the only way to estimate the scope of the STI/HIV epidemics in these populations. Rural to urban male migrants have been singled out as a potential high risk group of men in China. Young, poor unmarried men who are working temporarily in urban centers away from their homes likely engage in more risky sex than their rural counterparts who stay at home or find brides. Migrant men have been shown to be a high risk group for STIs and HIV (Yang et al., 2005b), but the data available indicate that migrants are a diverse group with substantial variation in sexual practices.

While migrants as a whole cannot be considered a high risk sexual group, there are subsets of migrants in China that are at increased risk of STIs and HIV (Li et al., 2004; Yang et al., 2005a, 2004). Male heterosexual risk has been explored in a small study of Yunnan miners near Gejiu City. It was found that among a convenience sample of migrant male miners, almost 10% had chlamydia. Approximately 80% of miners had never used a condom in the last six months, and substantial gaps in knowledge about STI/HIV were apparent (Zhao et al., 2005). Another small qualitative study of miners in the same area found that men who had low incomes were particularly at risk for low STI/HIV knowledge and risky sexual behaviors (Gao et al., 2005). However, a study of migrant men in Shanghai revealed a relatively low prevalence of STIs and HIV as well as limited sexual risk behaviors (He et al., 2005).

Methodologies for Studying High Risk Men

There are several methodological challenges that make the formal study of heterosexual men challenging in China. Male partners of commercial sex workers are more difficult than CSWs to recruit in most areas. One of the core pillars of the sex industry is anonymity, and guaranteeing that a CSW partner's information is unlinked to any identifying information can be difficult. Although some groups of businessmen can identify their peers who also purchase sex, generally the lack of a cohesive social network of CSW partners makes respondent driven sampling less useful. In addition, in some parts of China, men may not use STI clinics. One study of market vendors in eastern China suggested that as many as half of sexually active respondents go directly to pharmacies for treatment of STIs (Detels et al., 2003).

Despite these challenges, several methodologies can be used to study high risk men. Formally incorporating male military recruits into the HIV/STI surveillance system would be an important first step in understanding male risk. Place-based sampling (Weir et al., 2003, 2004) has been used in other contexts and may be useful in recruiting representative samples of CSW sex partners. Time location sampling (TLS) provides another potential mechanism for studying heterosexual male risk behaviors.

Conclusion

Reducing male heterosexual risk is one of the most important and understudied aspects of HIV prevention and control in China. Since STIs are increasingly common in urban China and co-infection with STIs tends to increase the risk of HIV transmission, utilizing male and female gender specific prevention messages will be important. Gender influences the way that STI/HIV risk is perceived and enacted. In order to decrease this gender specific risk, we need better understand both female and male determinants of risk.

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Chapter 7
HIV/AIDS Structural Interventions in China: Concept, Context and Opportunities

Yan Hong

Introduction

The global HIV/AIDS epidemic has leveled off in recent years, attributable to advances in both treatment and prevention. With 33 million people infected and 2.1 million deaths in 2007, HIV/AIDS remains a leading cause of death (UNAIDS, 2007). In many developing countries, the HIV virus is still spreading out of control. China, the most populous country in the world, has witnessed an alarming increase in new HIV cases (Grusky et al., 2002). In 2007, the Chinese Ministry of Health reported in its biennial HIV/AIDS epidemic update that the estimated number of HIV infection cases reached 700,000 (Chinese Ministry of Health [CMOH] & World Health Organization [WHO], 2007). In the last few years there has been a notable shift in the HIV epidemic from ethnic minorities to the majority Han population, from rural to urban areas, from intravenous drug injection (IDU) transmission to heterosexual transmission, and from isolation of the epidemic among high risk groups to involvement of the general population (China CDC, 2004; UNAIDS, 2003). The epidemic in China appears to be following the pattern through which HIV/AIDS has spread in other countries – a slow period of introduction, followed by a more rapid spread, and then reaching a period of sustained growth (Grusky et al., 2002). The number of persons infected may be comparatively low for a country of 1.3 billion people; however, the sharp increase in new sexually transmitted HIV cases indicates an important problem demanding further attention (Brady et al., 2001; UNAIDS, 2002).

Given the lack of effective HIV vaccines, behavioral prevention intervention has been critical to HIV risk reduction. International literature

Y. Hong (✉)
School of Rural Public Health at Texas A&M
Health Science Center, College Station, TX, USA
e-mail: yhong@srph.tamhsc.edu

J.D. Tucker, D.L. Poston (eds.), *Gender Policy and HIV in China*, The Springer Series on Demographic Methods and Population Analysis 22, DOI 10.1007/978-1-4020-9900-7_8,

indicates that HIV prevention intervention programs in the first decades of the pandemic tended to be individual-focused, based on the assumptions that risk behaviors are conscious decisions that result from rational choices. In recent years, with the growing awareness of the role of social structural and environmental influences on HIV risk behaviors, structurally-focused intervention have been increasingly advocated (Des Jarlais, 2000; Parker et al., 2000; Sumartojo, 2000). An accumulating body of literature suggests that structural interventions that go beyond individual factors can produce more effective and sustainable effects (Latkin & Knowlton, 2005; Metzger & Navaline, 2003). There is a growing interest to implement structural interventions in developing countries such as China, where the escalating HIV/AIDS epidemic has narrowed the window of opportunity to make a difference.

In this chapter, we first introduce structural factors of HIV transmission, define structural intervention, and discuss its concept and rationale using the examples in global literature. Then we examine the context of HIV/AIDS epidemic in China with description of high risk groups and structural factors, and explain a more pragmatic attitude from the Chinese government and a potential for future structural interventions. Finally, we review the existing HIV/AIDS interventions in China, explore possible intervention strategies, and discuss the challenges we face.

Structural Intervention—Defintition, Concept and International Experiences

Structural Factors of HIV Infection and Transmission

Before we introduce the definition of structural intervention, we need to clarify the concepts of environmental or structural factors related to HIV infection and transmission. In seeking to understand the factors that contribute to the HIV/AIDS epidemic, in the past three decades, researchers around the world have found that HIV behaviors are affected by the environment as well as by individual characteristics.

The first decades of HIV prevention intervention research were primarily individual-oriented studies guided by psychological theories such as the health belief model (Rosenstock, 1974), social cognitive theory (Bandura, 1986), theory of reasoned action (Fishbein & Ajzen, 1975), the information-motivation-behavioral skills approach (Fisher & Fisher, 1992), and the transtheoretical model of behavioral change (Prochaska et al., 1992). Fisher and Fisher (2000) recently reviewed seven of the main theoretical models

of HIV risk behavior change, and noted that these theories have informed HIV prevention literature in a number of ways including understanding individual process of behavior change and providing individual-level constructs that are important to target in behavior change. However, these models did not fully consider the dynamic nature of sexual behavior, and assumed that individuals act rationally and within a cost-benefit analysis framework. Such models also assumed that freedom of choice for particular behaviors was available to all individuals at all times (Logan et al., 2002).

Latkin and Knowlton (2005) provide a perspective of social interaction in understanding risk behaviors. They argue that risk behaviors are not randomly distributed within a population, but rather generated and perpetuated through socially- or environmentally- structured social interactions. This dynamic helps explain why HIV, like many other infectious diseases, often clusters within certain sub-populations. Furthermore, social behaviors are often not rational choices based on objective information but are socially prescribed; that is, behavioral decision-making is based on bounded rationality, or practical constraints (March & Simon, 1959). For example, choice of partner is often based on group-specific norms of acceptable partners. Condom use depends both on condom availability and negotiation with the partner. Therefore, in developing HIV prevention, it is important to begin with an understanding of social and environmental influences on risk behaviors and social processes that promote or perpetuate these patterned behaviors. Social influences on behavior include social networks, social norms, behavioral settings, and community characteristics (Kelly & Kalichman, 2002; Latkin & Knowlton, 2005).

Parker et al. (2000) present a perspective on the fundamental determinants of the HIV/AIDS epidemic in international settings. They identify the following analytically distinct but interconnected categories of structural factors of HIV/AIDS: economic (under)development and poverty, population mobility including migration, seasonal work, and social disruption due to war and political instability, and gender inequality. According to Parker, Easton and Klein (2000), proximate causes are merely the particular mechanisms that will change over time, while the influence of fundamental causes will persist. Addressing only the proximate causes will do little in the long term to eliminate disease and promote health. Instead, it is necessary to confront fundamental causes in order to prevent disease.

These frameworks distinguish environmental factors from individual factors, and describe structural factors as having a more immediate or proximal impact on individuals (at the intermediate level) or a more distal impact (at the macro level) on population. This is an important distinction because

they characterize differing views of HIV experts about how structural factors relate to HIV risks and where interventions need to be targeted (Sumartojo, 2000). At the macro level, the vulnerability of persons to HIV/AIDS is influenced by broad social structural characteristics, such as economic inequalities, gender inequality, social class, and stigmatization, which are far from individual's control but have impact on the lives of social groups. At the proximal level, vulnerability to HIV/AIDS is more closely linked to social interaction within social networks, lack of accessible services, or legal barriers to prevention and care. The differentiation of individual, proximate and macro levels of factors has important implications because the design and implementation of HIV/AIDS prevention interventions will depend on which level is accepted as causes of HIV outcomes or as the most promising targets for interventions (Blankenship et al., 2000).

Structural Intervention: Concept and Principles

A good understanding of structural factors for HIV risks is a crucial step to develop appropriate structural interventions. Structural intervention refers to a public health intervention that promotes health by altering the structural context within which health is produced and reproduced (Blankenship et al., 2006). Structural intervention differs from many other public health interventions in that it locates the source of public health problems in factors in the social, economic and political environments that shape and constrain individual, community, and societal health outcomes, rather than focusing on characteristics of individuals who engage in risk behaviors (Sumartojo, 2000). A classic example of structural intervention was the one by John Snow, who ended a cholera outbreak in London by removing the handle from the pump that had been delivering contaminated water (Snow, 1855). Snow did not conduct knowledge education or skill-building seminars in order to motivate residents to avoid using water from that pump. He simply removed the handle, a kind of structural intervention that would probably be impossible today. Other examples of structural intervention in public health include providing low-fat and healthy food in school cafes to reduce obesity in children, enforcing seat-belt law to reduce mortality due to motor accidents (Sumartojo, 2000).

According to Latkin and Knowlton (2005), developing social structural approaches to interventions, from an ecological perspective, starts first with questions about malleability of different risk behaviors and access to risk reduction materials within the social environment. Second, questions are asked regarding potential sources of social influence, e.g., who occupies appropriate social positions for targeting HIV behaviors among the risk

groups. Third, questions are asked regarding how to make it more socially acceptable to change the behavior or break norms (Latkin & Knowlton, 2005).

Different from traditional public health interventions, design and implementation of structural interventions may encounter a number of unique challenges. First, structural approaches require a shift in our thinking about how to change behavior. Many view behaviors as personally motivated or resulting from a person's conscious decisions. The role of structural environment is therefore overlooked (Sumartojo, 2000). Second, structural interventions are difficult to evaluate because they do not conform easily to conventional experimental design, and effects are difficult to measure. Researchers may be hampered by a lack of methodologies for studying the complex relationship between the context of health and health outcomes. The effectiveness of structural interventions may therefore be hard to defend scientifically without new and rigorous research methodologies (Des Jarlais, 2000; Wohlfeiler & Ellen, 2007). Third, structural intervention requires greater participation of stakeholders and consensus building, sometimes in the face of considerable resistance. Structural intervention can involve major policy or programmatic change, and sometimes challenge deeply held social, political and economic interests. This means that in developing structural interventions, it is important to consider whether they are politically viable and acceptable to communities they most affect (Blankenship et al., 2000). Fourth, structural factors may be so broadly defined that interventions become impossible. For example, we could easily link poverty, gender inequality, vulnerability of young people to HIV, but that would provide little insight into where to start in developing HIV policy or useful, on-ground, health promotion interventions to prevent the disease and improve the lives of the infected. The challenge is to take the structural perspective and develop workable responses to the epidemic (Blankenship et al., 2006; Sumartojo, 2000).

HIV/AIDS Structural Intervention: Global Experiences

Compared to the literature on the structural and environmental factors that shape the HIV/AIDS epidemic, the published literature on structural intervention is rather limited. Nevertheless, existing literature documents the potential of structural interventions for reducing HIV risks. These interventions target structural factors at interpersonal, organizational, community, and state levels.

One of the classical examples of intervention based on theories of social influence is the popular opinion leader (POL) intervention among gay

communities in the United States (Kelly et al., 1991). In this study, POLs were identified in gay bars and received sessions of HIV prevention and outreach skills. POLs returned to their communities and disseminated the information to their peers. In the follow-ups, men from the community that received intervention reported a significantly greater reduction in unprotected anal intercourse than the men from the comparison communities (Kelly et al., 1991). The POL model later has been adapted to various populations, including injection drug users (IDUs) (Latkin et al., 2003), young Latino migrant workers (Somerville et al., 2006), low-income women in the US (Sikkema et al., 2000), alcohol users in India (Sivaram et al., 2004), and high risk population in Peru (Maiorana et al., 2007).

Needle/syringe exchange programs are well-known examples of structural interventions that provide accessible harm reduction measures to marginalized populations. First used in the Netherlands to control an outbreak of hepatitis A in the early 1980s, the program has been quickly adapted in many other countries to control the HIV/AIDS epidemic, particularly HIV transmission among IDUs. In the US, such programs are prohibited from receiving federal funding, but has been implemented by local or private funding in more than 150 US cities. Many studies have shown that needle exchange is effective at preventing HIV while not promoting drug use (Ksobiech, 2003). Needle exchange programs have been established in more than a dozen countries. In some countries such as the Netherlands and Australia, the program has been credited with maintaining a low rate of new HIV infections among IDUs (Dolan et al., 2005). In China, the needle exchange programs have recently been established in pilot sites (Wu et al., 2004)

The Sonagachi project of Calcutta, India is a renowned example of structural interventions focused on social empowerment and community mobilization (Basu et al., 2004). The program started with defining HIV as an occupational health problem and labeled prostitutes as “sex workers”. This label helped reconceptualize the role of sex workers in the community’s economy and diminished the discourse of morality or crime. The program organized multi-level, multi-faceted interventions addressing community (having a high-status advocate; addressing environmental barriers and resources), group (changing social relationships), and individual factors (improving skills and competencies related to HIV prevention and treatment). Rather than treating sex workers as the beneficiaries of prevention programs, the program mobilized sex workers, increased their social solidity and emphasized their representation and active participation in all aspects of the program (Jana et al., 2004). The Sonagachi project has helped prevent HIV infection among sex workers in that area compared to other urban centers in India.

Educational and economic empowerment has been another approach of structural intervention to reduce HIV risks. The United Nation Population

Fund has sponsored the micro-credit programs and integrated it with other health education programs. In countries like Nicaragua, Chad, Laos, Bangladesh, and Viet Nam, women receive seed funding that lead to economic independence, and they also learn to protect themselves against HIV and other reproductive health problems (UNPF, 2008). Since the early 1990s, the Sma Pattana Cheewit project in Thailand has provided low-income girls with scholarships to cover their educational and personal costs so that they can attend secondary school (Kanchanachitra, 1999). An evaluation program conducted by UNAIDS found that girls who participated in these programs were more likely to continue their education, and less likely to become sex workers (Kanchanachitra, 1999).

Uganda and Thailand represent examples of high-level political commitment to fight HIV/AIDS and successfully curb the epidemic. Thailand's 100% condom use program (CUP) is an example of such strong commitment. The program seeks to prevent the sexual transmission of HIV through increasing condom utilization in Thai sex establishments to 100%, and involves the active participation of governmental authorities and owners of sex establishments. Condoms are supplied without charge to all sex establishments, which, it is important to note, technically remain illegal despite the existence of the 100% CUP. If clients refuse to use condoms, sexual services are withheld. Condom use was strictly enforced through provincial AIDS committees, local police, monitoring, and imposition of sanctions on commercial sex establishments that fail to comply (Hanenberg et al., 1994). Since its inception in 1989 and its expansion nationwide in 1991, condom use rates in brothels rose from under 50% in 1989 to 94% in 1993. Sexually transmitted infection seroincidence decreased from 6.5 per 1000 population to 2.07/1000 in 1992, declining to a historic low of 0.38/1000 in 1997 (WHO, 2000).

The above are some remarkable examples of structural intervention in the international literature of HIV/AIDS prevention and intervention. Whether these examples are possible in the Chinese context is uncertain, and cultural adaption is necessary based on careful study of structural factors of HIV epidemic in China.

HIV/AIDS Epidemic in China: Context for Structural Intervention

HIV/AIDS Epidemic in China: Current Situation

While the actual HIV seroprevalence in China remains uncertain, the current official estimate of number of persons infected with HIV exceeds 700,000 (CMOH & WHO, 2007). Since the first AIDS case was diagnosed in 1985,

the HIV infection cases have been increasing by more than 30% annually from 1998 to 2002, with a 54% rise from 2002 to 2003 alone. As the world's most populous country, China has a low overall HIV prevalence, with nearly 0.1% infected in the general population. However the HIV/AIDS epidemic in certain regions and certain subpopulations of China faces a potential explosion. Historically, IDUs and commercial blood/plasma collection were the primary HIV high risk groups in China. In recent years, infection through sexual transmission is growing the fastest; sexually transmitted HIV cases have increased from 7.2% in 2002 to 43.6% in total infections by the end of 2005 (CMOH, UNAIDS, & WHO, 2006). In 2007, heterosexual transmission of HIV accounted for 44.7% of new infection cases and has become the dominant mode of HIV transmission. Meanwhile, the infection rate among MSM is increasing rapidly as well. Overall, the male female ratio among the HIV infected is decreasing, and there is a shift from rural to urban, from minority to the majority Han (CMOH & WHO, 2007). Such epidemic trends suggest that HIV is at the verge of spreading from core high risk populations (e.g., IDUs, sex workers) to the general population.

A number of review studies on HIV/AIDS epidemic in China have identified the key subpopulations that represent the unique epidemiological characteristics in China (He & Detels, 2005; Hong & Li, 2007; Liu et al., 2006a; Qian et al., 2005; Wu et al., 2004; Yang et al., 2005a).

Injection drug users. Since 1980s, illicit drug use has spread from the drug trafficking route of "golden triangle" to the rest of China, with substantial geographic variation. National behavioral surveillance data suggest that injection is an increasingly common route for illicit drug use as a cost-effective way of experiencing the effect of the drug (Ming et al., 2002). The average prevalence of IDU among drug users increased from 35% in April 1995 to 61% in April 2003. Among IDUs, about 45% share needles (China CDC, 2004). HIV infection among IDUs has been reported in all 31 provinces of China, and infection rates are as high as 30% in certain areas such as Yunnan, Guangxi, and Xinjiang (Qian et al., 2006). The majority of drug users (79%) are between 17 and 35 years old and comprise predominantly rural (30%) and unemployed people (45%) (Liu et al., 2006b). Although the proportion of reported HIV/AIDS cases attributable to IDU decreased from 71% during 1985–2000 to 50% in 2002, HIV prevalence among IDUs increased. The average HIV prevalence rates among drug users increased from 0.4% in 1995 to 5.9% in 2002 (Liu et al., 2006b).

Recreational drug users. Recreational drugs are also referred to as "club drugs", "soft drugs" (as opposed to hard drug), or "new-type drugs". Recreational drugs include methamphetamine (or crystal meth, or "ice"), ketamine (or K-powder), or MDMA (or ecstasy), amphetamine, triazolam, etc. These "new-type" drug users are different from traditional injection drug users

who are mostly heroin users. Unlike heroin or opium, which ultimately suppresses users' sexual desire, recreational drugs often produce a rapid and pleasurable rush followed by euphoria, heightened attention, and increased energy (Colfax & Ruzman, 2006). High risk sexual activities (e.g, unprotected sex, group sex, and anal sex) and even violence often follow the recreational drug use and therefore may lead to sexual transmission of HIV. Since late 1990s, recreation drugs have gained increasing popularity among young people in China, particularly in urban areas. It is reported that the number of recreational drug users has accounted for more than 9.5% of total drug users in China in 2004, and the percentage is increasing rapidly (Xinhua News Agency, 2005). Entertainment establishments and private parties are popular venues for recreational drug use. Most of these drug users are youth or young adults in the cities, and an increasing number of sex workers (both male and female), MSM, and even young professionals, young social elites, and college students are joining the group. Despite its severe personal and social consequences, very limited epidemiological data are available regarding the recreational drug use.

Former blood/plasma donor. In the early 1990s, thousands of for-profit blood/plasma collection centers were established in China, especially in rural areas of central or eastern China. The majority of paid donors were adults aged 20–50 years (Wu et al., 2001). Since the mid-1990s, a large number of HIV infections have been reported among blood donors in many provinces, especially in central China (Shan et al., 2002). In 1998, the "Law of Blood Donation" became effective nationwide and commercial blood/plasma donation had decreased substantially since then, but many people were already infected. A survey among 1997 randomly selected villagers from villages in the area with many former blood donors found that HIV prevalence was 10.8%, with values of 15.1% among former blood donors and 4.8% among non-donors (Ji et al., 2006). In 2003, 21% of cumulatively reported HIV/AIDS cases in China were related to commercial blood/plasma donation (Qian et al., 2005).

Commercial sex workers and their clients. Since early 1980, commercial sex has reemerged along with China's economic reform and opening-up to the outside world. It is estimated that there are between 4 and 10 million female sex workers in China (Hong & Li, 2007). According to a nationwide probability survey in 2000, among Chinese men 20–64 years, 6.4% have ever engaged in commercial sex at least once during their lives (Pan et al., 2004). Recent studies found that there are a growing number of male sex workers (i.e., money boys), mostly rural-to-urban migrants in big cities (He et al., 2007; Mi et al., 2007). A majority of commercial sex workers work in entertainment establishments (e.g., bars, karaoke, dancing halls, clubs, hotels, massage parlors, barbershops, hair salons, and hair washing rooms)

(Xia & Yang, 2005). A recent review found that many commercial sex workers are young (teens or twenties), with primary or junior high school education, highly mobile (moving from one workplace to another, and moving between cities). Sex workers also have low rates of consistent condom use and high rates of STI. A subset of sex workers have drug abuse problems (Hong & Li, 2007). Recent sentinel survey among sex workers suggests an HIV prevalence around 1%, but in some sites such as Yunnan and Guangxi, the infection rate was as high as 10% (CMOH et al., 2006). Since 2007, heterosexual transmission has become the dominant mode of HIV infection in China, millions of commercial sex workers and their clients have become the key "bridging population" linking high risk groups (such as IDUs and STI patients) to the general population (Hong & Li, 2007; Yang et al., 2005a).

STI Patients. The number of STI cases has risen dramatically since the initiation of economic reform in late 1970s. In 2003, more than 37,000 attendees at STI clinics were tested for HIV, about 0.24% were tested positive. All national sentinel sites reported HIV infection among people infected with STI (China CDC, 2004). Studies found that most individuals with STIs reported having multiple sexual partners with a mean number of 6.2 for men and 7.2 for women. Approximately 70% of males reported paying for sex, whereas one fourth of women reported being involved in commercial sex. A majority of them reported never using condoms when having sex with different partners (Choi et al., 2003; Wang et al., 2001a,b). Data also indicated that many people with STI continued to have sexual activities after having STI symptoms (Liu et al., 2003). A study among 11,461 STI patients in Guangxi found that 1.2% were HIV-infected (Chen et al., 2007).

Men having sex with men (MSM). In 1997, the laws were changed so that homosexual activities were no longer illegal in China. In 2001 homosexual activities were no longer classified as a mental illness in China, but stigma against homosexuality is still severe. Most of homosexual or bisexual men are still under social pressure to hide their sexual orientation (Choi et al., 2003; Zhang & Chu, 2005). Further, many MSM are married and continue to have sexual relationships with their spouses (Choi et al., 2003; Liu et al., 2006a). A majority of individuals who identify as MSM live in large cities, tend to be more educated and have larger social networks. Their large social networks potentially increase their likelihood of HIV infection. (Qian et al., 2005). On the other hand, stigma against homosexual activities drives them underground and hinders preventive and educational programs. A convenience sample of 481 homosexual men in Beijing showed 3.1% were HIV positive, 49% of participants reported unprotected anal intercourse, and 22% reported unprotected anal or vaginal intercourse with women in

the past 6 months (Choi et al., 2003). Ma et al. (2006) reported on three consecutive surveys among MSM using respondent driven sampling in Beijing from 2004 to 2006 in which the HIV infection rate rose from 0.4% to 4.6% to 5.8%. The increase of HIV infection was also accompanied by an increase in syphilis cases, self-reported history of STI, and unprotected sexual activities.

Migrant workers. The uneven economic growth and a large surplus of agricultural labor have led to a massive rural-to-urban migration in China since the mid-1980s. There are more than 120 million floating population in China, mostly young adults with elementary or junior high school education (Li et al., 2004). The sheer number and their mobility have led to concerns that they may have increased sexual and HIV acquisition risks, linking the rural and urban subgroups. Male migrants may be likely to become clients of commercial sex workers when far away from home and with increased disposable income and decreased social networks. Female migrant women often lack good education and job skills, and may have limited opportunities to earn money. An increasing number of young women are recruited into commercial sex (Liao, 1998; Zheng et al., 2001). Approximately one-tenth of males have patronized commercial sex and 6% of male and female migrants have exchanged sex for money (Li et al., 2004). Previous studies also reported their higher rates of HIV-related behaviors including having multiple sexual partners, selling blood, and substance abuse (Anderson et al., 2003; Li et al., 2004; Lin et al., 2005; Yang et al., 2005b).

There is certain overlap within many high risk groups. For example, some drug users (both IDUs and recreational drug users) are engaged in commercial sex activities, and so are migrant workers. In addition to these key subpopulations with high HIV risks, there are other subpopulations that may be vulnerable to HIV infection, including blood transfusion recipients, children born to HIV infected women, youth and young adults. It is reported more Chinese adolescents are engaging in premarital sexual activity. As a result, the number of unplanned pregnancies and STI among Chinese young adults has increased markedly (Wang et al., 2005). Studies among general Chinese population found that a considerable proportion of adults engaged in risky sexual behaviors such as having casual sexual partners and having premarital sex. All studies reported a low percentage of condom use (Yang et al., 2005a). The national stratified probability sample reported 10% of adult males and 4% of adult females engaged in sex with more than two noncommercial sex partners during the prior year, and 9% of men purchased sex. Only 0.3% always used condoms when engaged in sex with prostitutes (Parish et al., 2003).

Structural Factors of HIV/STI

A number of studies have been published regarding HIV risks in China, many of these have reported the structural factors. These factors include social economic factors, political factors, organizational factors, community factors and interpersonal factors.

As early as 1991, Gil reported the potential fast spread of heterosexual transmission of HIV in China, even though the prevalence was very low at that time. Gil attributed the HIV risk factors to increasing political freedom, population mobility, increasing disposable income, widening income gap and an unequal gender status (Gil, 1991). Researchers also reported that along with China's economic reform and opening up to the outside world, increasing population mobility and personal freedom, changing social norms and sexuality have fueled the growing HIV epidemic (Gil et al., 1996; Hershatter, 1996; Zhang et al., 1999). Stigma has been identified as an important barrier to HIV prevention and care for people living with HIV/AIDS (PLWHA). Stigma prevails in general population as well as health care providers, and it affects not only PLWHA, but also the social groups at higher risks of HIV, and even people from the areas with higher rates of HIV infection (Cao et al., 2006; Li et al., 2007a,b; Neilands et al., 2008; Webber, 2007). Gender norms are also a determinant of women's vulnerability to HIV infection (Lin et al., 2007). Unequal power distribution and economic deprivation are reasons behind the low condom use rate and inadequate access to HIV prevention services (Choi & Holroyd, 2007). Zhang (2004) attributed the growing HIV/AIDS epidemic to worsening inequality, relative poverty, marginalization and social exclusion. According to Zhang, the blood/plasma collection is a testimony of the country's "mindless embrace of unbridled, profit-seeking capitalism, and the weakening of the state role in supervising capitalist activities and investing in social welfare" (2004).

In recent years, more studies were conducted regarding policy factors in China's HIV epidemic. For example, Tucker et al. (2005) pointed out that China's family planning policy and the imbalanced male female ratio will create a group of poor, young, unmarried men who may have an increased HIV/STI risk. Wu et al. (2001) noted that unregulated blood donation and collection in early 1990s have resulted in a large number of HIV infection and transmission in central and northern China. Tucker and Ren (2008) described how the Chinese system of administrative detention at female "re-education" centers may marginalize sex workers, complicating effective HIV prevention services. Several scholars have identified the household registration system (i.e., "Hukou") as a barrier for HIV prevention for rural-to-urban migrants, because it denies the migrants'

rights to urban health care and education services (Hong et al., 2006; Yang & Xia, 2006).

Several empirical studies have identified other structural factors of HIV risks. For example, people who migrate are more likely to report HIV risk behaviors (Li et al., 2004; Yang et al., 2007, 2005b). In big cities, migrants report higher rates of HIV risk behaviors than their local urban counterparts (Yang et al., 2005b; He et al., 2007; Mi et al., 2007). However, in rural areas, local sex workers report higher HIV risk behaviors compared to sex workers who migrate to the area (Hong et al., 2008). For women working in entertainment establishments who provide sex services, the workplace (e.g., saunas, barbershops, karaoke bars) plays a critical role in their sex risk behaviors (Rogers et al., 2002; van den Hoek et al., 2001). In addition, the support of gatekeepers (i.e., managers of establishments) strongly predicts the sex workers' condom use behavior and HIV testing (Hong et al., 2009; Yang et al., 2005c).

A More Pragmatic Attitude and Escalating Interventions

The Chinese national HIV/AIDS policy has gone through different stages in response to the growing epidemic. The government's attitudes have gradually shifted from "denial" to officially endorsed "harm reduction" (Hammett et al., 2008).

During the first 10 years (1985–1995), the government adopted an attitude of denial toward the disease of "western imperialism" (Gil, 1991). A "rehabilitation approach" that was instituted in the Maoist era continued to dominate HIV/AIDS prevention. Commercial sex workers and drug users were sent to "reeducation centers" or "rehabilitation centers". Anyone diagnosed with HIV/AIDS was prohibited from entering China or moving within China. PLWHA were deprived of their rights of working, marriage and having children. Homosexual activities were illegal; and carrying condoms was evidence for commercial sex and could lead to an arrest. Nevertheless, HIV/AIDS epidemic kept growing fast despite these strict punitive approaches. In 1998, the Principles for STI/AIDS Education and Prevention Messages was issued jointly by the Ministry of Health and eight other ministries (Wu et al., 2007c), which indicated that government was taking a more pragmatic attitude toward the epidemic. The basic tenet of this HIV policy was knowledge education, assuming that people would change their behaviors with better awareness and knowledge. Meanwhile, drug use and commercial sex remained two of the "social evils" that were subject to be "fiercely cracked down". With pressure from the growing HIV/AIDS epidemic and from the international community, China issued

the Plan of Action for Containment and Control of HIV/AIDS in 2001 (Wu et al., 2007c). The policy first highlighted the effective strategies for control of HIV, including condom promotion, methadone maintenance treatment (MMT), and needle social marketing for IDUs. Along with the policy shift, more funds through central government and international organizations were apportioned to HIV programs. Funding was used to improve and regulate blood donation centers, provide free anti-retroviral therapy (ART) for the poor, and other HIV prevention and treatment programs (Wu et al., 2004).

With an official endorsement of "harm reduction", a series of pilot projects were carried out, led by China Center for Disease and Control (He & Detels, 2005). In 2003, the China CARES Project provided free HIV counseling and testing, free ART therapy and care, and free prevention of mother-to-child transmission, free schooling for AIDS orphans, and assistance to families affected by HIV/AIDS in poor areas. Initiated in 2003 in 51 county level communities, the program was extended to 76 other communities in 2006 (Qian et al., 2005). In 2005, MMT programs were established in China, and the plan was to open 1000 such clinics nationwide over the next 5 years (Li, MQ et al., 2007). Other harm reduction programs have been implemented including needle exchange programs and increasing access to HIV testing (Sullivan and Wu, 2007).

However, there exist a number of barriers to the scale up of these HIV prevention approaches. For example, an evaluation of a MMT program in Liuzhou of Guangxi found that "feeling insecure" is a main concern for heroin users to utilize the program (Li, MQ et al., 2007). In a pilot study of 100% condom use program (CUP) in Jingjiang City of Jiangsu Province in 2001, the local CDC director shared his frustration with the media shortly after the program was initiated: "We planned to conduct a baseline assessment in July (2001) with the purposes of figuring out how many sex establishments and sex workers live (in the city). However, we could not recruit a single person in the entire first three months (because of periodic crackdown by the police on the sex establishments)" (Anonymous, 2002). A recent public humiliation of FSWs in Shenzhen, the birthplace of China's economic reform and an industrial boomtown bordering Hong Kong, underscores the challenges facing implementation of 100% CUP among FSWs in China. On November 29, 2006 (two days before the World AIDS Day), Shenzhen police forced more than 100 arrested FSWs, all handcuffed and dressed in identical yellow smocks, to march in public while their names were announced in front of a crowd of thousands of bystanders (Anonymous, 2006).

These setbacks betrayed an unconvinced attitude from local government and a lack of coordination between departments. Despite of these setbacks, we have seen a stronger political commitment and a more pragmatic attitude

toward HIV/AIDS from the government, which suggests a promising space for structural intervention.

Opportunities and Challenges of HIV Structural Intervention

Existing HIV/AIDS Structural Interventions

A number of HIV/AIDS intervention studies have been conducted in recent years. Published data on existing HIV/AIDS intervention programs in China were retrieved by searching the PubMed. A total of 17 studies were located (see Table 7.1). Most of the interventions targeted the high risk populations such as IDUs and female sex workers, some focused on migrants, students, pregnant women, and health care providers. Among these intervention studies, a majority (15) utilized individual-focused intervention approaches, mostly knowledge education or voluntary counseling and testing (VCT) designed to change the behaviors of targeted individuals. Only two intervention programs utilized structural intervention approach. One was Hammett and colleagues' (2006) peer education program among IDUs in the border areas of Guangxi and Viet Nam. The other was Zhongdan and colleagues' (2008) 100% condom use program among establishment-based female sex workers in Wuhan. There is a lack of published evaluation on the government initiated harm reduction programs such as MMT program and needle/syringe exchange programs.

Recommendations of HIV/AIDS Structural Interventions

Based on theories of structural intervention, the current HIV/AIDS epidemic in China and existing HIV/AIDS interventions, we suggest the following structural interventions to reduce HIV risk in China. These structural intervention strategies target the different structural factors of HIV/AIDS epidemic, including social norms, social influences, legislature, media, access to health care, and education.

1. Intervention by changing social norms through popular opinion leaders (POL) and peer outreach should be expanded. Global literature has documented the success of such approaches (Kelly et al., 1991; Latkin et al., 2003). POL and peer outreach may be particularly effective for socially marginalized groups such as IDUs, sex workers, MSM and migrant

Table 7.1 Existing HIV/AIDS intervention programs in published literature

Source	Location	Population	Intervention strategy
Wu et al., 2002a	Yunnan	IDU youth	Knowledge education
Wu et al., 2002b	Yunnan	Health care provider	Knowledge education
Ma et al., 2002	Guangdong	FSW	Knowledge education; STI diagnosis & treatment
Chen & Liao, 2005	Guangxi	IDU	NGO-delivered individual consultation
Wang et al., 2005	Shanghai	15–24 yr-old	Knowledge education
Khoshnood et al., 2006	Urumqi	Pregnant women	VCT
Liao et al., 2006	Hainan	FSW	Knowledge education
Hammett et al., 2006*	Guangxi & Viet Nam (border)	IDU	Peer education, needle provision
Li et al., 2006	Guangxi	FSW	VCT
Zhongdan et al., 2008*	Wuhan, Hubei	FSW	100% condom use program
Rou et al., 2007	Anhui, Beijing, Fujian, Guangxi, Xinjiang (5-city trial)	FSW	Knowledge education
Wu et al., 2007b	Yunnan	FSW	Knowledge education
Tian et al., 2007	Yunnan	Rural students	Knowledge education
Wu et al., 2007a	Guangdong	IDU	Needle social marketing
Lau et al., 2007	Sichuan	FSW	Knowledge education
Qian et al., 2007	Shanghai	Female migrants	Individual constitution
Cheng et al., 2008	Henan	Rural students	Knowledge education

* Structural intervention.

workers. Such peer outreach approaches can facilitate communication of risk reduction messages by utilizing the mechanism of diffusion of social norms in social networks. POL and peer outreach interventions can also be focused on institutions that facilitate mixing between high- and low-risk individuals and also link different networks together. Venues such as bars, internet sites, and commercial sex establishments are “hot spots” for connecting with high risk groups and transmitting the virus. Implementing culturally appropriate HIV communication and peer outreach programs in these sites may be particularly effective.

2. Sex education and HIV prevention should be integrated with school curriculum. Through appropriate communication and education, social norms

regarding safe sex and HIV infection can be gradually changed as we observed in many other countries. Sex education has never been a part of school curriculum in China, yet the majority of HIV infected individuals are between 15 and 35 years old. Recent data showed that unprotected sex and unwanted pregnancies among school-aged youth are increasingly prevalent (Wang et al., 2005). Because of lack of appropriate sex education, the internet has been a primary source of sex-related information for college students (Gao et al., 2001). In addition, the emerging recreational drugs and the fast growing number of "new drug users" among youth and young adults deserve special attention. Age appropriate education program is therefore urgently needed for adolescents and youths. Traditional classroom teaching needs to be incorporated with internet education, peer outreach, and other formats of education that are more appealing to the young generation.

3. HIV prevention education is urgently needed for rural population, and training of HIV prevention, diagnosis and treatment is urgently needed for rural health care providers. A majority of HIV-infected individuals live in rural areas. Further, millions of young rural migrants are moving into cities each year. Education to increase knowledge, promote norms of HIV prevention among rural population is critical. Education programs can be locally developed to reflect the considerable geographic variation in HIV/STI epidemic in China. In addition, health providers in rural areas are in special needs of training on HIV/STI prevention, diagnosis, and treatment, HIV risk reduction counseling, and stigma reduction.

4. HIV testing should be greatly expanded. Among the 700,000 estimated HIV infection cases, only 6% have actually been tested, meaning there are 94% of people are living with HIV but unaware of their positive status (Wu et al., 2004). In addition, voluntary testing and counseling is an important approach of awareness-raising for the at-risk population. HIV testing can be offered at no cost to the public. Same-day results, social marketing, and screening of HIV in STI clinics are potential strategies. In addition, confidentiality and privacy should be assured for those who choose to be tested.

5. Better legislation on HIV/AIDS is needed. Over the past decades, a number of laws and regulations have been issued regarding HIV/AIDS. However, the rapid spread of HIV reveals the limitations of these laws and a lack of enforcement. One the one hand, legislature and regulations should be reformed to decriminalize commercial sex and drug use. The government has gradually realized that elimination of commercial sex and drug use is unlikely in the current socio-economic climate. Data show that the numbers of sex workers and drug users continue to increase despite the punitive approaches. Punishment and detention can drive these marginalized groups underground and keep them from preventive measures and seeking clinical care. Even though it is unrealistic to expect the central government

to "legalize" commercial sex or drug use in the near future, we can learn from other countries to better regulate commercial sex and drug use. On the other hand, laws are especially needed to protect PLWHA and ensure their rights to health care and human rights. Laws are also needed to protect the health and legal rights of socially marginalized populations such as migrant workers, sex workers and drug users.

6. Gatekeeper intervention is an approach that shifts the attention of HIV risk behaviors from at-risk individuals to the people in charge of the sex industry. For example, the majority of commercial sex workers work in entertainment establishments (Hong & Li, 2007). The gatekeepers (e.g., managers or owners of establishments) can be targeted for HIV prevention intervention with the aims to change condom-use policy and promote social norms of HIV prevention among sex workers in the establishment. There are two reasons for such approach. First, gatekeeper's opinions about condom use impact their sex workers' condom use behaviors (Hong et al., in press; Morisky et al., 2005; Yang et al., 2005c). Second is the high mobility of sex workers, who usually change their workplaces every three to six months (Hong et al., 2008; Zhongdan et al., 2008). The main purpose of gatekeeper interventions is to enhance or promote positive social norms of condom use and HIV prevention in the establishment. Given the high turn-over rate of FSWs and the big influence from the gatekeepers, focusing on gatekeepers may be a cost-effective approach for the purpose. Similar approaches can be used for migrant workers in factories or construction sites.

7. Scale up of harm reduction programs including 100% CUP, MMT and needle/syringe exchange programs. The scale-up effort requires community and government mobilization as well as strong government commitment. For instance, the 100% CUP pilot project in Wuhan involved multiple sectors, including commercial sex workers, establishment owners, STI clinics, departments of public health, public security, industry and commerce, and family planning (Zhongdan et al., 2008). Several studies reported the government's commitment to scale up the harm reduction programs nationwide, however, evaluation study on program outcome and impact are scarce. Harm reduction programs should also be extended to recreational drug users, most of them are currently out of the reach of public health professionals.

8. Integration of HIV prevention services with existing public health and social services. In Sub-Sahara Africa, there have been initiatives to co-locate HIV/STI, VCT and prevention of mother-to-child transmission (PMTCT) into family planning services (Mekonnen et al., 2004). Recently, there has been a push to integrate family planning services with anti-retroviral services (Shelton and Peterson, 2004), and to integrate HCV screening into HIV testing and outreach programs (Kresina et al., 2005) and such programs

have demonstrated good efficacy. In China, family planning is a national doctrine and a comprehensive system has been established at various levels with extensive community outreach. To integrate HIV prevention services into current family planning infrastructure may be an effective structural intervention approach.

9. Using social marketing approach to reduce stigma against HIV/STI and increase social acceptability of PLWHA. Stigma is one of the biggest barriers to HIV prevention intervention in China. We could learn from successful social campaigns to change social norms on smoking and driving under influence in western countries (DeJong and Wallack, 1992; Dorfman and Wallack, 1993). Social marketing should be focused on promoting negative images of risky behaviors as well as promoting negative images of health behaviors (Dorfman and Wallack, 1993). The extensive reach of centralized Chinese media could be exploited for this purpose.

10. Access to health care is another urgent need for the rural residents, rural-to-urban migrants and urban poor. China's rural cooperative health insurance collapsed in the 1980s due to the dissolving socialist commune system, which resulted in more than 95% of rural residents being uninsured (Bogg et al., 1996; Grogan, 1995). Rural-to-urban migrants are not entitled to employer-sponsored benefits even though they are employed in the cities because of the household registration system (i.e., "Hukou") (Hong et al., 2006). Privatization of health care and skyrocketing expenses of health care have resulted in limited or no health care services among millions of urban poor (Liu et al., 2002). Access to health care including preventive services is an essential step for HIV prevention for these vulnerable populations.

11. More in-depth research on structural factors of HIV/AIDS and structural interventions is needed. More research is particularly needed in three areas: (1) structural factors of HIV/AIDS epidemic. Although a considerable amount is known about the structural factors associated with HIV risks and transmission in global settings, empirical efforts in China are limited. Structural factors are especially pertinent to the social, cultural and political context, and therefore require studies based on indigenous data and insights. (2) Evaluation of existing structural interventions. How to measure the intervention effect that is beyond the individual-level behaviors, and include data on both individual and structural levels merits further study. Evaluation should not only focus on positive impact of the structural intervention, but also the unintended consequences. (3) Innovative, sustainable approaches of structural interventions. It is always important to design innovative, timely and cost-effective structural interventions that address important public health problems.

There is no one structural intervention that can address all of the sources of HIV risk. Effective and sustainable structural interventions are often

multi-faceted, involving multiple sectors. Further, structural interventions are not meant to replace individual-based interventions. Instead, structural interventions can significantly advance HIV prevention goals when integrated with individual-based interventions (Blankenship et al., 2006). Therefore, in addition the above suggested strategies, public health professionals need to collaborate with other agencies to examine structural factors of HIV epidemic and explore timely and innovative structural intervention approaches.

Challenges

There are many challenges ahead in the design, implementation, and evaluation of HIV/AIDS structural interventions in China. The most prominent three are listed below.

First, as identified by many researchers, stigma remains one of the most significant barriers to control HIV/AIDS in China. The strong stigma is the product of Chinese traditional culture and its unique political system. HIV stigma also reflects more fundamental problems of widening regional disparities in economic development, growing inequalities between rich and poor, and marginalization and exclusion of a social "under-class", gender inequality and changing sexuality. In addition to a lack of research on these issues, there is a lack of official recognition that increased risk to HIV infection are closely related to broader economic, social and public policies (Choi & Holroyd, 2007). In both rural and urban areas, discrimination toward PLWHA and their families is commonplace, and it leads to low willingness to participate in HIV prevention and intervention programs. Stigma is also a reason for many people to avoid testing or restrain from preventive measures (Li et al., 2007a,b). The strong stigma surrounding HIV/AIDS, including the stigma from the governmental officials, law makers and law enforcement agencies, makes it difficult to commit sufficient funds and manpower to implement effective programs, and makes health care providers reluctant to work with high-risk population (Wu et al., 2004).

Second, there is a paucity of trained public health professionals at all levels, from central to provincial to county to township to villages and communities. After two decades of efforts to control HIV/AIDS, it is now more evident than ever before that limited local capacity is a severe barrier to implement effective HIV prevention and care programs (He & Detels, 2005; Wu et al., 2004). China needs professionals for effective HIV prevention as the new HIV cases increase annually; professionals are also urgently needed for a growing number of AIDS patients in need of ART and other health care. Moreover, since most of the HIV-infected individuals live in rural and

remote areas, more human resources and training programs are needed in resource-poor areas.

Third, a lack of political commitment at local levels and poor multi-sector coordination hinders a widespread response. The central government has made a strong commitment to stop the HIV epidemic through a series of policies and increasing funding. However, a lack of coordination between the central and local government and a lack of enforcement and evaluation at various levels of government has resulted in widely variable implementation. Thus compulsory reeducation center for commercial sex workers, and compulsory rehabilitation center for drug users often overshadow the central government's new "harm-reduction" programs such as MMT, needle exchange and 100% CUP (Zhang, 2004). A lack of coordination between multiple sectors often results in inconsistency of policies at central government and local government and inefficiency of policy implementation at the local level.

Conclusion

In this chapter, we presented the theory, rationale and examples of structural intervention in global literature. Then we depicted the context of current HIV/AIDS epidemic in China and a growing acceptability of harm reduction and stronger government commitment to control the epidemic. Finally we reviewed the existing HIV/AIDS interventions, suggesting potential structural intervention strategies and the challenges ahead.

Taking a structural approach to prevent HIV/AIDS implies a much broader role for public health professionals. It requires a shift in perceptions about how to influence HIV risk behaviors, and new and interdisciplinary research methodologies (Sumartojo, 2000). Structural interventions aim to modify the social, economic and political structures in which we live. These may affect the legislation, media, health care, and social norms, and may include policy, technology, environment and economic interventions (Wohlfeiler & Ellen, 2007). Structural interventions can be highly sustainable when rooted in laws and policies or when integrated into other essential services, although at the same time, they can be controversial and vulnerable to interest group struggles (Blankenship et al., 2006). The growing HIV/AIDS epidemic and limited intervention studies in China underscore an urgent need of effective and sustainable interventions. The more pragmatic attitude and stronger political commitment from the central government suggest a promising space for research and implementation of structural interventions. The window for China to avoid a generalized epidemic is closing, and collective efforts are needed to combat HIV/AIDS epidemic.

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Chapter 8
Patterns of Sexually Transmitted Infections in China

Ginny Garcia, Rachel Traut Cortes and Dudley L. Poston

Introduction

The analysis of sexually transmitted infections (STIs) is a topic of major interest in demography, sociology and other disciplines. Indeed the STI phenomenon itself has resulted in recent years in the creation of several new journals including *AIDS*, *Sexually Transmitted Diseases*, and *Sexually Transmitted Infections*. STIs are a problem of enormous import in the world today and continue to spread at alarming rates. Furthermore, they are increasingly affecting larger and larger numbers of people. Specifically, sexually transmitted infections, such as HIV, are now gaining a foothold in the heterosexual population in China. The heterosexual population of China is at risk of infection for several reasons. These include the spread of infection via commercial sex workers in coastal provinces into mainland China by educated business men as well as by the growing number of surplus boys. China has also seen a rise in infection levels concurrent with their open door policy. This chapter explores the differing impacts of these infections in the People's Republic of China.

Though STIs are referred to by some investigators as sexually transmitted diseases (STDs), sexually transmitted infection (STI) is the most current and appropriate descriptor. Previously referred to as venereal diseases (VDs), they are now known as infections for various reasons that are associated with the stigma surrounding the terms "venereal," "disease" and "sexually transmitted." Whereas a disease is indicative of a lifelong and potentially incurable affliction, infection is in reality the more appropriate referent because of advances in modern medicine, which have rendered most

G. Garcia (✉)
Department of Sociology at the University of Texas at San Antonio
San Antonio, TX, USA
e-mail: ginny.garcia@utsa.edu

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sexually transmitted infections curable, and at the very least manageable. The only STI that carries a death sentence is the human immunodeficiency virus (HIV) and its resultant acquired immune deficiency syndrome (AIDS). But even the symptoms of this STI can be kept at bay for a number of years with proper treatment. Simply put, STIs have become increasingly common, and most may be completely cured or managed with medical treatment. This chapter examines the incidence of key STIs in the People's Republic of China.

The general acceptance of the term STI is imperative for several reasons. It has been established that a stigma surrounds the term STD. This stigma needs to be addressed before any prevention and treatment strategies can be implemented. There seems to be reluctance among many to address sexuality and its inevitable connection to the spread of STIs; this is a major barrier to effective prevention and treatment. Moreover, the stigmatization associated with STIs is a worldwide problem. A recent study conducted in China indicated that a perceived stigma strongly affected the willingness of infected persons to seek treatment and notify their spouses of infection. The authors stated that, "the perception of stigma blocks the acceptance of community prevention efforts among people at risk and reduces the probability that that they will inform their sexual contacts. Both factors cause continued transmission of STDs" (Liu et al. 2002: 336). The use of the term "infection" provides an image that is not as stigmatizing as "disease." Thus, acceptance and transition into the term infection serves as a vital step in the battle to raise awareness and decrease the rate of spreading.

The terms STI and STD are interchangeable at this point, however, and many still use the term STD to describe the infections to be addressed in this chapter. Thus, both terms will be used as necessary. Eight STIs serve in the literature as the main guide for identification. These eight infections are chlamydia, bacterial vaginosis (BV), gonorrhea, trichomoniasis, human papilloma virus (HPV), genital herpes, HIV/AIDS, and syphilis. However, owing to data limitations, analyses will be restricted to the three bacterial infections of chlamydia, gonorrhea, and trichomoniasis.[1]

Bacterial infections should be given special attention for several reasons. First, they represent the most potential for widespread devastation: "individuals who are infected with STDs are at least 2–5 times more likely than uninfected individuals to acquire HIV if they are exposed to the virus through sexual contact" (CDC 2005). These particular infections (i.e., nonulcerative STDs) tend to make an infected person more susceptible to the HIV virus because they increase the concentration of cells that are more

[1] The CHFLS provides urine results for the three bacterial infections, chlamydia, gonorrhea, and trichomoniasis, which may be identified through urinalysis.

receptive to infection (CDC 2005). Furthermore, they increase infectiousness given that infected persons shed more cells with HIV if they have another infection. Since these particular bacterial infections are spreading swiftly through China, it is important to analyze the impacts of not only the infections themselves but the impacts they will have on the spread of HIV/AIDS. With respect to China, detection of the infections is necessary because many women are unaware that they are infected; this is because their infection has usually resulted from the behavior of their spouses or steady sexual partners. Also, as the HIV/AIDS epidemic becomes more visible in China, it is imperative that these infections be made public knowledge and cured so as to prevent their further spread.

As we examine rates of infection in China, we see that the bacterial infections are spreading rapidly. However the avenues of transmission as well as the affected populations for the Chinese vary dramatically compared to populations in the United States. The landmark study conducted by Parish and his colleagues (2003) uncovers evidence that chlamydia is indeed spreading at an alarming rate among the Chinese. It is interesting to note that chlamydia and gonorrhea are typically regarded as infections of the young in the United States,[2] but they are becoming a problem for middle-aged women in China via the sexual behavior of their husbands or steady sexual partners. In fact, a shift toward infection in the older age groups was detected between the years of 1995 and 1998 in a study conducted by Chen and colleagues (2000). The most current analyses conducted by Parish and colleagues reveal that, "prevalence of chlamydial infection per 100 population for women was 2.6. . .gonorrheal infection prevalence for women was 0.08" (Parish et al. 2003: 1265). Again we underline the trend toward infection in older age groups among women in China. This topic will be discussed in detail in later sections.

In China, there has been an increase of chlamydial infection particularly among women between the ages of 30 and 39. These infections are usually spread through contact with their husbands or steady sex partners who travel frequently and engage in commercial sex while away from home (Parish et al. 2003). In general, STIs are affecting those between the ages of 20 and 49, with 93% of those infected falling into this category (Chen et al. 2000). Sexually transmitted infections pose special risks because if left untreated they can cause permanent damage as well as amplify the transmission of HIV infection. Not only has there been an increase in the spread of infection

[2] Chlamydia is currently the most commonly reported STI in the United States and is especially common among young women ages 15–24 (MMWR 2005: 558). Furthermore, the rates of infection with respect to both gonorrhea and chlamydia are most prominent among females younger than 20 years of age (Kent et al. 2002: 373).

among men who frequent commercial sex workers, but also among their wives and partners. In regard to the HIV/AIDS epidemic, Beyrer has stated that "the risk of infection among men younger than age 45 was significantly associated with unprotected sex with commercial sex workers, while the risk for women was largely associated with behaviors of their spouses or steady sex partners" (2003: 1303). This evidence indicates the presence of a more mature epidemic in China due to the spread of HIV/AIDS into the heterosexual population.

According to Parish and colleagues, chlamydia is the most rapidly rising infection among the Chinese and has been termed a silent epidemic due to the fact that in the majority of cases no symptoms are present (2003; CDC 2005). Many researchers are finding support for a resurgence of all STIs as well as the emergence of a severe HIV/AIDS epidemic. Chen and colleagues, in conjunction with the Department of Disease Control, Ministry of Health (the study was organized by the National Center for STD and Leprosy Control) collected data pertaining to STD incidence and prevalence in China (Chen et al. 2000, see also Cohen et al. 2000). Their findings indicate that rates for STDs overall are increasing, and that the rates in men were consistently higher, though the gender gap is lessening (Chen et al. 2000). Extramarital transmission is identified as the key source of infection, and the number of persons infected in this manner significantly increased from 1995 to 1998 (Chen et al. 2000). Specifically, the average increases were 17.3%, 18.3% and 23.3%[3] (Chen et al. 2000).

If we broaden the scope of examination to include all the STIs examined in Chen's study, the incidence of infections in China increased 4.2 times for females and 3.8 for males between the years of 1990 and 1998 (Chen et al. 2000). These numbers are indicative of a growing problem in China that is continuing to increase. The changes in the economic and social environments have led to many subsequent alterations, which seem to have had a major impact on the spread of infections. These changes include new attitudes toward sexual behaviors and extramarital affairs, a new focus on personal wealth, and a more widespread access to pornography and commercial sex. Furthermore, migration trends are allowing for the spread of infection in parts of China that have previously remained untouched or maintained a low prevalence of infection (Smith 2005). These migration trends are expected to play an even larger role in the spread of all STIs including HIV/AIDS in the next decade.

In the case of China we are faced with several issues regarding the nature of STIs. Prior to the founding of the Peoples' Republic of China in 1949,

[3] Data were collected on gonorrhea, syphilis, genital warts, nongonococcal urethritis/cervicitis.

STIs such as gonorrhea and syphilis were fairly common (Hershatter 1997; Chen et al. 2000). The Communist Party was able to effectively eradicate STIs under Mao's regime given that it was considered patriotic to seek treatment and/or to report cases of infection. In addition, commercial sex was virtually eliminated via such strategies as closing down brothels, forbidding prostitution, offering free treatment, and publicizing prevention and treatment programs (Chen et al. 2000). But in the past 20 years with economic modernization and China's opening to the outside world, there has occurred a marked increase in the spread of STIs in China. Much of this is due to the expansion of the commercial sex industry, itself heavily responsible for the spread of infection. In fact, some project that by 2010 the rate of HIV infection in China will surpass that of the United States and rival that of sub-Saharan Africa (currently the highest in the world) (Parish et al. 2003; Tucker et al. 2005; Xia and Yang 2005).

Historically, mass migration has led to an increase in the number of sexually transmitted infections with respect to the Chinese. Cyranowski states that, "historical precedents, such as a sex ratio imbalance caused by mass migration to Shanghai in the 1930s, have led to rampant sexually transmitted infections" (2005: 425). This brings to light the uniqueness of the Chinese situation regarding the spread of sexually transmitted infections. Migration aside, the Chinese are experiencing problems related to the implementation of their one-child policy and the subsequent increase in the number of males born per female. A normal sex ratio at birth (SRB) is around 105, that is, 105 males are born for every 100 females born. This is a biological phenomenon and can most likely be explained by the fact that females enjoy higher survival rates than males (Poston and Glover 2005). In the late 1980s the SRB began to increase with highs of 120 and 118 reached in 2000 and 2001, respectively (Poston and Glover 2005). Some have suggested that this excess translates into a surplus of nearly 30 million boys born in China between the years 1980–2000 who will be unable to find wives to marry (Poston and Glover 2005).

Many of these excess men will be characterized by poverty, unemployment, low levels of education, and the inability to find wives (Tucker et al. 2005). Furthermore, it is expected that they will act as a bridging population for the spread of sexually transmitted infections into the general public. Because the characteristics of the surplus boys are similar to those of migrant workers, they can be analyzed accordingly. Thus, just as migrant populations have been identified as key sources to the spread of infection, the surplus men may also be regarded in this way. Smith indicates the following with regard to migrant populations:

> For the most part they are young and poorly educated, and although they are in the sexually most active part of their lives, they actually have little knowledge

> either about STDs in general, or about HIV specifically, and almost no access to preventive education or regular health care (Smith 2005: 69).

We can begin to see the negative impacts the surplus boys may well have on the spread of sexually transmitted infections in China.

In this chapter self-reported data from the Chinese Health and Family Life Survey are examined with respect to the incidence of chlamydia, gonorrhea, and trichomoniasis. Also available are urine results for each of the above mentioned bacterial infections. Equations modeling their incidence are estimated.

Prior Studies

Sexually transmitted infections (STIs) have become an increasingly widespread problem in many parts of the world. In the United States for example, estimates indicate that nearly 19 million new cases of STIs occurred in 2000 (Boonstra 2004). This is an alarming number and the most striking fact is that those most affected are minorities under the age of 25. In China the rate of infection is just as alarming although there are slight differences in the composition of the risk population. It has been reported that the "rate of increase in the number of infected persons [previously] had been about 30% per year, but this ... doubled by the year 2002" (Smith 2005: 65). The literature concerning STIs and HIV/AIDS all seem to point to several reasons for the rapid spread of infection in China. These include China's open door policy and its subsequent introduction to Western culture, the rise of the commercial sex industry, and increasing numbers young migrant workers, i.e., the floating migrants.

It was mentioned earlier that the U.S. Center for Disease Control and Prevention (CDC) has identified eight major STIs, namely, HIV/AIDS, syphilis, trichomoniasis, human papilloma virus (HPV), bacterial vaginosis, chlamydia, genital herpes and gonorrhea. This chapter focuses specifically on the bacterial infections of chlamydia, gonorrhea and trichomoniasis. The following paragraphs provide an overview about the nature and symptoms of each. An analysis of Pelvic Inflammatory Disease is also included because it is the result in many cases of untreated infections of gonorrhea and chlamydia in women.

STIs – An Overview

Chlamydia is a bacterial infection that is the most commonly reported STI in China, the United States and many other countries. It is caused by the

bacterium *Chlamydia trachomatis* and if left untreated can cause particularly serious problems with a woman's reproductive system. It is mainly transmitted through vaginal, anal and oral sex, and can also be passed from mother to child during a vaginal delivery. Chlamydia is typically known as a "silent disease" because around three quarters of infected women and one half of infected men have no recognizable symptoms. If symptoms do occur, they normally appear within 1 to 3 weeks after exposure and can include abnormal discharge and/or burning sensation during urination. Untreated infections in women can eventually spread into the uterus or fallopian tubes and cause pelvic inflammatory disease. Chlamydia can be diagnosed with a laboratory test and is easily treated and cured with antibiotics. It also increases susceptibility to HIV by up to five times. In men, complications are rare though it may lead to epididymitis which can cause pain, fever and in some cases sterility (CDC 2005).

Gonorrhea is a bacterial infection caused by the bacterium *Neisseria gonorrhoeae* and if untreated can lead to pelvic inflammatory disease in women and epididymitis (a painful condition of the testicles that often leads to infertility) in men. It is typically transmitted through contact with the penis, vagina, mouth or anus. It may also be spread from mother to child during a vaginal delivery and can cause blindness, joint infection or a life-threatening blood condition in the baby. Symptoms for men include a white, yellow or green discharge from the penis and/or burning sensation during urination. Some men may experience painful or swollen testicles. Symptoms for women include painful urination, increased vaginal discharge and/or vaginal bleeding between menstrual periods. Infected persons may or may not have any of the above mentioned symptoms, but if they do, they tend to appear within two to five days after infection. Gonorrhea also increases susceptibility to HIV. There are several laboratory tests used to diagnose gonorrhea, and it is successfully treated with several different antibiotics (CDC 2005).

Trichomoniasis is a parasitic infection caused by the single-celled protozoan parasite *Trichomonas vaginalis*. The vagina is the most common site of infection for women and the urethra for men. Trichomoniasis is spread via penis to vagina contact and vulva to vulva contact. For women the symptoms include a frothy yellow-green discharge that has a strong odor, and for men a mild discharge and/or burning after urination or ejaculation. Symptoms typically occur within five to 28 days after exposure. If left untreated in women the infection can result in babies born with low birth weight and/or born premature. Also, like the two above-mentioned infections, it renders patients more susceptible to infection with HIV/AIDS. This STI is detected through a physical examination and laboratory test. It is cured with the prescription drug *metronidazole* (CDC 2005).

Pelvic Inflammatory Disease (PID) is a general term used to describe an infection of the reproductive organs in a woman. It is most often caused by gonorrhea and chlamydia. It can be characterized by chronic pelvic pain, ectopic pregnancy, sterility, abscess formation and in some cases death (related to complications). It occurs when bacteria move from the vagina, through the cervix and into the reproductive organs. Women younger than 25 are at a greater risk for developing PID as their cervixes have not fully matured making them more vulnerable to the STIs that develop into PID. The most common symptom of PID is lower abdominal pain, and there may also be foul-smelling discharge, pain during sex or urination and irregular menstrual bleeding. PID is treated with several antibiotics depending upon the cause of infection; two are usually prescribed to ensure protection against a wide range of infectious agents. Treatment does not reverse existing damage.

In the case of many of the STIs the CDC has identified, one of the major obstacles to their study in any country is the fact that they manifest themselves with few or no symptoms or with ambiguous ones. Many infected persons' symptoms are unrecognizable and as such go undetected. Another problem that has been identified with regard to the proliferation of STIs is the stigma associated with having a sexually transmitted infection. Many infected persons are reluctant to fully disclose information to health officials, notify their partners of infections, and/or seek treatment. The following section will describe this problem and its theoretical background.

Attribution Theory as Applied to Stigmatization

One of the many obstacles to successfully applying prevention and treatment strategies with regard to sexually transmitted infections is that of stigmatization. Stigma is defined as, "an interactional process that exists within a social or cultural context and is perpetuated by 'the acceptance of the stigma by the stigmatized"' (Radecki-Breitkopf 2004: 4). Also, "stigma is defined as an undesirable attribute in a person that is viewed as setting that person apart from the rest of society" (Cunningham et al. 2002: 334). In many cases, the afflicted person feels responsible for his or her condition and in turn attributes these feelings of shame, rejection or embarrassment to the self or to others' behavior. Attribution theory, a general theory of how people assign meaning and causality, refers to this internal and external assignment of blame. The labels associated with STIs create stigma and, because, at least in some cases, the stigma is not automatically "revealed," individuals may be unwilling to admit to or even seek help for the infection. Cunningham and colleagues revealed that one of the major barriers to successful STD related

health care is the manner in which stigma negatively influences the decision to disclose sexual behavior (2002).

Stigma can be characterized in any number of ways including "abominations of the body" or "blemishes of individual character" related to personality or behavior as described by Goffman (Radecki-Breitkopf 2004). The stigma is intensified as the risk to others (i.e. contagion) increases. Thus in the case of STIs, researchers are faced with the dilemma of underreporting since many participants are unwilling to report their condition owing to their perceptions of it. Cunningham and colleagues found that "adolescents report a greater reluctance to respond honestly to questions about contracting a sexually transmitted disease, frequency of sexual intercourse, anal sex, or oral sex" (Cunningham et al. 2002: 334). These perceived attitudes and consequences associated with STIs constitute a major barrier to their study and subsequent elimination of the infections. Consequently, it becomes necessary that health and public officials begin to refer to sexually transmitted infections as just that – infections that are treatable and/or curable (Garcia 2006).

Evidence from China suggests that STIs were all but eradicated during the Maoist regime. In large part this is attributed to the reduction of the shame associated with admitting to being infected. Studies detailing the elimination of STIs during this time in China indicate that one of the key components of Mao's strategy involved convincing those who were infected that they should not blame themselves but rather the West and capitalism for their infections. The notion of being personally responsible for contracting an STI was all but removed, and the reluctance to get treatment and testing was eliminated. An increase in STI incidence has been observed in China beginning in the 1980s, and many postulate that this increase directly coincides with an introduction to Western culture and subsequent acceptance of Western norms and beliefs. Thus as the Chinese begin to adopt Western norms more widely, they will inevitably adopt the same attitudes with regard to the stigmatization of STIs (Garcia 2006).

Attributional theory also helps elucidate the emotional responses invoked as a response to contracting an STI. For example, if an individual attributes the responsibility of contraction to him/herself, a response of anger or self-blame may be detected. If attribution is viewed as a form of labeling, it can be observed that afflicted individuals' behaviors will be aligned with the label – or stigma. Thus in the case of STIs, shame is the most common response and an individual will align one's behavior accordingly. Currently, the attitude toward STIs in the United States and in many countries in the world tends to be one of embarrassment, shame, and repression. Accordingly, individuals who are diagnosed with STIs behave in a manner consistent with those beliefs.

The exploration of STIs within the scope of attribution as labeling should be important for application; it is necessary to know how the STI is perceived by people in order to design successful interventions. In addition, it is possible that the degree of stigma can be lessened through information (Garcia 2006).

STIs – History and Development

The introduction of this chapter indicated that STIs had been virtually eliminated in China during the 1950s. Reports indicate that STIs were originally introduced in China by Portuguese traders sometime in the 1500s, and they had managed to gain quite a foothold by the 1930s and 1940s (Cohen 1996). The high rates of infection during this time are most likely attributable to prostitution. An estimated 10 million Chinese were infected with sexually transmitted infections in 1950 (Cohen et al. 2000). This problem was addressed as an issue of the utmost importance with the installment of Mao Zedong and his Communist Party objectives. His beliefs were that these infections signified a greater affliction with respect to the overall health of the Chinese people and the nation (Cohen 1996). Thus, in 1950 Mao mounted a nationwide campaign with the help of the Central Research Institute of Dermatology and Venereology to eliminate VDs (as they were referred to then). This campaign involved four components. The first involved the training of all health-related personnel. This part of the program educated practitioners in the recognition and treatment of STIs. A second element of the program featured an insistence on mass screenings in many parts of the country. As a third feature of the program, a massive propaganda campaign was implemented that identified the West and capitalism as the true enemy and vessel for the spread of infection. Mao Zedong was able to effectively redirect the nation's contempt toward the actual affliction rather than the infected person. Last, Mao directed a good portion of his efforts at the eradication of prostitution. He was able to accomplish this last goal by closing down brothels, arresting prostitutes and placing them in programs of reform. It was his intention that these women would transfer their loyalty from brothel owners over to the new regime. The women also received labor-related training and education and were not released until they became employed or participated in an arranged marriage (Cohen 1996). One of the most effective tenets of this program was that Mao made the treatment and its subsequent eradication of STIs an act of patriotism. According to an analysis conducted by Cohen and colleagues, STIs had all but vanished until the 1980s when China re-opened its doors to the West (1996).

STIs – Rates and Prevalence

With regard to STI research conducted in China, one of the best and most well known analyses is by Parish and colleagues (2003). Their results indicate that the highest risk factor for contracting chlamydia is unprotected commercial sex. The authors write that, "transmission remains concentrated in paths that lead from commercial sex worker to husband/steady partner to wife/steady partner" (Parish et al. 2003: 1271). The impacts of this research are profound because they point not only to a hidden epidemic of STIs that can lead to an increase in the spread of HIV/AIDS, but to a previously unidentified risk population especially prone to infection, consisting of married men who are well-educated, travel often, and earn large incomes. This is counterintuitive to the notion that chlamydia is primarily an infection concentrated among young people, or a disease of the youth, as is the situation in the United States.

In terms of actual rates of infection in China, we do not have a clear picture. The Chinese Centers for Disease Control do not publish their rates, so we must turn to individual prevalence studies and the estimates of the World Health Organization. However, China has implemented a program to control the spread of sexually transmitted infections organized by the Chinese Ministry of Health in conjunction with the National Center for AIDS Control and the National Center for STD and Leprosy Control. A national system of STD surveillance was implemented in 1988 in response to the *Law of the People's Republic of China on the Prevention and Control of Infectious Diseases* and the *Management Regulation of STD Prevention and Control*. This law deemed syphilis, gonorrhea, AIDS, genital herpes, lymphogranuloma venereu, chancroid, genital warts and non-gonococcal urethritis/cervicitis as reportable infections (Chen et al. 2000). A major obstacle to their prevention efforts is the significant amount of underreporting resulting from the fact that many are not treated in public settings (Chen et al. 2000). Also, because the Chinese do not have access to reports on STIs in the private sector, they do not have the ability to give exact estimates of their prevalence. However, the research of Chen and colleagues allows for an analysis of trends with respect to the situation of STIs in China.

The above-mentioned program implemented a study conducted from 1989 to 1998 and uncovered the following. Overall, rates of infection increased 4.2 times for women and 3.8 times for men, and extramarital transmission was identified as a key component in the spread (Chen et al. 2000). Chlamydia and trichomoniasis were not identified in their study, although the rates for gonorrhea were documented. Gonorrhea showed a rise of 11.4% during the study period and accounts for the highest percentage of reported STIs (Chen et al. 2000). The cases of infection are concentrated among older

age groups as expected. However, this particular study attributes this to later onset of sexual activity among the Chinese. The World Health Organization (WHO) reports that 18 million new cases of curable infections were detected within the East Asian region. Their estimates indicate that there are 5.3 million currently infected with chlamydia in this region, 3 million infected with gonorrhea and 10 million infected with trichomoniasis (WHO 2001).

The decline of the centrality of the socialist regime in China in the last two decades has been argued to have contributed substantially to the rise of commercial sex (Parish et al. 2003). Current data and research indicate that the rise of the commercial sex industry is having a tremendous impact on the spread of STIs and HIV/AIDS. The number of Chinese female sex workers (FSWs) is estimated to have increased from 25,000 in 1985 to 420,000 in 1996, and some believe these estimates to be low (Tucker et al. 2005). In fact, a study conducted by Cyranowski indicates that the number of prostitutes in China currently falls between 4 and 6 million (2005). Slightly more than one-half of FSWs in China admit to having never used condoms during commercial sex encounters in the year of 2000 (Tucker et al. 2005). A recent study conducted on female sex workers in China indicates that somewhere between 14 and 50% of them are infected with STIs (Xia and Yang 2005).

Studies pertaining to HIV/AIDS and its prevalence indicate different progressions of the epidemic and these phases have been combined in an all-encompassing picture of China. Whereas foreign contacts can be originally singled out as the initial marker for the spread of infection, Thompson points to plasma donation as the first phase of the epidemic (2005). This began in the mid-1980s and was facilitated by entrepreneurs who would pay poor peasants to donate plasma. Plasma is a "liquid portion of blood that provides critical proteins for blood clotting and immunity" (Thompson 2005: 6). Thus the remaining blood was pooled and injected back into donors allowing for one infection to multiply rapidly in the same way it did in the U.S. among hemophiliacs. Infections that were thought to be localized during this time frame had spread to 30 of the 31 Chinese provinces as of 2003.

Intravenous drug users (IDUs) are a second risk population and account for 44% of adults living with HIV/AIDS in China as of 2003. IDU's are increasingly a huge risk population because they often turn to commercial sex to support and/or facilitate their habit (Thompson 2005). Furthermore, IDU's tend to be more sexually active than was previously estimated. This group is indeed acting as a bridging population into the heterosexual population. In a study conducted by Yang and colleagues they, "found that drug users were more likely to be involved in higher-risk sexual behaviors than those who do not use drugs. Most female drug users (52–98%) reported having engaged in commercial sex" (2005: 270). These numbers indicate that IDU's are significantly affecting the spread of HIV/AIDS. Thompson

reports that sexual transmission marks the third phase of the epidemic. This is synchronous with recent studies indicating the spread of HIV/AIDS into China's interior as it is being facilitated by commercial sex and young migrant workers. Current estimates indicate that the rate of infection among the heterosexual population has increased from 6% in 1997 to 11% in 2002 bringing out concerns that this phase of infection will surpass the others in severity (Thompson 2005).

Turning to STIs in general we see that women are increasingly susceptible when husbands and/or partners engage in male to male sex and/or commercial sex. Estimates regarding men who have sex with men are somewhat unclear, but the major concern is the prevalence of men who do not use condoms while engaging in risky sexual behaviors. Furthermore, female sex workers admit to rarely using condoms. One study found that, "most female sex workers (FSWs) and individuals with STDs had concurrent sex partners, . . . and many continued having unprotected sex after noticing STD symptoms in themselves or their sexual partners" (Yang et al. 2005: 270). Reports are beginning to show that the spread of STIs and HIV/AIDS is increasingly associated with the commercial sex industry. Smith notes that "the fastest growing rate of new HIV infections is from sexual contact, much of which appears to be linked to the emergence of a thriving commercial sex industry in many parts of China" (Smith 2005: 66; see also Yang et al. 2005). These data become progressively salient when we take note of the fact that condom use amongst FSWs is further hindered in China. This is because women who carry condoms can be arrested for prostitution as it serves as indicator of their behavior (Thompson 2005). The research by Parish and colleagues brings special attention to the fact that chlamydial infection increases the chances for the spread of HIV/AIDS and thus must be checked in order to prevent an epidemic of previously unforeseen consequences.

Current literature on the spread of STIs and HIV/AIDS cites temporary migration as another reason for the rapid increase in the spread of infection. Smith notes the "increasing rates of mobility as one of the most important factors leading to the rapid diffusion of HIV" (Smith 2005: 67; see also Yang et al. 2005). China's economic reforms have led to a major increase in the mobility of temporary workers to the major cities of China. But this enormous migration has also resulted in a significant increase in the vulnerability and spread of STIs. The migrant population has been identified as a "bridging population" allowing for the spread of infection into the general population (Smith 2005). Yang (2005) for instance, has undertaken an extensive review of studies conducted all over China and reports that these floating migrants are the group with the highest STI prevalence rates. Given the fact that floaters are usually young males whose wives or partners have remained

in the rural areas (Poston and Duan 2001), it is likely that the floaters have multiple sex partners and have participated in casual and/or commercial sex (see also Smith 2005).

As we noted in the introduction, the issue of surplus boys comes into play as they may inevitably become migrant workers in response to their situation. Tucker and colleague's analysis of surplus men in China indicates that, "as a result of their limited economic resources, surplus men will migrate to other areas for job and/or brides" (Tucker et al. 2005: 541). Many studies point out that the characteristics of surplus men and migrant workers are quite similar. Thus, as migrant workers tend to participate in risky sexual behaviors, we can assume that this propensity will carry over into the population of surplus men.

An operational definition of surplus men describes them as, "young, poor, unmarried men" (Tucker et al. 2005: 542). Tucker and colleagues further demonstrate that this group is certainly at a higher risk for becoming migrants and may already fully comprise certain migrant groups (2005). As female sex work flourishes, the surplus men will increasingly participate in unprotected commercial sex. Even those who are relatively poor will be able to afford sexual services to some degree. These men will participate in high-risk behaviors when they are poor and financially unstable, exposing them to a host of infections. Eventually as they transition into a certain level of stability they will then transmit the infections acquired during the risk period to their steady sex partners (Tucker et al. 2005), hence fulfilling their role as a bridging population. Tucker and his associates point out that it is important to study male bridging populations because such populations were discovered in Cambodia and sub-Saharan Africa and were instrumental in the spread of infection from a localized group into the general population (Tucker et al. 2005). They argue that these bridging populations are not governed by typical social norms, and that their behaviors will be widespread among the group. Accordingly, as more and more surplus men begin to engage in risky sexual behaviors, we can expect that these trends will be characteristic of the entire bridging population. Thus, we can begin to perceive the potential impacts for the spread of infection that a surplus of over 20 million men can have on the general population of China.

The spread of STIs and HIV/AIDS in China is an issue requiring a great deal of attention. "The data also reveal a growing problem with STDs in women, with increasing attribution of STD transmission to extramarital sex. . .In China, it seems more likely that women are actually experiencing a dramatic increase in STDs" (Cohen et al. 2000: 144). Parish and his colleagues have uncovered the fact that women are in fact at higher risk of contracting an STI from their husbands who are engaging in unprotected sex with commercial sex workers. The research results on chlamydia,

gonorrhea, and trichomoniasis that will be reported in this chapter go beyond most analyses of STIs because it enables the comparison between the self-reported answers regarding contracting STIs and urine-based evidence. This comparison will suggest that the hidden epidemic of STI's in China may well be more widespread than previously assumed.

It seems that China's open door policy has in fact opened up the country to a host of problems with regard to STIs and HIV/AIDS. Under Mao's regime, STIs had all but been eradicated because of the elimination of the commercial sex industry and the fact that it was an act of patriotism to report and/or to seek treatment for STIs (Cohen et al. 2000). But according to Hershatter's book, *Dangerous Pleasures* (2000), some of the social forces favoring the spread of STIs include the cultural justification for personal wealth and the collection of consumer goods, increases in numbers of unhappy marriages that would lead to extramarital affairs, the younger ages for first and continuing sexual activity, the increased availability of pornography, particularly through the Internet, and sexual messages in the mass media (see also Cohen et al. 2000). We have already pointed to the work of Parish and his associates who uncovered the fact that STIs are being spread to the wives and/or steady partners by older, educated men earning high incomes.

The literature reviewed for this chapter indicates that China is experiencing significant problems with respect to the spread of sexually transmitted infections. Older, more educated men and women in China are increasingly susceptible to infection as the commercial sex industry grows. Furthermore, China is facing an even larger dilemma as the number of surplus boys continues to grow. This was illustrated by the research that identified surplus boys as a population characterized by risky sexual behavior. These surplus boys are also expected to act as a bridging population for the spread of infection into the mainstream. China is increasingly adapting the norms associated with Western culture, and it is argued that these beliefs and practices will also increase the likelihood of infection. Most bacterial infections are often present with no symptoms and may indicate an increase in the chances of infection with HIV/AIDS. These problems are further compounded by the stigma associated with being infected with an STI in all cultures.

Methods

Data

The Chinese data analyzed in this chapter are from the Chinese Health and Family Life Survey (CHFLS) conducted by the University of Chicago/NORC, Renmin University, Beijing Union Medical College and University

of North Carolina. It is a nationally representative sample of the Chinese in the ages 20–64 with the exclusion of Tibet and Hong Kong. The population sample was drawn according to the 1990 national population census and public health reports of STD infection rates in different provinces and cities. Certain populations were over-sampled due to the higher rates of STDs in certain regions (Parish et al. 2003). A total of 5,000 individuals were initially sampled and 3,813 completed the interview. Also available in these data are urine results for 3,426 participants.

The CHFLS data were restricted to respondents who reported being sexually active. These respondents were captured by including positive responses by unmarried participants to a question asking for their total number of sex partners other than their current primary partner. Married individuals were asked, "Before you were married for the first time, how many people have you had sex with?" Those not captured by either of the previous two questions were asked, "How many people did you have sex with in the last 12 months?" The respondents who reported to having a sex partner were included as part of the sample. Those respondents who reported not having any form of sex partner were dropped from the sample, and any missing observations were dropped. It is important to note however, that the response of zero sex partners is to be expected. This can be explained by the fact that those who were married at the time of the survey would have reported zero to the question inquiring about partners before marriage. Other observations may be zero due to the fact that some respondents reported zero sex partners in the last twelve months. Also excluded were respondents who did not agree to provide a urine sample. The final sample size included 3,168 participants, 1,565 of whom were males and 1,603 of whom were females.

Table 8.1 describes the characteristics of the sample population. We have access to many of their demographic characteristics and report data pertaining to their age, education, region of residence and whether or not they are urban or rural. Among the non-demographic characteristics listed are variables pertaining to their risk level for contracting an STI. These include time spent away from home and number of sex partners.

In the CHFLS, 60 interview sites were used to encompass participants from all 31 Chinese provinces. The interviews were conducted by mid to late career social workers and researchers in their forties and fifties. They were specifically trained to conduct the interviews and were of the same sex as the respondents in the field. Also, when the section of the questionnaire pertaining to sexual behavior/sexuality and STIs came up, the interviewers turned the computer screens to face the participants so that they could enter the data privately. This should increase the number and quality of responses given related to sexual practices/behavior and risk level

Table 8.1 Frequency Distribution (Unweighted) of Dependent and Independent Variables (Chinese Adults: Male/Female; N = 3168)

	Urine results (no.)		Bacterial infection in last year		STI ever	
	Men n = 1565	Women n = 1603	Men n = 1565	Women n = 1603	Men n = 1565	Women n = 1603
Age						
20–29	11	19	9	19	12	2
30–39	22	44	9	41	11	6
40–49	17	20	5	18	7	0
50–59	1	6	4	4	4	2
60+	0	0	1	0	0	0
Education level						
No school	2	2	0	0	1	0
Primary	5	14	2	10	1	0
Low mid	17	41	12	35	13	2
Upper mid	19	28	12	26	15	3
Jr. college	3	3	1	10	4	4
Univ/Grad	5	1	1	1	0	1
Region						
Coastal	22	48	13	45	16	5
Other	29	41	15	37	18	5
Location of Residence						
Urban	44	77	23	73	27	10
Rural	7	12	5	9	7	0
Time Spent Away from Home						
≤ 1 week	38	85	18	72	21	7
≥ 1 week	13	4	10	10	13	3
Number of sex partners in last year						
0	23	72	8	66	4	8
1	6	13	2	8	1	0
2 or more	22	4	18	8	29	2
Commercial Sex						
Yes	14	0	12	0	20	0
no	37	89	16	82	14	10
Totals	**51**	**89**	**28**	**82**	**34**	**10**

for contracting and STI. The data set is rich in demographic information and contains full descriptions of sexual history and behavior. We will use these self-reported responses to compare against the results obtained through urine-based analyses.

Operationalization

Our dependent variable – the likelihood of contracting an STI – will be modeled according to the following three queries: (1) whether the respondent's urine indicates that an STI is currently present, (2) whether the person reports having had a bacterial infection in the last year, and (3) whether the person reports having ever had an STI. These will be dummy variables, coded 1 if yes. The analysis will include several independent variables of interest listed in Table 8.1. They will be operationalized as follows: Age is a categorical variable including ages 20–29, 30–39, 40–49, 50–59, and 60+; education is a categorical variable including no school, primary, low middle, upper middle, junior college and university+; region is a dummy variable representing whether the respondent resides in a coastal region; residence is a dichotomous variable for urban residence with one being equal to urban; time spent away from home is a dichotomous variable representing whether or not a person spends more than one week away from home (0=less than one week away and 1=more than week away from home); sex partners is a categorical variable representing number of sex partners before marriage including none, one, or 2 or more; commercial sex is a dichotomous variable representing whether or not the respondent has ever paid for sex (1=yes).

Each of the three dependent variables (uresult – urine results, bac – reported having a bacterial infection in the last year, STI – reported having an STI ever) is binary. The negative result is signified by a zero and a positive result by a one. Logistic regression is employed as the method of analysis.

Results

Summary Statistics

Table 8.1 presents descriptive data for the respondents. The data are organized according to each of the three principal dependent variables, namely, whether or not the respondents' urine indicated the presence of an STI, whether or not they responded yes to having had a bacterial infection in the last year, and whether or not they indicated having ever had an STI. The urine-based results indicate the highest frequencies in the following categories; of those infected who tested positive for an infection via urine samples, 39.5% of men fall into the 20–29 age range and 48.1% of women fall into the 30–39 age range, 52.6% of men fall into the lower to upper middle education range and 68.3% of women are in the primary and lower middle education categories, 53.3% of women live in a Coastal region, 34.6% of

men and 57.1% of women are urban residents, and 69.6% of men and 97.7% of women report having been away from home for less than week out of the year. Finally, 27.6% of the men who tested positive indicated consumption of commercial sex work.

The variable measuring the number of sex partners has especially interesting patterns. For example, among men who tested positive, 58.0% reported zero sex partners. However, 38.4% of them reported two or more. Among the women who tested positive, the majority reported zero sex partners. These findings support the notion that women are indeed being heavily affected by the behavior of their partners. It is important to remember that a response of zero to this particular variable does not mean no partners ever; instead it means the respondent had none before marriage or in the last twelve months.

These results confirm that the majority of cases are occurring among older age groups and higher incidences of infection in women in the Coastal South may be explained by the concentration of prostitutes in that region. They further confirm that those with less education and those living in urban areas are more susceptible to infection as was expected. However, the results show that contrary to what has been previously found, the majority of cases of infection are among those who reported not having traveled for more than one week of a given year. Furthermore, the majority of both sexes who tested positive indicated not having had any sex partners in the last year. Also, the variable for commercial sex impacted the males only (none of the females who tested positive or reported any infection also reported to participating in commercial sex). The strongest association with the incidence of an STI for males is having participated in commercial sex. The last two findings only serve to support prior analyses indicating that women are becoming infected via the behavior of their husbands or steady partners.

Logistic Regression Results

Table 8.2 reports the results from the logistic regressions for the sample population. Model 1 presents the urine-based results. Model 2 presents results for whether the respondent reported having a bacterial infection in the last year. Model 3 presents results for whether the respondent reported ever having had an STI. Model 1 indicates that other things being equal, the odds of having an STI show up in urine are decreased by 37% with each increase in an age category. Being an urban resident increases the odds of having an STI by 237%, and participation in commercial sex increases the odds of having an STI show up in urine by 203%, other things equal. The variables measuring level of education, region of residence, time spent away from home, and numbers of sex partners are not significant.

Table 8.2 Logistic regression results (Chinese adults: Male/Female; N = 3168)

Socio-demographic characteristics odds	Model 1 (Urine Result) logits odds ratios	Model 2 (Bacterial Inf.) logits odds ratios	Model 3 (Any STI) logits ratios
Age	−0.46***	−0.28**	0.02
	0.63	0.75	1.01
Education Level	−0.27	0.26	0.77***
	0.77	1.30	2.16
Region of Residence	0.09	0.953***	0.33
	1.09	2.59	1.39
Urban/Rural	1.21***	1.41	−1.14*
	3.37	0.35	0.32
Time Spent Away from Home	−0.28	−0.535	0.69**
	0.75	0.59	1.99
Number of Sex Partners	0.04	1.21	1.34***
	0.96	1.10	3.83
Commercial Sex	1.11**	0.51	1.04*
	3.03	1.67	2.83
Constant	−2.13**	−4.24***	−7.79***
F, prob > F	17.46, 0.000	11.96, 0.000	142.72, 0.000
N	3168	3168	3168
Degrees of Freedom	34	34	34

* Significant at 0.1
** Significant at 0.05
*** Significant at 0.01

Model 2 represents the findings associated with self-reported responses to whether or not the respondent had a bacterial STI in the last year. The variables for education level, urban residence, time spent away from home, number of sex partners, and consumption of commercial sex are not significant. Age is negatively associated with the incidence of STIs; with each increase in a category of age, there is a 25% decrease in the odds that a person will report to having an STI in the last twelve months, all else equal. Region of residence is positively associated with an increase in the odds of reporting to an STI. In other words, the odds of having an STI are increased by 159% if the respondent resides in a coastal location, other things being equal.

Model 3 represents the findings associated with self-reported responses to whether or not the respondent ever had an STI. The variables for age and region of residence are not significant. Level of education, time spent away from home, number of sex partners and participation in commercial sex are positively associated with the incidence of STIs. In other words, the odds of the respondents reporting to having an STI in their lifetime are increased by 116% with each increase in level of education, 99% for those who spent

more than one week away from home, 282% (almost three times) as number of sex partners increases, and by 183% (almost two times) if the respondent has participated in commercial sex, other things being equal.

Implications and Discussion

The results reported in this chapter are generally as expected. Previous findings indicated that there would be a lower risk associated with an increase in age, education would be inversely related to risk-level, those in coastal areas would be more susceptible, a greater number of sex partners would increase risk, being away from home more than one week per year would increase risk-level, consumption of commercial sex would increase risk levels, and living in an urban location would be positively associated with risk of contracting an STI. Many of these findings were replicated in our work. In terms of the urine results, associations were detected with less frequency than those for the self-reported responses. Number of sex partners was not significant in terms of urine results but was positively associated with risk-level for the results based on self-reporting of STIs in the respondent's lifetime. Additionally, the variable for time spent away from home was not significant in the urine results equation but did display significance for self-reporting of STI infection over the lifetime. It is important to note that time spent away from home resulted in a hefty increase, 98%, in the odds of reporting to having an STI in the respondent's lifetime The variables that did display significance based on urine results were those of age, consumption of commercial sex, and urban residence. Urban residence and commercial sex participation performed as expected; however, age had an opposite effect in relation to the hypothesis. In other words, age resulted in a negative correlation with incidence of STI infection in the urine, or as the respondent increases in age their odds of infection decrease. Given that these three variables are highly significant among the urine results, this may be indicative of an epidemic in city centers where commercial sex is more available and those who are younger are more inclined to participate in risky sexual behavior.

The urine results clearly show that people are either under-reporting or are unaware of the fact that they are currently infected with an STI. If China is indeed suffering from a hidden epidemic, then it is imperative that future research include urine-based data. It is also important to find out how many of these inconsistencies are attributable to omissions or ignorance of STI symptoms. If omissions are more common, then it is necessary to spread education so that the stigma associated with infection can be lessened. If the discrepancies are based upon the fact that people are unaware of what STIs are (which we suspect might be the case), then once again, it is imperative that education be disseminated in terms of diagnosis and treatment.

Future work should be focused on these discrepancies and should include questions designed to uncover facts pertaining to STIs in particular. Further analyses on STIs in China would ideally include urine results to compare against the self-reported responses. If China does not have the strict regulations that the U.S. does with regard to blood testing, then such data should be included as well. This is particularly important in light of the HIV/AIDS crisis, which seems to be developing at an unprecedented pace in China. The fact that many of the respondents reported to not having traveled more than one week in the past year is also very interesting. If the spread of STIs is not in fact attributable to travel, then further analyses need to be conducted in terms of the utilization of sex workers.

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Part IV
Commercial Sex Worker Policies and the Law

Chapter 9
The "Risk Environment" for Commercial Sex Work in China: Considering the Role of Law and Law Enforcement Practices

Scott Burris and Guomei Xia

In this chapter we describe a framework developed for considering how law influences the health risk environment for Injection Drug Users (IDUs) (Burris et al., 2004), and then apply it to the regulation of commercial sex work in China.

The Framework

Law may be seen as an ecological cause of risk and a medium of structural intervention to reduce risk. As a causal factor, law contributes to the construction of ecological determinants, and also operates as a mechanism through which ecological characteristics operate to produce health outcomes (Burris et al., 2002). To illustrate, laws prohibiting the possession or distribution of certain drugs can have powerful effects on a society over time. In the United States, for example, drug law has contributed to high, racially disparate rates of incarceration, and swollen prison budgets. They have influenced our conceptions of the proper balance between individual rights and state power, and (through the disenfranchisement of drug felons) have arguably changed the course of elections (Brownsberger, 2000; Tonry, 1995; Uggen and Manza, 2002). Likewise, the daily interactions of law enforcement agents and injection drug users (IDUs) in particular places are a mechanism through which ecological conditions are transformed into risks and outcomes. Law is also a prime potential mode of structural intervention; it sets broad and effective rules of behavior (Blankenship et al., 2000). Both new and well-established public health interventions rely on law as a means

S. Burris (✉)
James E. Beasley School of Law at Temple University, Philadelphia, PA, USA
e-mail: scott.burris@temple.edu

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of structuring an environment in healthy ways (Gostin, 2000). For example, a law requiring customers in brothels to use condoms changes the context in which sex workers and clients negotiate safe sex (Albert et al., 1995; Sumartojo, 2000). Food safety laws, as well as regulations requiring passive restraints in automobiles, create markets in which safety is not primarily a matter of consumer choice.

Law, however, must be seen as a complex phenomenon in its own right (Burris, 2002). "Law" can be understood to include not only the rules as they are to be found "on the books" in statutes, regulations and court decisions, but also in the institutions and practices through which they are implemented "on the streets" (Black, 1976), and, indeed, in the understanding of the rules and the system in the minds of people in the population (Ewick and Silbey, 1998). Law, then, consists of four distinct components, which are illustrated in the simple heuristic in Fig. 9.1.

The "law on the books" includes the formal, written, legal rules – statutes, constitutions and regulations – as well as court decisions interpreting the law. The boundaries of this formal body of law may vary somewhat from place to place. In China, for example, socio-legal scholars treat speeches and rules of the Communist Party as the equivalent of formal law. But by and large the delineation of this domain is straightforward. In the context of criminal

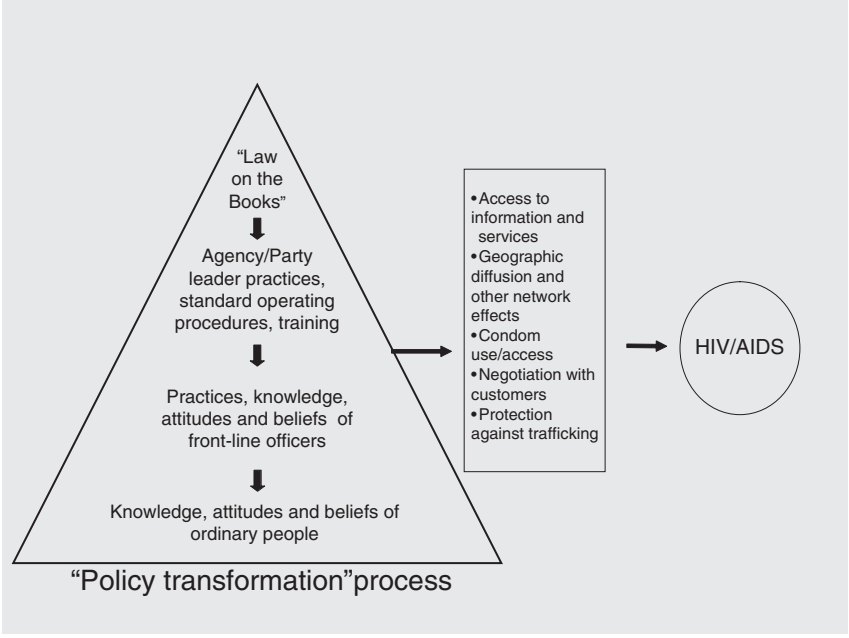

Fig. 9.1 From policies to HIV/AIDS among sex workers *based on* Burris et al., 2004

law, law on the books broadly defines the roster of criminal acts, and sets the mission and powers of law enforcement agencies.

Law on the books is only part of the picture. Implementation research has long demonstrated that the actual application of law is subject to many institutional, individual and environmental factors, which form a gap between law as written and law as actually applied (Bardach, 1977). So significant is the difference that the implementation of laws has been called a "policy transformation" process (Percy, 1989). Policy implementation begins with the management tools of the implementing agencies – training, work rules, policies and standard operating procedures – but extends through the practices, knowledge, attitudes and beliefs of the line personnel who are expected to enforce the law. In Fig. 9.1, we also include the knowledge, attitudes and beliefs of regulated parties, whose understanding of, and reaction to, the law and the way it is enforced influences its effectiveness.

Applying the Framework to Sex Work in China

The theoretical framework just discussed is well-suited to the study of the health risk environment of commercial sex workers in China. In China, injection of drugs and unprotected sexual behaviors are the two main pathways of HIV transmission. The proportion of those infected through the blood collection system is declining. Evidence indicates that drug users and commercial sex workers will be the major foci of HIV transmission in the emerging Chinese epidemic. In the following sections, we use the framework for an analysis of sex work in China.

HIV and Other STIS in China

As of the end of September of 2004, there were 89,067 reported HIV infections in China. IDUs accounted for 41.3% of the cases. In some areas – such as Xinjiang, Yunnan, and Sichuan – more than 50% of reported HIV cases are among IDUs. In sentinel surveillance at STI clinics, the average infection rate among unlicensed sex workers rose from zero to 1.3% between 1995 and 2000. The percentage of this population reporting total condom use was quite low (Yang and Xia, 2006). Moreover, some sex workers are also IDUs. An epidemiological survey conducted in 2003 showed that 1.4% of the sex workers had injected drugs in the past half year, and that 37.9% had shared a syringe (UN Theme Group on AIDS, 2004).

Individual Risk Behaviors and Related Interventions

Considerable public health research has been devoted to identifying the individual risk factors that make commercial sex workers (CSWs) susceptible to particular diseases, and to developing strategies to help individuals cope with or modify their suceptibilities on their own (Yang and Xia, 2006). Individual risk factors include lack of knowledge about HIV transmission, economic hardship, client refusal/coercion, and control by pimps/establishment owners (Xia and Yang, 2005). Incorrect beliefs also contributed to the use of methods that offered no protection. Individually-oriented interventions include testing and counseling, education and condom-promotion programs – for example, promoting 100% condom availability in hair salons and bars.

Ecological Approaches to Risk and Structural Interventions

With experience and the passage of time, it has become evident that individual risk factors, and efforts to help individual CSWs change their behavior, are insufficient. CSWs exist in complex "risk environments" (Rhodes, 2002) in which individual risk behaviors are shaped by ecological factors including the limited availability of resources. In other contexts, socioeconomic transition has been identified as an important element of the risk environment (Rhodes and Simic, 2005). To be effective, intervention efforts must address these exogenous, structural factors to which CSW behavior is an adaptation.

This analysis is useful in China. China is undergoing a dramatic economic transition characterized by growing and extreme inequality in the population. This is certainly influencing the growth of the sex industry as a site of economic activity by poorer people, particularly rural women. Sex worker behavior is also influenced by laws and law enforcement practices. Corruption among law enforcement officials, the system for funding law enforcement, and the limited protection of human rights, all have the potential to create a more dangerous environment for sex workers in relation to HIV and STIs.

In-depth interviews with women working in entertainment venues have found strong evidence of the economic catalysts of sex industry participation. Often, 30–40% were laid off workers. Many were married, or had been married, and were working to pay expenses such as a child's tuition after a divorce or employment reversal in the family (Xia and Yang, 2004). Another study among Shanghai entertainment venue workers found that most were of rural origin and had no more than a junior high school education (Xia and Yang, 2005). Economically marginal women have few options for earning a

living wage. Once in sex work, their economic vulnerability (owing in part to an oversupply of sex workers) and lack of power relative to male clients make it more difficult to insist on safe sex and condom use (Yang and Xia, 2006).

Sex Work Laws and Their Possible Behavioral Effects

Data from around the world indicate that more or less serious and sustained harassment is a fact of daily life for illegal sex workers (Wahab, 2005). This also appears to be the situation in China. The increasing use of the term "sex workers" in China in recent years does not change the fact that the sex trade is illegal (Standing Committee of the National People's Congress, 1991). Laws against prostitution are being enforced, and those in the business do not enjoy legal basic labor protection, let alone legal immunity. According to public security department statistics, there were well over 12,000 prostitution prosecutions in the whole of China in 1984, more than 100,000 in 1989, and more than 200,000 in 1991. From 1984 to 1991, police investigated and prosecuted around 620,000 people for prostitution. Annual prosecutions have continued to rise, to around 250,000 persons in both 1992 and in 1993. These data raise several important issues.

First of all, despite intensive law enforcement action and considerable expense, the state has not achieved the goal of "eliminating" prostitution. Indeed, it is estimated that the number of people in sex work exceeds official figures by more than ten times. Moreover, it is unreasonable to expect the state to ever eliminate prostitution. If it requires 7.5 hours of a police officer's time to arrest a sex worker, and a city of 6 million people has 120,000 people in the trade, then it would require some 450 full-time "moral policeman" working for a year to get them all under control. At an average city wage, this would require at least 6 million RMB (Pan, 1999).

Secondly, fines, detention for reeducation, or reeducation through labor cannot effectively prevent violators from committing further offenses. Detention and fines only force some women sex workers to intensify the sex trade to recover losses. Similarly, a fine of renminbi (RMB) 5,000 (about 715 U.S. dollars) is not high enough to make men of money and power change their habits and behavior. Moreover, support for the use of the reeducation through labor is waning. In a general meeting of the National People's Congress in 2004, the level of skepticism about reeducation through labor was unprecedented. There were 13 bills addressing the defects of the practice, accounting for almost 1% of all the bills. These bills were signed by 420 representatives, 10% of the total representatives. Opinions of some representatives against reeducation through labor were sharp, pointing out the lack

of legitimate grounds for detention, the unclear scope of those subject to detention, exceedingly harsh penalties, improper procedures, multiple and conflicting judicial interpretations, all adding up to abuse of power and undue deprivation of civil rights. It was also noted that, in a handful of places, the system of reeducation through labor is notoriously used as a weapon against peasants who ask higher authorities for help against local abuse of power, and to punish whistle-blowers who report corruption.

Third, the commercial sex trade has not been forbidden, but just informally regulated. Police practices are, to some extent, independent of the written laws concerning prostitution. Police generally have the discretion and the dexterity to deploy a wide variety of criminal and public order laws to accomplish their street control and public safety missions, and research indicates that they do so in the area of drug use (Lovell, 2002; Maher and Dixon, 1999). Similarly, one hears repeatedly in China of varieties of cooperation, coexistence, symbiosis and oppression among sex workers and police, often persisting along with periodic crackdowns. While crackdowns can appear harsh to the casual observer, they in fact leave much of the industry untouched. An officer interviewed in a recent study explained what happened in one crackdown this way: "Although now more than 1,000 sex sites were shut down, more than 1,000 are left and will never die. Why? They have been under the umbrellas" (Xia, 2003). Given that every sex worker requires a client to perfect the crime, it is also noteworthy that so few men end up in re-education facilities. Xia recently found only a dozen male sex clients among 1,600 people confined in one re-education facility. Asked where all the men were, an official answered: "The men were fined and set free; the women were confined" (Xia, 2003). It is thus more accurate to say that the sex trade in China is regulated than to say it is prohibited. The urgent question thus is how to regulate the trade in a manner that minimizes its risks for individuals and the public health.

Law enforcement practices can actually increase the risk of HIV transmission. Increasing attention is now paid in the epidemiological literature to the role of commercial sex in the network dynamics of HIV transmission (Lau et al., 2002). Law enforcement against commercial sex is uneven geographically and sporadic over time. Migration is one way for sex workers to avoid legal troubles. One governmental official argued: "If there is a crackdown at the provincial level, the prostitutes will retreat to counties; if there is a crackdown in one county, then there will be more prostitutes in other counties. Do such crackdowns really work?" (Xia, 2003). If sex workers move frequently to avoid being disciplined, the risks of spreading HIV may increase.

There is evidence that police activities can influence the willingness of sex workers to carry condoms (Lau et al., 2002). Though the Chinese Ministry of

Public Security has already stipulated that officers should not regard carrying a condom as evidence of prostitution, in practice, many police still do so (Xia, 2002). A sex worker of 22 years old interviewed in a 2004 study of 40 women, for example, reported: "if there is a condom in your bag, they slap you on your face, and you must admit prostitution, too." Another person, a 28 year-old who ran a café, said: "I do not allow the young lady to [practice the sex trade] in the shop, but once a policeman came to the shop, found a condom upstairs, and arrested me. I did not really know at that time what it was about because I am not in the shop all the time, and often came just at closing time" (Xia and Yang, 2004).

Criminal laws and enforcement practices can also influence CSWs risk by affecting the ability of public health agents to effectively deliver prevention services. In many places, public health interventions against AIDS are rejected by the target population. "The young lady, like a mirage, disappears when you approach," is how one social worker described her experience doing outreach among sex workers (Xia, 2006). Similar stories can be told about China's new methadone maintenance program. A 48 year old male drug injector in Shanghai said frankly: "If government builds the methadone clinic in the community, we who have taken drugs for many years will go. But if we are arrested, nobody will go. The government said again and again we would not be arrested. The police said: 'Who said we are not going to arrest you? We didn't.' If there are no arrests, I think that 80% of the persons would like to accept methadone substitution. But if people are going to get arrested, no one will go" (Xia, 2006).

Conducting Research on Law, Law Enforcement, and CSW Health

There is considerable room for additional work in this area. In keeping with the diagram in Fig. 9.1, this work may focus on any of several dimensions of law as it relates to IDUs, each of which raises a variety of different issues and suggests numerous research questions. In this section, we discuss these areas in greater detail.

Law on the books is the starting point for analysis of how laws and their implementation affect CSW health. The basic laws in China have been identified, and include the key party directives on sex work and crackdowns. There is room for more systematic research on how these laws influence the health risks and health behaviors of CSWs, compared to similar settings under different regimes. Such research could identify which aspects of the law are most significant in shaping these risks and behaviors.

In researching the impacts of formal law on CSW health, it is also important to pay careful attention to the question of what law is "relevant" among the huge body of rules that exist in a modern state. Regulations on residency or other "general" laws have been applied to CSWs elsewhere (Wahab, 2005; Blankenship and Koester, 2002; Harcourt et al., 2005). Of course, to the extent that voluntary sex work is a rational choice depends on the range of options for a given person. The role of economic necessity and the lack of opportunity for education or other work can be seen as, in part, a function of law and should not be neglected in this analysis.

Management policies and party efforts, as well as the activities of the police at the street level and the beliefs of people in the sex business are clearly a highly developed and locally particular set of attitudes and practices that constitute a de facto regulatory system that must be intensively studied to allow us to figure out how the legal regime influences sex worker risk and how, in practical terms, a healthier set of regulatory practices might be designed and implemented. More research is needed on the determinants of police behavior towards sex workers, and particularly the contribution of such malleable factors as negative attitudes and arrest quotas. Understanding better how sex workers cope with police interference can guide work among both sex workers and police.

Conclusion

Both law enforcement and public health are directed to the promotion of good health and good order in the community. We have argued in this chapter that law enforcement agents are of substantial importance in the search for environmental determinants of IDU health. We have suggested a change in focus in research to address a need that has remained unmet for some years, not just with respect to IDUs, but also with regard to commercial sex workers, illegal migrants and other populations living at or beyond the margins of legality. Researchers concerned with the health of marginalized populations have long recognized that laws and law enforcement practices do impact health and behavior. But for a variety of reasons researchers have not done much to deal with and directly address these factors. In a quite similar way, the recognition of the importance of structural factors in health has so far outstripped research and interventions premised on that ecological view of health. It is imperative that we deploy an ecological approach to studying law and law enforcement practices as contributing causes of HIV and targets of prevention intervention.

The significance of this change in focus is substantial. Rather than looking solely at the population at risk of HIV, such research would take seriously the

notion of social causes of disease or risk environment by directing significant attention toward *other people and institutions* that structure disease risks among marginalized populations. A focus on law enforcement responds to these risk structuring factors with a research aimed at producing structural interventions – that is, interventions that try to change the environmental risks, rather than helping sex workers cope with a risk environment that has not changed. Looking away from the population immediately at risk and in the direction of others whose behavior creates risk offers many new opportunities for prevention work.

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Chapter 10
Administrative Detention of Prostitutes: The Legal Aspects

Hualing Fu and D.W. Choy

Introduction

In China, misdemeanors are usually diverted from the criminal justice system. They are typically dealt with by the police summarily without the participation of the judiciary. Prostitution is deemed to be one of the minor offenses and has largely been left to the police. Prostitution *per se* is not a criminal offense in China, and criminal law is not concerned with prostitution unless organized crime is involved. Prostitutes in general are regarded as victims of a social evil who need help, education, and treatment more than they need punishment.

In this chapter, we will examine the following: (1) the legal standards for imposing administrative penalties for prostitution; (2) the police discretion in imposing such penalties and factors that constrain the exercise of police discretion; (3) the profit-driven activities within penal institutions; and (4) the legality of the administrative punishment of prostitutes in relation to its necessity, rationality and proportionality.

Deprivation of Personal Freedom in International Law

International human rights law does not necessarily prohibit administrative detention if it serves a legitimate goal and the means used to achieve this goal are reasonable and proportionate. Under the International Covenant on Civil and Political Rights (ICCPR), a three-step test is adopted to determine the legality of restrictions on rights and freedoms. First, a restriction must be provided by law. Second, any restriction must be necessary

H. Fu (✉)
Faculty of Law at The University of Hong Kong, Hong Kong
e-mail: hlfu@hkucc.hku.hk

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(in a democratic society). Third, any restriction must serve one of the legitimate purposes expressly enumerated in the law. We now discuss each of these three parts.

Restrictions Provided by Law

The limitation of personal freedom must be specified by the law. This is in accordance with a fundamental principle of the rule of law doctrine. But "law" has been interpreted widely to include not only codified law but also unwritten law (such as case law), so long as the law is clear, and the restriction does not result in the destruction of rights and freedoms. There are two additional substantive requirements with regard to the quality of the law. The first is that the law must be accessible and citizens must know what is permissible and not permissible in a given case. The second is that the law must be clear and foreseeable. A norm is law only when it is formulated with sufficient precision so that a citizen can reasonably foresee the consequences which a given action may entail. A law is inconsistent with the ICCPR if it is vague or overly-broad.

The final condition for a law is that it should also provide adequate safeguards and effective remedies against any abuse of power. This is especially so when the law bestows on the government wide discretionary powers.

Necessary Restrictions in a Democratic Society

Permissible restrictions must also satisfy the ICCPR's second requirement of necessity. The government must prove that there is a pressing social need to limit rights and freedoms. The fact that the government acts in good faith or has historically enforced the restriction does not necessarily make the restriction valid.

The concept of necessity is qualified by the phrase "in a democratic society" in the international and regional human rights instruments. The absence of democratic necessity has caused some concern in the Chinese context, for the need varies greatly between a socialist and a capitalist state and between an authoritarian and a liberal democratic government. However, this difference may be more of a problem in the areas of political rights, such as freedom of expression and assembly. The need to control prostitutes may be a more common concern of societies; hence it may be more possible to develop a common standard with respect to this particular group of rights.

Proportionality

The restriction must be proportionate, that is, the interference with freedoms protected must be proportionate to the legitimate interest pursued. The principle of proportionality also means a rational connection between the restriction of the right and the goal to be achieved; the government should choose a less restrictive measure to limit the exercise of the right.

Legal Provisions and Police Discretion

Punishments for Prostitution

In China, the police have the exclusive power to impose administrative punishment on prostitutes and on those who visit prostitutes. The police have designed a sliding scale of administrative penalties proportionate to the circumstances and consequences of the offense. Four levels of administrative penalties are available:

Level 1: Under the Security Administrative Punishment Law (SAPL) which came into force on March 1, 2006 (as well as the repealed Security Administrative Punishment Regulations (SAPR)), a prostitute is subject to a five day administrative detention *or* a fine of not more than 500 Yuan (about 65 US dollars) if found guilty of soliciting in a public place for the purpose of prostitution if the circumstance of the offense is minor (SAPL, Article 66; SAPR, Article 30);

Level 2: Under both the SAPR and SAPL, a prostitute is punishable by a ten to 15 day administrative detention and/or a fine of not more than 5,000 Yuan (SAPL, Article 66; SAPR, Article 30);

Level 3: Under the Decision of the Standing Committee of the National People's Congress on Strict Prohibition Against Prostitution and Whoring, issued in 1991 (NPCSC Decision, 1991), prostitutes or their clients can be subjected to shelter for education (*shourong jiaoyu*), a compulsory administrative measure of detention for education and labor, for a period of six months to two years (NPCSC Decision, 1991, Section 4); and

Level 4: Re-education through labor (*laodong jiaoyang*, or *laojiao* in short) applies to a person who, previously being subject to the administrative punishment of warning, fine or administrative detention for a prostitution offense, commits the offense of prostitution (NPCSC Decision, 1991, Section 4). The maximum term of *laojiao* is three years.

For the offense of prostitution, institutions for level 1, 2, and 3 penalties are operated by the police, while level 4, *laojiao*, is under the control of the Ministry of Justice (MoJ). It is important to note that while the police have the full responsibility for in-take, the responsibility for operating penal institutions is divided between the police and the MoJ, with the court and the procuratorate performing certain oversight functions.

Fiscal Crisis and Punishing for Profit

The move to a socialist market economy in China has exposed the inadequacies of China's old revenue regime and has resulted in many financial problems for the government. The state-owned enterprises upon which the state relied as the main sources of revenue in the planned economy eventually became a burden on the state. The share of budgetary expenditure of the government in gross domestic product (GDP) has fallen steadily throughout the 1980s and 1990s (China Internet Information Centre, n.d.a and n.d.b).[1]

The relative reduction of the government budget has had a direct impact on the budgetary income of government institutions, including the criminal justice institutions. Police and correctional institutions have received less funding. The budgetary allocation from the government has proven to be insufficient to cover the expenditures. In police stations at the county level and at penal institutions in poor regions, budgetary income often fails to cover the basic salaries of the officers.[2] In the post-revolutionary society where the government prioritizes economic development over other considerations, the police and other non-productive sectors have become secondary in government funding.

Institutions are therefore forced to seek alternative funding sources, commonly referred to as extra-budgetary funds (EBF). Given the political and legal positions of law and legal institutions in China, each institution is able to find sufficient income to compensate for the budgetary shortfalls: the police by imposing heavy fines and pursuing profitable crimes, prostitution

[1] For a detailed discussion of how the police made use of their power to make money to overcome the hardships during the fiscal crisis, see Fu and Choy (2003).

[2] Among the 119 police stations in Shanxi Province for example, 29 failed to pay the salaries of their officers on time at the end of 2001, affecting 5,032 officers. Another 50 stations were only given budgets to cover salaries, but not administrative and operational expenses (Zhai et al. 2002). One report stated that the formal budget for the local level police station could only cover one-third to one-fifth of the expenditure of the police station (Wan et al., 2000). For a detailed discussion of the financial situation of penal institutions, see Fu (2005a).

in particular; the courts by levying fees; and the penal institutions by engaging in commercial activities using cheap prison labor.

Prostitution as a Source of Police Income

The use of fines was not popular in the Chinese criminal justice system until the early 1990s. Traditionally, Communist ideology treated fines as fundamentally bourgeois because they allowed wealthy people to buy justice and avoid punishment. As such, fines as a form of punishment were regarded as inconsistent with the principle of equality.

The economic liberation and the legal reforms brought fundamental changes to the use of fines in China. The use of fines has been expanded in the criminal law, and the police have used the imposition of fines as an alternative to punishment. In addition to political liberalization which makes the use of fines ideologically acceptable and to the economic reforms which have enriched the society and made fines economically possible, another important reason is that offenses with fine-generating potential, principally traffic violations, gambling and prostitution, have soared. There are now both incentives and opportunities for the police to generate EBF.

Prostitution is a particularly attractive offense for the police. Vices like prostitution re-emerged in Southern Chinese cities in the early 1980s and soon spread to other parts of China (Ren, 1999). Prostitution grew very quickly and has become a major embarrassment for the government. In 1982, only 11,500 persons were punished for prostitution (Ren, 1999); in the late 1990s and early 2000s, the number soared to more than 400,000 (Yang, n.d.). Given the estimate these days of approximately six to ten million prostitutes in China,[3] there is a huge market for the police.

The police have wide discretion in determining which administrative penalty to apply. Moreover, discretion is exercised in considering political, legal, and financial factors. The legal test is vague but consistent: when a prostitute repeats the offense or there are other aggravating circumstances (involving foreigners for example), long-term detention should be imposed. But the legal standard is not the only or the most important consideration.

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[3] In 2003, the Chinese government announced that according to official statistics, China had six million prostitutes. In his book *Zhongguo Hongdengqu* (China's Red Light District) published in 2000, Fang Siyu estimated that prostitutes constituted 0.8% of the country's total population. China now has a population of over 1.3 billion; thus, according to Fang's calculation, there should be more than 10,400,000 prostitutes in China (WHO, 2005; Fang, 2000: 15).

Political circumstances are also important. For example, prostitutes may be subject to harsher penalties during strike-hard campaigns against other vices. Similarly when there is public outrage or a direct demand from political authorities to clean up the cities, the police tend to abuse long-term detentions. It is indeed notable that while the law provides that only prostitutes who repeat the offense should be subject to *laojiao*, most of the inmates in *laijiao* institutions are not repeat offenders.[4]

Financial considerations seem to be the key in most circumstances in determining the severity of penalty to be received by prostitutes. Prostitution is the offense which is punishable by the highest amount of fines under the SAPR and the SAPL.[5] The law authorizes the police to impose a maximum fine of 5,000 Yuan on a prostitute and any person who visits a prostitute, and the standard punishment is to fine the solicitor 10,000 Yuan (for both) and to detain the prostitute. Most prostitution cases end up with the fines being collected.[6] Prostitutes who are institutionalized tend to be the financially disadvantaged (China AIDS Testing Net, n.d). For obvious reasons, clients are willing to pay to avoid any publicity of the event, and the police most often are willing to forget the event once the money is properly paid. Indeed, because of the financial incentives, since the early 1990s, the police have sent fewer prostitutes to *laojiao* which is under the control of another Ministry.

Given the budgetary shortfall for the police, the legal authorization to impose harsh fines and the prevalence of the offenses, the police have an incentive to catch as many prostitutes as possible. Indeed, overzealous policing on prostitution has led to many shocking news stories in China. For example, a police station allocates quotas to individual officers as to the amount of fines they have to generate each month and even how many prostitutes they should fine or detain. Under the institutional pressure and the lure of opportunities, some police have become innovative in catching prostitutes: they set traps, follow suspicious persons, and raid hotels in the

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[4] For example, the percentage of re-offending prostitutes in the *laojiao* institutes in Zhejiang Province accounted for 17.8% of the total number of prostitutes in the institutions in 1991, and the percentage reached 29% in 1999 (Fu, 2001).

[5] Under the SAPL, except prostitution, the offense of organizing others to illegally cross the national border, an offense newly classified as punishable by administrative punishment, is also punishable by a maximum fine of 5,000 Yuan (SAPL, Article 61).

[6] Using Hebei Province as an example: among all the cases involving prostitution being investigated in the Province in 1996, only 12 persons were arrested (which accounted for 0.15%), while 6,959 persons were fined (which accounted for 85%) (Liu et al., 1997). There is also the suggestion that the low percentage of prostitutes and clients of prostitutes being imposed administrative incarceration is due to the insufficiency of detention facilities (Biddulph, 2003: 258).

middle of the night. When such measures fail to catch legitimate prostitutes, police may detain lovers for prostitution, frame innocent migrant workers as prostitutes, and even collude with beauty parlors to lure people for prostitution and then to fine them (Wang, 2006; Cai, 2002; Democracy & Law, 2006).

It is difficult for the police to strike a proper balance in dealing with prostitution, that is, placing prostitution under proper control while not jeopardizing the local economy and killing the "goose that lays the golden egg." The police tend to enforce the law against prostitution for political reasons, such as satisfying public demands to clean up the streets, as well as for their own financial interests. At the same time, the police have to be cautious not to drive prostitution to other places. To maintain a steady and continuous income through fining prostitutes, the police need to keep vice establishments alive and functioning. Otherwise, prostitution will move away, taking the customers and the potential police income with them. Furthermore, the displacement will affect revenues for local governments which regard the sex industry as an important aspect in luring outside investment. In the name of protecting a "soft environment" for investment, some local governments even create "special zones" in cities in which prostitution is tolerated and the police are off-limit (Zhu, 2001).

The Logic of Penal Institutions: Security, Rehabilitation or Profitability[7]

A Chinese penal institution, including institutions for prostitutes, has three objectives. The first relates to safety and security concerns within the institution. An institution should be able to prevent inmates from perpetrating further crimes on society, from harming guards, each other, and themselves. Security concerns also necessitate that inmates are fed and kept in a condition that does not pose serious danger to their health and life.

The government has a direct interest in institutional security and has written many rules. For example, a "three No's" rule requires no escape, no suicide and no major unrest in the institutions. Any violation of the prohibitive rules leads to the punishment of the institution collectively and responsible officers individually. Penalties often take the form of a deduction of bonus, demotion and even dismissal. These prohibitive rules are clear and sharp, and they carry immediate consequences if violated. But enforcement

[7] For a detailed discussion of the *laojiao* system, its history, functions and operations, see Fu (2005a,b).

of the rules from the government also tends to fluctuate according to particular circumstances. Security would be tightened for example if an escape occurred in other institutions, or before important events or holidays. In many aspects, they are symbolic, and the officials are well-versed in symbolic politics. Security is something a penal institution has to pursue but about which it is not passionate.

The second objective involves education and rehabilitation. Under the law, education and treatment are integral components of the correctional institutions, and prostitutes and other offenders are required to undergo certain educational programs. Penal institutions have to allocate time and resources for this particular purpose; and the government assesses the results through examinations. A rehabilitation program for prostitutes has three components: the education program in which prostitutes receive basic literacy education and vocational training; a treatment program in which prostitutes undergo routine STI and HIV/AID tests and treatment;[8] and a labor component which is expected to instill an ethic of hard work in the offender.

But unlike the prohibitive rules which are highly political and carry real consequences if violated, rules relating to education and reform are usually largely symbolic and for presentational purposes. They are issues that the government and the institutions can discuss in media, reports and, of course, textbooks, without actually doing much about them. (Reiner, 1994) The government is half-hearted at best when imposing a passing rate in the education program. It is difficult to imagine what education function the lengthy administrative detention actually serves given the requirement that prostitutes themselves have to bear the cost of their education and treatment. The heavy fines paid to the police and the costs incurred in the institutions may be covered by the prostitutes themselves, but more often through loans from relatives and friends, creating strong incentives for prostitutes to make quick money to pay off the debt upon their release.

Education becomes a burden on the institution and a formality for the offender. Classes may or may not be held depending on the demand of production, but the authority has to prepare inmates to take and pass the examination. It seems each institution should have an educated inmate assigned the special responsibility of coaching others to pass the examination. The institution can always obtain an advance copy of the examination questions, and the inmate teacher bears the responsibility to prepare standard answers

[8] The percentage of prostitutes being infected with HIV/AIDS has skyrocketed over the past decade: it increased from 0.02% in 1996 to 0.93% in 2004, representing a 4,550 times increase! (Ministry of Health, 2006).

and then have the inmates memorize them. As a result, most of the inmates can give correct answers without even knowing the questions.

The third objective is the productive use of labor in penal institutions, making them more profitable and less dependent on government funding. Since the 1980s, in order to respond to the decline of government funding as a result of China's moving toward a market economy, Chinese penal institutions have changed their priorities and management structure in accordance with the changing economic policies by commercializing prison labor to maintain normal operations. Profit-generation has become the critical working rule in most, if not all, penal institutions in China. Profit is important to both the state and the institutions. Ultimately, punishment becomes a business. Inmates in the institutions are forced to work, in the name of education, to generate income for the institutions. The work they do is mostly routine, menial, seasonal and usually serves little educational purpose. While improved financial conditions in penal institutions may directly or indirectly benefit the prostitutes during their incarceration, other important objectives, such as treatment and education are effectively marginalized.

Conclusion

As China is experiencing a fiscal crisis as a result of moving toward a market economy, the police and the penal institutions have become zealous in manipulating administrative incarceration to make personal and institutional profits. In this process, the original educational and rehabilitative purposes are often subverted. Education and rehabilitation have become propaganda and mere formalities while income is the real priority. Consequently, the cheap labor of inmates has become an important income-generating resource. There is little rational connection between the stated goal and the means that can be used to achieve the goal.

Punishment is often unduly harsh and not proportionate to the nature of the offense. A prostitute, or other minor offenders for that matter, may incur incarceration of up to three years, which is a more severe sentence than imposed by a court for more serious criminal law offenses. The irony of administrative penalty is most clearly demonstrated by the fact that those offenders who are better informed actually falsify their crimes when they are detained for prostitution or for other crimes, so that their offenses would be classified as "serious" to qualify for criminal punishment to be imposed by the court. In conclusion, while certain kinds of compulsory education and treatment for prostitutes may be necessary for the protection of public order and public health and for the rehabilitation of prostitutes, the existing

system is ill-motivated, badly designed or poorly implemented. It offers little procedural protection of rights, it produces undue burden on prostitutes in custody, and it is not effective in rehabilitation.

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Chapter 11
Decriminalizing Sex Work: Implications for HIV Prevention and Control in China

Dongbao Yu, Edmund Settle, Ruotao Wang and Lenore Manderson

Introduction

While needle sharing remains the main source of HIV transmission in China, the percentage of HIV infections from sexual transmission is steadily increasing, and commercial sex work is regarded as one of the primary factors leading to this increase. Current government policies such as the criminalization of sex workers and "severely cracking down on illegal activities such as sex work" (Ministry of Public Security, 1981) have a limited positive impact on HIV/AIDS prevention and control. Moreover, they leave sex workers socially and legally marginalized, thereby limiting the effectiveness of prevention and outreach programs.

Prostitution has a documented history in China of more than 2,500 years (Hershatter, 1997), and was commercialized prior to 1949. After the founding of the People's Republic of China, the eradication of prostitution became one of the Communist Party's initial social accomplishments. By 1955 prostitution was declared eliminated from mainland China.

Over the past 25 years, in tandem with China's domestic economic expansion, commercial sex-work re-emerged initially in the industrializing coastal cities and has rapidly spread inland. Between 1983 and 1993, China's Xinhua News Agency reported the cumulative number of registered sex workers at 920,000. During the late 1990s, Public Security Bureau officials recorded the detention of more than 700,000 sex workers and clients (Zhang and Ma, 2002). Current estimates place the number of sex workers in China at more than six million (UNDP, 2001b), the majority of whom are women from rural areas (Liu, 2003). Given that sex workers are a highly

D. Yu (✉)
National Center for AIDS/STD Control and Prevention, Chinese Center for Diseases Control and Prevention, Beijing, PRC
e-mail: yud@who.int

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marginalized population, both socially and legally, the actual number of sex workers in China is believed to be much higher (Vandepitte et al., 2006). To prevent further increased transmission of HIV and other sexually transmitted infections among commercial sex workers and their clients, the Ministry of Health is now advocating alternative prevention and control policies to reach this group. However, legal policies such as decriminalization and regulation of the sex industry are not yet under consideration.

The purpose of this chapter is to synthesize lessons, based on a review of the social, economic and legal contexts of sex work, concurrent HIV/AIDS epidemics, examples of successful interventions to sex workers in China, with a major emphasis on decriminalization and regulation of sex–work and its possible impact on HIV prevention and control. We map future directions for more effective legal policies and programs.

Overview of the HIV/AIDS Epidemic in China

Although the overall HIV infection in the adult population of China remains less than 0.1%, the fast increase in the rates of infection, the sheer size of the population, and the widespread existence of risk factors which facilitate the spread of infection have all caused growing concern. By the end of 2005, there were an estimated 650,000 people in China living with HIV/AIDS, among which 75,000 have developed AIDS (MOH, 2006). Among the estimated new HIV cases in 2005, 49.8% were associated with sexual transmission, 48.6% were associated with injection drug use, and 1.6% were associated with mother-to-child transmission of HIV (MOH, 2005). It is estimated that by the year 2010 as many as 10 million Chinese may be living with HIV if no sufficient responses are mounted, thus resulting in a catastrophic loss of life, further straining China's health care system, reducing China's ability to achieve the country's Millennium Development Goals (MDGs) and eroding impressive economic gains made over recent years. Cases of HIV/AIDS are now reported in all 31 provinces, municipalities, and autonomous regions on the mainland (see Fig. 11.1).

It is widely predicted that heterosexual transmission will be the primary mechanism for the next wave of the HIV/AIDS epidemic in China. There are estimates of more than 3 million commercial sex workers (CSWs) in China (Kaufman and Jing, 2002). Different kinds of commercial sex service exist in hotels, massage parlors, karaoke halls and bars in the urban areas, as well as in rural areas, remote townships, and along main transportation routes. We return to a more detailed discussion of commercial sex work below. There is also widespread risk of HIV infection among men who have homosexual

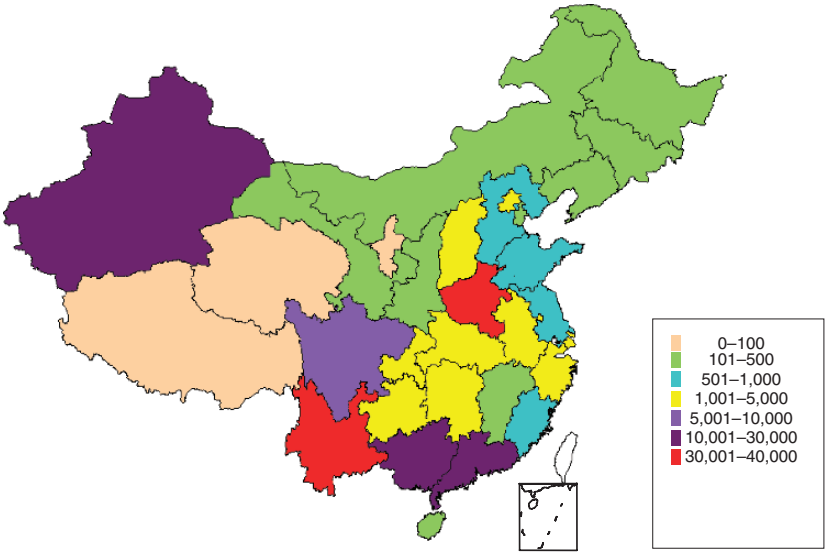

Fig. 11.1 Geographic distribution of reported HIV/AIDS cases in China, by Nov. 2005 Source: National Sentinel Surveillance data, China National Center for AIDS Control and Prevention.

sex for whom risk behaviors are regular. For the purpose of brevity, we will not review this issue in any detail in this chapter.

Contemporary Sex Work in China

Most sex workers in China are domestic rural-to-urban female economic migrants, and tend to be young, unmarried, and undereducated. They often lack the relevant skills and qualifications to participate in stable urban or industrial employment, and likely hold insecure jobs with poor working conditions (Gupta, 2000). With the development of market oriented economic reforms, large numbers of laborers have been laid off from rural and bankrupt state-run enterprises across the country, precipitating the further migration to cities and pushing more unemployed women workers into sex work.

Sex work is not often the first choice of employment. Rather, individuals tend to drift into sex work after holding several low-skilled and low-paying jobs. In Beijing the average wage for a waitress is around 800 Yuan. Sex workers, on the other hand, can earn between 100 and 1,000 Yuan per day, depending on their service location. For example, one study in Beijing indicated that sex workers earned around 1,120 Yuan per week, while sex

workers in Mianyang city, Sichuan province reported earning a monthly salary of around 3,000 Yuan per month (Personal interview, 2004).

Commercial sex work is an integral part of China's immense "underground economy." The estimated worth of this underground economy, with an output and income not taxed by the state, is staggering. According to official estimates, the economic value of China's untaxed output and income is 10% of China's 10 trillion Yuan economic volume (Liu, 2003). While there is no accurate figure for the sex industry, it is estimated that the value of China's sex industry is approximately 250 billion to 1,000 billion Yuan (Anonymous, 2006).

Socio-Economic Reforms and the Growth of Sex Work

According to the UNDP, China reduced its number of rural poor from 250 million (30.7% of the rural population) in 1978 to 30 million (3.2% of the rural population) in 2000 (UNDP, 2001a). Rural to urban migration is seen as a primary reason for such a dramatic drop in rural poverty. Currently, there are approximately 130 million rural migrant workers of which 30% are women (UNDP, 2001a). While China has made significant progress in overall poverty reduction, income distribution has increasingly become unequal. The proportion of rural poor in central and western China has increased from 77% of the country total in 1992 to 85% in 1999 (UNDP, 2003).

The reform and development of the rural economy have led to a dramatic increase of surplus farm labor, which was initially absorbed by the increase of rural enterprises. From 1978 to 1985, the number of residents employed in rural enterprises rose from 28.3 million to 69.8 million workers. However, the "growth of employment in the rural enterprises, which had been absorbing large numbers of rural laborers into non-farm work, declined from 11.9 to 3.3% in 1980–1990 and 1990–2000, respectfully" (Wolf, 2003:15). As a result, starting in the early 1990s, there was a significant shift of the agricultural labor force migrating to non-farm jobs in large urban areas where incomes were higher. The perceived benefit of higher salaries also pulled rural women to urban areas. While some women were able to find short-term work in manufacturing or service industries, additional numbers moved to sex work (Rogers et al., 2002). The decline in rural enterprise employment is dramatically contrasted by the sharp increase in prostitution detentions during this same period.

Inequity in access to education is a key factor contributing to women's participation in sex work. Prior to 1979, universal and equal access to basic education was a priority for the central government. However, the accelerated shift from a planned to a market economy in the 1990s corresponded

to the growing gender gap in schooling, especially in rural areas. Currently, the average Chinese female over 15 years old has an average of 6.5 years of schooling (Jones and Lin, 2003). Furthermore, a study showed that 72% of sex workers had low educational attainment and lacked skills for non-sex work (Pan, 2004). As a result, rural women's social status has decreased.

Gender-based labor discrimination against rural women is widespread in China, and is another key factor in the rapid increase in prostitution. Domestic rural to urban female migrants tend to be young, undereducated and primarily take insecure jobs with poor working conditions. According to the latest statistics published by Xinhua in October 2000, China has a total of 330 million working women, accounting for 46.6% of the workforce. However "women's jobs tend to be simple, and auxiliary, concentrated in the service sector, and lack development potential" (Gyorgy and Korea, 1998). Furthermore, women are more likely to be laid off than their male counterparts and are less likely to be hired or promoted. In a 1987 poll of 660 industrial enterprises, 64% of laid off workers were female. Women who are unable to hold well-paying jobs may turn to sex work for financial security.

Consistent with the experience of women worldwide, Chinese rural women are increasingly marginalized in the process of modernization and economic liberalization, as they are "pushed more and more to the bottom of the social hierarchy" (Zhang and Ma, 2002:803). According to one survey, the social status of rural women has increasingly diminished during the last ten years (All-China's Women Federation, 2001). Even though globalization has changed the face of China's traditional values, women are increasingly faced with gender-based discrimination in the family and work force, as well as diminishing opportunities in education. Thus, an increasing number of rural women and girls have few options except to enter the sex industry.

The Legal Status of Sex Work

Although prostitution is illegal in China, Chinese law does not specifically define sex work. The behavior of prostitutes, i.e., prostitution, is given, but is still vague. The act of prostitution is viewed as a legal and moral problem contrary to China's socialist ideology and traditional values. Existing laws and regulations primarily focus on punishment for those who facilitate, coerce or shelter persons to engage in sex work. For example, the majority of the contents of Law on the Protection of the Rights and Interests of Women (NPC, 1992) detail the penalties and legal responsibilities for violations, thus providing a legal basis for enforcement of the law. Definitions of prostitution or sex work seem simple, but are difficult to uniformly enforce in practice.

Consistent with this representation, current Chinese laws and regulations emphasize combating and banning prostitution. Article 358 of the People Republic of China's (PRC) Criminal Law (National People's Conference (NPC, 1997) stipulates that a person found guilty of forcing a woman into prostitution can be sentenced from five to 10 years imprisonment. Article 359 states a person who profits, invites or accommodates a woman for prostitution to be sentenced to up to five years imprisonment, or criminal detention, or surveillance; if the circumstances are serious, the sentence will be greater than five years imprisonment and simultaneously subject to fines or confiscation of property.

In 1991, the Decision on Forbidding Prostitution (NPC Standing Committee, 1991) raised the maximum punishment for forcing another person into prostitution to death and optional confiscation of property. The decision adds a crime of organizing others for prostitution, which also has the maximum punishment of death with optional confiscation of property. The decision also provides that if an individual visits female minors under the age of 14 years for commercial sex, he shall be punished according to provisions of the Criminal Law on the crime of rape, punishable by death. The Decision on Forbidding Prostitution sets the maximum penalty for mediating prostitution at 15 years imprisonment with an optional fine of up to 10,000 Yuan.

Furthermore the Decision on Forbidding Prostitution (NPC Standing Committee, 1991) states all persons who engage in prostitution or whoring shall be forced to go through venereal disease inspection. Persons suffering from venereal diseases shall be given compulsory medical treatment. It further details that if an individual is aware that he or she has a venereal diseases such as syphilis or gonorrhea, and continues to prostitute him/herself or visit a prostitute, he or she will be sentenced to up to 5 years imprisonment, criminal detention or surveillance, plus a fine of up to 5,000 Yuan.

In the context of HIV/AIDS control, there are several references to the legal status of prostitution. According to the State Council's Plan of Action for Containment and Control of HIV/AIDS in China (2001–2005), prostitution is considered an illegal activity that can contribute to the uncontrolled spread of HIV/AIDS. At the State Council AIDS Control Working Conference held in April 2004, Vice-Premier and Health Minister Wu Yi reiterated the importance of the policy of taking uncompromising measures to reduce prostitution, and thus reverse the growing rate of HIV due to sexual transmission. She stated that firm measures should be taken to cut down on prostitution to prevent the spread of HIV/AIDS. She also recommended the expansion of condom promotion activities for high risk groups (Wu, 2004). These contractions between health and legal polices create an environment where sex workers remain highly mobile, unwilling to acknowledge they are at risk for HIV, and increasingly reluctant to take part in voluntary

counseling and testing programs because they fear the legal and social stigmatizing consequences.

According to the latest Intervention Guide for Entertainment Sites to Female Workers for HIV/AIDS and STI Prevention (Provisional) of 2004, female sex workers at various types of entertainment sites, restaurant, hotels, and on-street locations are defined as a key target group. Therefore, "HIV/AIDS education campaigns shall be launched through means of outreach services and peer education in order to promote the use of condoms, and enhance the effectiveness of the comprehensive intervention strategies, such as encouraging testing and treatment of the potential virus-infected individuals and providing reproductive health inquiries" (China CDC, 2004).

Characteristics of Sex Work in Relation to HIV Infections

Types of Sex Work and Condom Use

Contemporary sex work in China is organized hierarchically in China. The highest level consists of sex workers who operate in star hotels or serve as "second wives." These sex workers tend to be prettier and more educated than others. Their clients are usually well-off businessmen, government officials and other high-income individuals. Regular condom use among this group tends to be relatively high because these sex workers are able to negotiate with their clients and have a higher educational achievement.

The next level consists of sex workers who receive a regular salary from working in establishments such as dance halls, karaoke bars, massage parlors or barbershops and beauty salons. In these environments, sex workers have less ability to demand condom use and are usually under the direct supervision of a manager. Many sex workers at this level may be aware of safe sex practices, but their ability to insist on condoms use is linked to their need for continued employment and wages. Women who work at this level often view non-condom use as a comparative advantage, which may lead to higher income. At both of these levels, sex workers have access to HIV/AIDS prevention material and some negotiating capacity for condom use with clients.

The lower two tiers of sex workers are usually directly supervised by managers in brothels, beauty salons, saunas, and roadside hotels, or are supervised by pimps as street walkers. The conditions of work provide these women with little power or control. Women in such establishments, and street walkers, have limited ability to negotiate condom use, limited access

to health care services, a higher frequency of commercial sex partners and little access to HIV/AIDS prevention materials.

Consistent condom use among sex workers remains low, though there is a trend of a slow increase over the years owing to the health education campaigns. In 2005, the self reported "never use," "some time use" and "always use" in sex workers' commercial sex acts in the last month were 9.8%, 50.3% and 39.9%, respectively(see Fig. 11.2). It is noteworthy that condoms are not or only sometimes used in about 60% of the commercial sex acts (see Fig. 11.2).

The decision to use a condom primarily depends on the partner's or client's preference. Among surveyed sex workers in southwest China, approximately half, or 47.4%, did not use a condom because the client refused. This number rose to 66.7% among street prostitutes. Some 29.2% of Yunnan sex workers mistakenly rationalize not using a condom because of their familiarity with the client (Horizon Market Research and Futures Group Europe, 2002). More significantly, among men between the ages of 25 and 45 who frequented prostitutes, about 40% said they had sex without using a condom (Horizon Market Research and Futures Group Europe, 2002). While men are more likely to use a condom during a lone sexual encounter, increased familiarity with either a sex worker or non-commercial sex seems to reduce the frequency of condom use. Low and inconsistent condom use among sex workers place sex workers at high risk for not only contracting HIV, but also for transmitting it to the general population either through multiple clients or their non-commercial sex partners.

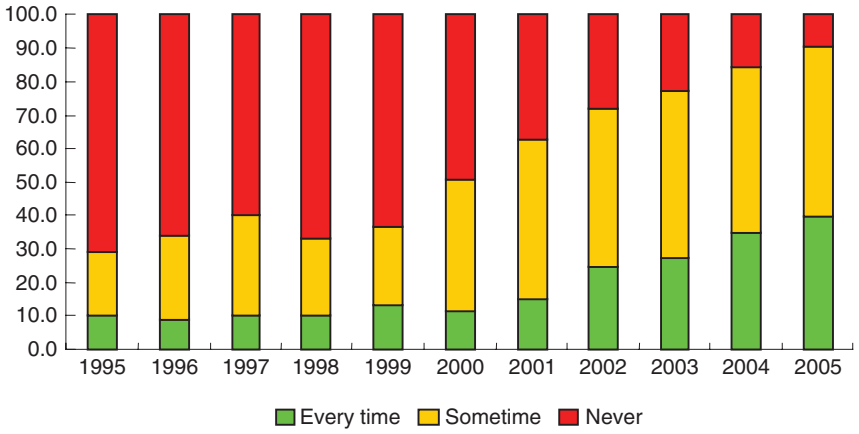

Fig. 11.2 Condom use by sex workers in last month with commercial sex clients from 1995 to 2005
Source: National Sentinel Surveillance data, China National Center for AIDS Control and Prevention.

Sex Workers as a Bridge Population

The overlap between sex work and drug use is an important channel for the transmission of the virus through prostitution from the most at-risk groups to the general population. Two types of sex workers also use drugs. One group undertakes sex work to earn money to buy drugs, while the other group uses drugs contextually, influenced by peers or by the culture of sex work. In both contexts, sex work and drug use form a vicious cycle that leaves women with little opportunity to move.

HIV Infections Among Sex Workers

The national rate of HIV infection among sex workers in China has risen from an alleged zero percent in 1995 to an average of 1.0% in 2004, according to surveillance data. In some parts of Yunnan, Chongqing, Hunan, Guangdong, Guangxi, Sichuan and other provinces, HIV prevalence among sex workers is well over 1% (MOH, 2005).

Examples of Successful Interventions Among Sex Workers

Since 2001, a number of pilot prevention projects have targeted sex workers in China. Among them, a project focusing on condom promotion among sex workers was first launched in 2001 by the Chinese Ministry of Health (MOH), with the support of the World Heath Organization (WHO), in Huangpi District of Wuhan City, Hubei Province and Jingjiang County, Jiangsu Province. Within the first year of the program, it proved to be very effective in reducing the rate of STIs among sex workers. Consequently, the MoH extended the project to Danzhou, Hainan Province and to Li County in Hunan Province in March 2002. The so-called 100% Condom Usage Program (100% CUP) is recognized as a successful strategy for preventing and reducing the spread of STIs and sexually transmissible HIV.

The 100% CUP was implemented in diverse entertainment establishments, including beauty salons, saunas, bathhouses, karaoke bars and video karaoke venues, massage parlors and hotels. The program was perceived as pragmatic and beneficial for STI and HIV/AIDS control from the local public health and public security departments; the participants had access to quality condoms, and were provided instructions from health care personnel. Cooperation between the departments of Public Health and Public Security was especially important for ensuring that the relevant government agencies were involved in the planning and implementation of the projects. Dialogues, discussions and advocacy were organized among the government

leaders, the public and the media, and consensus was reached on the broad public health risks associated with sex work, and the utility of condoms in protecting the health of the workers against STIs/HIV.

A total of 757 sex establishments in the four provinces were targets of the interventions, and about 5,500 female sex workers participated in the program. The results of the 100% CUP indicated dramatic increases in condom use among entertainment establishment workers, ranging from an approximately 50% increase in use in the pilot area of Hubei Province, to a more than 500% increase in the pilot area in Hainan Province. The pilot areas had very low HIV infection rates to begin with (for instance, no known cases in Jingjiang, Hunangpi and Danzhou) and no infections were diagnosed subsequent to the introduction of the intervention. It has been found that a satisfactory level of cooperation occurred across the various government sectors, including the governor, the police, the owners of sex establishments, and especially among the sex workers.

Issues and Policy Recommendations

Intervention programs may be successfully implemented among sex workers if pragmatic attitudes are taken. It is widely recognized that sex work cannot be eliminated in the short run. In the meanwhile, the health of the larger population is at stake if the transmission of HIV/AIDS continues among sex workers and is transmitted from sex workers to the public. Moreover, a rational government needs to implement more pragmatic strategies in its policies of criminalizing sex work and sex workers, especially when it hampers the current efforts of effectively scaling up STI prevention among sex workers.

Current law enforcement methods often tend to inhibit effective HIV/AIDS outreach campaigns which target sex workers, such as condom promotion and voluntary counseling and testing. Given that many sex worker outreach programs utilize existing sex work networks to reach women in established enterprises, irregular crackdowns often disrupt or eliminate these networks and negatively affect the outreach programs. Field experience for behavior intervention has shown that punitive HIV/AIDS control policies are not only ineffective, but inhibit those who are actively trying to reach the most vulnerable to HIV/AIDS. The government should consider less severe penalties or even the decriminalization and regulation of sex work, to enable the adaptation of effective prevention activities targeting the sex workers who are vulnerable and marginalized.

The principal advantage of less severe penalties or the decriminalization of sex work is the expansion of social and legal space in which effective HIV/AIDS prevention programs can operate. By decriminalizing sex work,

local health authorities and non-governmental organizations would be better able to reach out to this vulnerable group and to provide them with AIDS awareness and prevention training. Furthermore, sex workers would have access to health care, which is virtually unattainable at present because of their social and legal status. Sex workers would also have more negotiating power with their clients in terms of condom use.

Further, local authorities would be better able to more effectively regulate and control sex work in their cities and towns. Local regulations could include zoning laws which would limit the number of male entertainment establishments in a specific area and their location in relation to schools and universities. Known industries which traditionally promote sex work would be required to ensure that employees have regular certified health exams, including STI/HIV tests. As part of their business license, owners of such establishments could be required to have on-site health education and drug prevention training for their employees. Finally, such industries could be taxed and the money earmarked for re-training programs which would provide sex workers with opportunities to increase their marketable job skills and thus eventually leave sex work.

A perceived disadvantage of open and decriminalized sex work is that it might be seen to increase the incentives for women to enter sex work, thus placing more women at risk of contracting HIV. Furthermore, an increase in the number of sex workers could overburden the capacity of national and local health authorities and NGOs to effectively provide awareness and prevention services. However, we believe this assumption to be false. In the past 10 years, the Chinese government has passed several laws and regulations which call for a crackdown of sex work, but the number of sex workers has continued to increase exponentially (Pan, 2005). Any increase of sex workers is dependent on education and labor opportunities, not legal status. The continued failure to address these limited opportunities for women will continue to drive rural women into sex work. As we have shown in this chapter, the majority of sex workers are economic migrants with limited opportunities, and are compelled to enter sex work for economic gain and security.

Given China's current political climate, linking HIV/AIDS control to periodic strike-hard anti-prostitution campaigns will likely remain a mainstay of health and public security policy. By initially reducing the number of sex workers and sex work establishments, highly publicized campaigns are seen by the general public as an effective method of HIV/AIDS prevention and control. However, these campaigns have minimal long-term effects on reducing the numbers of prostitutes and their customers, or on reducing STI/HIV transmission rates. By increasing the personal risk for sex workers, local crackdowns tend to increase the overall prices charged by brothels,

and the numbers of sex work establishments and individual sex workers increase. Therefore, China's current anti-prostitution policies can directly lead to an overall increase in underground prostitution, as increased income is the primary motivation for each new wave of sex workers.

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