

Advancing the Prevention Agenda for HIV and Other Sexually Transmitted Infections in South China: Social Science Research to Inform Effective Public Health Interventions

Kathryn E. Muessig · M. Kumi Smith ·
Suzanne Maman · Yingying Huang ·
Xiang-Sheng Chen

Published online: 18 January 2014
© Springer Science+Business Media New York 2014

Abstract Despite widespread biomedical advances in treatment and prevention, HIV and other sexually transmitted infections (STI) continue to affect a large portion of the world's population. The profoundly social nature of behaviorally driven epidemics and disparities across socioeconomic divides in the distribution of HIV/STI and care outcomes emphasize the need for innovative, multi-level interventions. Interdisciplinary approaches to HIV/STI control are needed to combine insights from the social and biological sciences and public health fields. In this concluding essay to a Special Issue on HIV/STI in south China, we describe the evolution of the region's HIV/STI epidemics and the government response, then synthesize findings from the 11 studies presented in this issue to extend seven recommendations for future HIV/STI prevention and care research in China. We discuss lessons learned from forging international collaborations between the social and biological sciences and public health to

inform a shared research agenda to better meet the needs of those most affected by HIV and other STI.

Keywords HIV · Syphilis · China · Intervention · Social science · Public health

Introduction

HIV and other sexually transmitted infections (STI) pose a substantial and growing burden of morbidity and mortality worldwide [1]. In 2012, 2.3 million people became newly infected with HIV, bringing the current global total number of infections to 35.3 million [1]. In 2008 alone, the World Health Organization estimated almost 500 million incident cases of chlamydia, gonorrhoeae, syphilis, and *T. vaginalis* [2]. Results of over 25 years of behavioral interventions to prevent HIV/STI have been mixed, mobilizing a call for programs that take a more integrated and multilevel approach to HIV/STI control [3]. The demand for integrated approaches is rooted firmly in the stance that many social scientists and social justice advocates have long argued: that HIV and other STI are inherently social diseases that cannot be understood or addressed in isolation from the social, economic, and political contexts and norms that shape risk behaviors and vulnerabilities [4–7]. Moreover, disparities in the distribution of HIV/STI and care outcomes that are driven by social and economic determinants of health [8] further underscore the need for interdisciplinary collaboration to deepen our understanding of HIV/STI risk [9].

As part of an initiative by the National Institute of Child Health and Development to increase international collaborations for social science research on HIV (R24 HD056670), researchers, clinicians and public health practitioners from

K. E. Muessig (✉) · S. Maman
Department of Health Behavior, University of North Carolina at
Chapel Hill, Chapel Hill, NC 27599-7440, USA
e-mail: kmuessig@med.unc.edu

M. K. Smith
Department of Epidemiology, University of North Carolina at
Chapel Hill, Chapel Hill, NC, USA

Y. Huang
Institute of Sexuality and Gender, Department of Sociology,
Renmin University of China, Beijing, China

X.-S. Chen (✉)
National Center for STD Control and Institute of Dermatology,
Chinese Academy of Medical Sciences and Peking Union
Medical College, 12 Jiangwangmiao Street,
Nanjing 210042, Jiangsu, China
e-mail: chenxs@ncstdc.org

the US and China conducted a series of interdisciplinary studies grounded in social science theoretical frameworks. The work was based in the southern city of Liuzhou, which has been heavily affected by China's HIV/STI epidemics. The research teams included social, behavioral and biomedical scientists, as well as public health practitioners from the University of North Carolina at Chapel Hill, the Institute for Sexuality and Gender Studies at Renmin (Peoples) University in Beijing, the National Center for STD Control in Nanjing, the Liuzhou City CDC, and an advisory network of Chinese and international HIV/STI experts.

In the introductory essay to this Special Issue [10], we describe themes that emerged from these projects within the broad categories of changes in norms of heterosexual behavior, the complexities of risk behaviors and venue-based risk environments, and persistent stigma faced by people living with HIV (PLHIV). In this concluding essay we provide a historical context of China's evolving HIV/STI epidemics and the government response. We then offer seven recommendations for potential new directions for HIV/STI prevention and care research based on findings from the 11 studies presented in this Special Issue. We close with a discussion of lessons learned on forging collaborations between social, behavioral and biomedical scientists and public health practitioners in order to inform a shared research agenda and generate interdisciplinary research that better meets the needs of those affected by, or vulnerable to, HIV and other STI.

Evolution of China's HIV/STI Epidemic and Prevention Agenda

The first case of HIV in China was identified in a tourist in 1985, and by 1989 indigenous cases had been reported in an outbreak among drug users in southern China [11]. China's earliest control strategy focused on quarantining infected individuals and requiring HIV testing for foreigners [12]. Concurrent with the growing HIV/AIDS epidemic, China began to experience a resurgence in reported cases of STI thought to be nearly eradicated under the socialist policies of the 1950s and 1960s [13]. Between 2004 and 2011, national surveillance sites measured a more than fourfold increase in reported number of syphilis cases [14]. High rates of other bacterial (e.g., chlamydia, gonorrhoea) and viral (e.g., herpes simplex virus 2—HSV2, human papilloma virus—HPV) STI have also been reported, especially among at-risk populations including female sex workers (FSW) and men who have sex with men (MSM) [14–17].

China's approach to disease control for HIV is strongly rooted in its epidemic surveillance system. This system consists of (1) national (now web-based) case reporting

which aggregates newly diagnosed cases from designated health facilities; and (2) a national sentinel surveillance system made up of over 1900 sentinel sites to date that track HIV/STI rates and risk behaviors among most-at-risk populations including FSW, injecting drug users (IDU), MSM and patients attending STI clinics, and other populations of special interest (e.g., migrants, pregnant women, youth, blood donors) [18, 19]. As the HIV epidemic took hold in China in the early 2000s—driven primarily by injection drug use and contaminated blood products—government resources shifted to implementation of global best practices for prevention. These efforts primarily consist of targeted health education, condom use promotion, targeted HIV and syphilis testing, methadone maintenance therapy and needle exchange programs, and prevention of mother to child transmission (PMTCT) [11, 20, 21].

In 2003, the Chinese government launched its first policies of a comprehensive AIDS control strategy, foremost among them the “Four Frees and One Care” policy, which provided free antiretroviral therapy (ART) for poor and uninsured AIDS patients, free voluntary counseling and testing (VCT), free drugs to HIV-infected pregnant women and HIV testing of newborns, free schooling for AIDS orphans, and care and economic assistance to households of people living with HIV/AIDS [12]. Universal free syphilis screening became available to all pregnant women in 2011 with the national PMTCT program. Like HIV, syphilis is a mandatory reportable infection and the National Center for STD Control collects and reports epidemic surveillance data. Additionally, in 2012, a new Department of STI Prevention was established within the China Center for Disease Control in Beijing. Syphilis screening has been integrated into HIV screening in some VCT sites and sentinel surveillance sites for HIV risk groups [22].

From 2005 to 2011, China's estimated population prevalence of HIV remained under 0.06 %. However, measured HIV rates among groups tracked through sentinel surveillance revealed a rising trend among MSM to 6.3 % in 2011 and a falling trend among IDU to 6.4 % in 2011, with FSW prevalence remaining stable at below 1 % [23]. In 2011, unsafe sex overtook injection drug use for the first time as the dominant mode of HIV transmission in China (63.9 vs 28.4 % of newly diagnosed infections, respectively) [23]. Government-sponsored HIV/STI programs have rolled out large scale delivery of behavioral interventions for FSW, IDU and MSM. However evidence of risk heterogeneity within these groups [24–26] suggests that portions of these populations may be less exposed to public health interventions and also more vulnerable to infection [27, 28]. One recent focus of the Chinese Ministry of Science and Technology includes the 12th 5-Year Plan Mega Project which will target these harder to reach portions of at-risk populations (12th 5-Year Plan Mega Project, 2012ZX10001-007).

Though widely acclaimed for its progressive and evidence based approach to HIV control [29], experts both within and outside the Chinese government acknowledge that effective implementation remains one of the biggest challenges in achieving policy goals, given China's massive size and regional variation. Unmet needs among PLHIV in some regions have been widely documented, including costly incidental fees for diagnostic tests, treatment of opportunistic infections, and conditions requiring hospitalization [30]. Programs are also needed to address the less discussed problems facing PLHIV such as malnutrition [31], suicide [32], and poor general quality of life [33].

Future Directions

Below we synthesize findings from the body of research conducted in the southern Chinese city of Liuzhou in the context of China's evolving HIV/STI epidemics and public health response. We discuss the implications of these findings for future intervention research in China with the following seven recommendations:

Recommendation 1

Expand current FSW outreach efforts within venue-based settings to include clients of FSW and other female workers and patrons (both male and female) at entertainment venues.

This Special Issue features research that provides an in-depth and socially contextualized picture of heterosexual HIV/STI transmission in Liuzhou City by investigating the dispersion and concentration of risk within and beyond traditional commercial sex settings. In China, interventions to prevent heterosexual HIV/STI transmission have largely focused on pre-defined at-risk groups—especially FSW [28, 34–37] and IDU [28, 38]. Our work, however, found high levels of self-reported risk behaviors taking place outside the context of commercial sex partnerships, including unprotected sex with non-commercial partners, multiple types of sexual partnerships, and one-time sex with casual partners [39–43]. These studies force us to rethink traditional risk profiles and behaviors and to consider the importance of sexual networks as links between individuals with “typical” high-risk behaviors and members of the general population. A more fine-tuned perception of sexual networks and more nuanced stratifications of risk profiles are apparent in the study of male migrant market vendors who vary widely in terms of social goals, business interests, and economic means, all of which shape their relationships with commercial, regular and casual sex partners [43].

These studies also document the role of business and leisure activities—and the public social spaces where they take place—in the formation of new sexual partnerships. Entertainment venues such as bars, night clubs and karaoke halls, are common places for forming and sustaining new and existing relationships through friends and business acquaintances. The venue-based recruitment methods used in two studies [40, 41] identified high prevalence of syphilis among respondents, particularly among those reporting ever having one-time sex (*yiyeqing*). Existing venue-based HIV/STI prevention efforts, which focus primarily on commercial sex, must therefore expand to include other types of entertainment venues such as bars, dance halls, and karaoke clubs. Traditional definitions of risk groups must also give way to a framework more inclusive of other types of risk profiles including female employees who may not self-identify as FSW, patrons of entertainment venues who are not necessarily clients of FSW, and migrant workers who do not fit the profile of traditionally targeted low socio-economic status migrants.

Recommendation 2

Design condom promotion messaging and interventions for sex work and non-sex work populations that address trust, familiarity and condom negotiation skills.

Several studies explore perceptions of sexual relationships and the ways in which gender, trust, socio-economic dynamics, and networking activities shape decisions about partner choice and condom use [43–45]. As in past research [46–48], the studies in this Special Issue found lower reported condom use by men and women during sex with regular partners or partners perceived as trustworthy or familiar [43–45]. In these relationships trust is conferred through interpersonal connections as well as through indirect connections—as when new sexual partners are introduced through friends or colleagues [43, 44]. By contrast, condoms are often associated with distrust, commercial sex, uncleanness, and emotional distance. These findings can inform condom rebranding efforts to develop socially meaningful health communication messages and campaigns.

These projects suggest ways in which exploratory research can inform intervention design, a currently underutilized strategy [49]. Indeed, many government led intervention efforts apply the same standard HIV knowledge and 100 % condom promotion approaches to diverse groups of FSW, youth and migrant workers [50–52]. Formative studies can play a critical role in the design of HIV/STI interventions by identifying target populations and tailoring intervention approach, messages and services that can then be tested for effectiveness.

Recommendation 3

Tailor intervention activities and materials for FSW that are sensitive to heterogeneity in their work venues, social norms, and individual sexual risk behaviors.

The studies reported in this Special Issue illustrate significant diversity among subgroups of FSW in terms of socio-demographic, cultural and behavioral characteristics, and subsequent risk of HIV/STI. A number of these studies consider the environments where people meet sex partners and focus on describing how the social norms, risk of violence, availability of alcohol and drugs, and other characteristics shape HIV/STI risk [40, 41, 44].

HIV/STI prevention activities for FSW in China have largely consisted of distributing condoms and information fliers, usually by outreach staff who physically go to commercial sex venues [34, 53]. This provides a unique opportunity for outreach staff to develop programs tailored to venue characteristics [54, 55]. However, with few exceptions [27, 56], the diversity across commercial sex venues has been described primarily in terms of disease distribution rather than used to inform and guide interventions. Findings in this Special Issue emphasize the need for risk-reduction messages and intervention strategies that take into account venue level factors—whether venue size, business type, or social interactions of venue patrons and management. Our interdisciplinary research teams studied a variety of environments where commercial sex takes place. These studies employ social frameworks which reveal important dynamics in relationships among different groups of FSW and between FSW and clients, managers, police and health outreach workers.

Studies in this Special Issue corroborate findings from previous research reporting that women working in smaller, lower-cost venues or on the streets are generally older and less educated than their counterparts at larger, higher-cost venues [54, 55]. However, contrary to what many of these past studies concluded about poor health behaviors of FSW in lower-cost venues, one of our studies found that women at smaller venues are highly concerned with self-protection because they are less able to afford medical care and lost income should they contract a disease [42]. In this study, women who work at larger venues are better educated but perceive themselves at lower risk of infection. Many women cite clients' external appearance and other signs of wealth as their primary means for assessing their risk of acquiring HIV/STI from these clients. The two types of FSW also relied on widely different sources of health information (friends vs. Internet), a critical distinction for considerations of the delivery mode of information-based HIV interventions [42]. As demonstrated in the comparison of entertainment establishments to service-based venues [40], the location of risk behaviors (literally

whether sex takes place on- or off-site) and practices for finding sexual partners can be incorporated into appropriate outreach methods including thoughtful placement of condoms or wording of safe-sex messaging. Finally, as Liu and colleagues note, public health practitioners should consider the management patterns and relationship dynamics within commercial sex work venues when designing appropriate intervention materials, especially in smaller-scale sex work venues where cultural practices specific to some ethnic minorities may influence the mode of business operations [57].

Recommendation 4

Address the role of drug and alcohol use in HIV/STI risk.

Drug and alcohol use emerge as critical elements of HIV/STI risk in our studies of commercial and non-commercial sexual encounters. Risk taking enhanced by substance-use features prominently among patrons of entertainment venues who report alcohol use as a way to facilitate new sexual connections [44], market vendors who incorporate social drinking into their social and business networking [43], and subgroups of FSW who also use injection drugs [45].

Heavy alcohol use and binge drinking are not uncommon in China [58] and are considered normative within both business and entertainment activities. High-risk sexual behaviors have been associated with alcohol use both internationally [59] and in China [60, 61]. Interdisciplinary approaches are still needed, however, to develop a more comprehensive framework for understanding the intersection of social norms, alcohol-use and sexual risk in order to inform more strategic interventions. For example, normative beliefs among FSW regarding peer alcohol use and sexual risk may play a role in their decisions about when and how much to drink [62]. This may expose novel intervention points by targeting FSW peer values or social dynamics among FSW, clients, and managers, all of which may have far reaching effects on HIV/STI risk in these populations. Health communication risk-messaging that portrays the connection between heavy alcohol use and sexual risk should be developed and disseminated in venues where alcohol is consumed, whether or not commercial sex is present.

Interventions to address HIV/STI risk in women who inject drugs and also sell sex represent a particularly urgent need given these women's heightened vulnerability and the scarcity of formal knowledge about them. Research by Gu and colleagues [45] for this Special Issue provides a rare insight into differences between these women and non-drug using FSW in terms of their behaviors, barriers to care, and risk-reduction challenges. For example, these women tend to be older, single (either unmarried or divorced), and have

spent more years working in commercial sex. These factors, together with elevated rates of HIV and STI infection in this group, underscore the need for interventions to address their dual sources of risk. New efforts could include programs to enhance health literacy while addressing stigma in clinics or partnerships with public security forces to find alternatives to targeting of women who are doubly vulnerable to arrest for commercial sex and illicit drug use activities. The analysis by Gu and colleagues found that FSW who use drugs report lower condom use rates with clients and poorer access to STI and drug treatment service in spite of high exposure to traditional health promotion materials (65–71 %), underscoring the need for more tailored interventions [45]. This analysis demonstrates that factors at various levels are associated with consistent condom use, including number of daily injections, support of condoms by venue managers, client willingness to use condoms, and perceived social stigma. These factors suggest that a multi-level intervention could have the greatest impact among these highly marginalized women.

Recommendation 5

Address the role of intimate partner violence in HIV/STI risk.

Intimate partner violence (IPV) emerged as an under-addressed area for intervention. As Gu and colleagues found [45], 56.7 % of 200 surveyed women who inject drugs and sell sex have experienced violence from their clients, managers, or regular partners. Furthermore, experience of any of these types of violence is significantly associated with inconsistent condom use in the past 6 months [45]. This is not the first documentation of physical or sexual violence towards FSW from police, clients, and gangs, or from regular partners [63–65]. Nonetheless, most health research and interventions for FSW do not address this aspect of health. The negative impact of client violence and threats of violence on condom use among FSW underscores its importance as an HIV/STI prevention priority and further emphasizes the need to address this threat to women's well-being [63, 66].

Though research on IPV among Chinese FSW is relatively new, Gu and colleagues' study suggests that the problem is widespread and intimately related to HIV/STI risk [45]. As IPV research in China expands, examples of successful sex worker interventions to reduce occupational violence from other global settings may provide guidance. The Songachi project in India is an example of a sex worker intervention that addressed the problem of violence against FSW by using existing social structures to promote community-building and collaboration and collective action programs among FSW to fight police harassment [67]. A second model from

an intervention in South Africa [68, 69] shows how a combination of microfinance programs can reduce STI risk and violence among participants. Other strategies from Thailand [70] and the Dominican Republic [71, 72] have developed programs to address differential power dynamics underlying IPV and HIV risk by appending community solidarity and empowerment programs onto existing structural and political initiatives. Thus a variety of intervention methods have demonstrated effectiveness and could be adapted for testing and evaluation in Chinese settings. Based on the findings presented in this Special Issue, we support development of venue level interventions to address IPV by creating supportive, "condom-friendly" sex work environments that foster alliances between managers, gatekeepers, and clients to both improve condom acceptability and reduce violence. A particular challenge that must be addressed for IPV intervention is reaching the large number of FSW who work in very small, low-end venues or freelance in parks or streets or through the internet.

Recommendation 6

Increase community-based efforts to reduce HIV stigma.

In China, stigmatizing attitudes toward PLHIV have been documented among the general population [73], students [74], employers [75], migrants [76], and rural residents [77]. Within this area of research, however, more information is needed on specific ways in which fear and stigma create barriers to HIV/STI testing and care and impact quality of life for PLHIV [78–80]. In the city-wide survey presented in this Special Issue, nearly one-fifth of respondents agree that PLHIV should be punished, while an even larger proportion (40 %) believe that people with HIV should be quarantined [81]. The same study also shows that accurate knowledge of HIV transmission routes among the general population is low: only 46 % of respondents know that neither sneezing nor sharing utensils can transmit HIV. Furthermore, correct HIV knowledge is associated with less stigmatizing beliefs about PLHIV [81].

A number of anti-stigma HIV interventions in China to date have targeted service providers [82–88], but our findings show the need for broader efforts at the community level as well. One example of a successful community-level anti-stigma campaign includes a community popular opinion leader model among 4510 market workers in Fuzhou, China. In this case, community level diffusion of HIV/STI disease prevention information achieved sustained reduction in HIV-related stigmatizing attitudes toward PLHIV [89]. Exposure to mass media among Chinese migrant workers has been previously associated with lower stigmatizing attitudes toward PLHIV and increased knowledge of HIV/AIDS in a dose response relationship [90]. In developing a mass media anti-stigma campaign,

interdisciplinary formative research should be conducted to determine the appropriate types and modes of media messaging. These campaigns also represent important opportunities to incorporate “new media” tools including mobile-phone and web-based technologies, interactive communication interventions, role-playing, and gaming [91, 92].

In addition to improving quality of life for PLHIV, community-based interventions may also help normalize HIV counseling and testing. Project Accept is an example of a successful model whose VCT uptake efforts in Thailand and sub-Saharan Africa (HPTN 043) [93, 94] increased opportunities to talk about HIV risk and risk reduction [95] resulting in significant increases in first-time testers and repeat testers in the intervention sites [93, 94]. A similar program among rural migrants in Shanghai found increases in VCT uptake as well as increased HIV/STI knowledge and increased positive attitudes toward PLHIV and condom use [96].

Recommendation 7

Expand support and counseling for PLHIV and their families.

PLHIV in China face significant barriers to care and elevated psychosocial burdens [97–100]. Several articles in this Special Issue identify an important need among PLHIV for greater support and acceptance from their families and local communities [81, 101, 102]. Internalization of HIV stigma is well documented among PLHIV in these studies who face the constant psychological and physical stress of social isolation [101]. In addition, HIV-related stigma extends to the families of PLHIV, creating complex webs of social and emotional burdens.

In recent years, community-based organizations and university-led studies in China have begun to test interventions to improve antiretroviral medication (ART) adherence among PLHIV [103–108]. These efforts have identified the important role that factors like social support and counseling may play not only in improving adherence outcomes but also overall quality of life for PLHIV and their families. At least three pilot programs are currently underway in China, two of which adapt existing U.S. interventions to increase medication adherence for local implementation [109, 110]. The adapted programs incorporate culturally relevant elements around family relationships, reputation, and social support as well as traditional Chinese conceptions of health and illness [104, 105, 108]. Other promising intervention models under development among PLHIV in China include focus on psychosocial support [111] and nutrition supplementation [112].

Social Science and Public Health Research: Cross-Fertilization for Mutual Benefit

The papers in this Special Issue illustrate the growing complexity of sexual risk profiles in China and their implications for HIV/STI interventions as well as persistent stigma and unmet needs among PLHIV. To date, most interventions have focused on individual-level beliefs and behaviors without sufficient consideration of social and structural risk environments. These seven recommendations for future intervention work illustrate ways in which collaborations between social science and public health can mutually inform HIV/STI-related intervention development.

Public health interventions in China can use collaborative approaches to become more attuned to the social and structural determinants of health. These include the cycles that perpetuate drug use and sex work, the role of social support networks in human health, the role of place and the local environment in influencing risk behaviors; they include the influence of stigma on uptake of health services, and the harmful effects of violence and emotional abuse on infectious disease prevention, care and treatment.

Collaborative research teams that utilize social science research methods and theoretical approaches can also address some of the challenges posed by China’s current risk-group based disease monitoring system and emphasis on programmatic indicators. Policy evaluation methods in China delegate the task of disease reporting to local health departments, where indicators reflecting intervention program activity (e.g., number of condoms distributed or number of clients seen per period of time) are favored over indicators measuring program outcomes. As a result, intervention evaluations tend to quantify effort but not efficacy. As China enters a new phase of public health interventions, a stronger tie between health outcomes and program goals could be facilitated through increased collaboration with social science researchers.

The value of partnering with social scientists in HIV/STI prevention research is present at all stages of research design and implementation. This includes sampling and measurement frameworks, identifying research questions, data collection, analysis, and translation of results into intervention strategies. In planning future intervention projects, public health researchers can benefit from incorporation of social science frameworks to enhance the depth, detail, and nuance of their research. In turn, social scientists can work with public health practitioners to harness their research findings to the design and implementation of ongoing intervention work. China’s commitment to prevention and care, biomedical research, and epidemic surveillance have laid a solid foundation for developing new multi-component, social science-informed interventions to reduce HIV/STI

transmission and improve quality of life for those at risk for and living with HIV.

Acknowledgments This essay is part of a Special Issue of *AIDS and Behavior* and was supported by “Partnership for Social Science Research on HIV/AIDS in China”, which was funded by NIH Grant #R24 HD056670, and supported by the UNC Center for AIDS research (NIH Grant #P30 AI50410). Kathryn E. Muessig was supported by an NIH institutional training grant during part of this work (5T32AI007001-35). The authors wish to thank Gail Henderson, Carol Golin, Suiming Pan, Sharon Weir, and Jing Li for assistance in developing this essay.

References

- UNAIDS. UNAIDS World AIDS Day Report: Results 2012. 2013. http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/jc2434_worldaidsday_results_en.pdf. Accessed 30 Dec 2013.
- World Health Organization. Global incidence and prevalence of selected curable sexually transmitted infections—2008. 2012, Geneva. http://apps.who.int/iris/bitstream/10665/75181/1/9789241503839_eng.pdf. Accessed 5 Dec 2013.
- Coates TJ, Richter L, Caceres C. Behavioural strategies to reduce HIV transmission: how to make them work better. *Lancet*. 2008;372:669–84.
- Farmer P. AIDS and accusation: Haiti and the geography of blame. San Francisco: University of California Press; 1992.
- Biehl JG. The activist state: global pharmaceuticals, AIDS, and citizenship in Brazil. *Soc Text*. 2004;22:105–32.
- Beyer C. War in the blood: sex, politics, and AIDS in Southeast Asia. London: Zed Books Ltd; 1998.
- Shilts R. And the band played on: politics, people, and the AIDS epidemic. New York: St Martin's Press; 1987.
- Millett GA, Peterson JL, Flores SA, Hart TA, Jeffries WL, Wilson PA, et al. Comparisons of disparities and risks of HIV infection in black and other men who have sex with men in Canada, UK, and USA: a meta-analysis. *Lancet*. 2012;380:341–8.
- Auerbach JD, Parkhurst JO, Caceres CF. Addressing social drivers of HIV/AIDS for the long-term response: conceptual and methodological considerations. *Glob Public Health*. 2011;6(Suppl 3):S293–309.
- Henderson G, Maman S, Huang YY, Muessig KE, Pan SM. Social contexts of heterosexual transmission of HIV/STI in Lijiang City, China. *AIDS Behav*. 2014;18(2).
- Wu ZY, Sullivan SG, Wang Y, Rotheram-Borus M, Detels R. Evolution of China's response to HIV/AIDS. *Lancet*. 2007;369:679–90.
- Sun X, Lu F, Wu Z, Poundstone K, Zeng G, Xu P, et al. Evolution of information-driven HIV/AIDS policies in China. *Int J Epidemiol*. 2010;39(Suppl 2):ii4–13.
- Cohen MS, Henderson GE, Aiello P, Zheng H. Successful eradication of sexually transmitted diseases in the People's Republic of China: implications for the 21st Century. *J Infect Dis*. 1996;174:S223–9.
- Chen XS, Peeling RW, Yin YP, Mabey DC. The epidemic of sexually transmitted infections in China: implications for control and future perspectives. *BMC Med*. 2011;9:111.
- Poon AN, Li Z, Wang N, Hong Y. Review of HIV and other sexually transmitted infections among female sex workers in China. *AIDS Care*. 2011;23(Suppl 1):5–25.
- Chen XS, Yin YP, Liang GJ, Wang QQ, Jiang N, Liu Q, et al. The prevalences of *Neisseria gonorrhoeae* and *Chlamydia trachomatis* infections among female sex workers in China. *BMC Public Health*. 2013;13:121.
- Wu Z, Xu J, Liu E, Mao Y, Xiao Y, Sun X, et al. HIV and syphilis prevalence among men who have sex with men: a cross-sectional survey of 61 cities in China. *Clin Infect Dis*. 2013;57:298–309.
- Sun X, Wang N, Li D, Zheng X, Qu S, Wang L, et al. The development of HIV/AIDS surveillance in China. *AIDS*. 2007;21(Suppl 8):S33–8.
- Zhang L, Fung Chow EP, Zhang J, Jing J, Wilson DP. Describing the Chinese HIV surveillance system and the influences of political structures and social stigma. *Open AIDS J*. 2012;6:163–8.
- Zhang KL, Ma SJ. Epidemiology of HIV in China. *BMJ*. 2002;324:803–4.
- Teng T, Shao Y. Scientific approaches to AIDS prevention and control in China. *Adv Dent Res*. 2011;23:10–2.
- Tucker JD, Hawkes SJ, Yin YP, Peeling RW, Cohen MS, Chen XS. Scaling up syphilis testing in China: implementation beyond the clinic. *Bull World Health Organ*. 2010;88:452–7.
- Ministry of Health People's Republic of China. 2012 China AIDS Response Progress Report. Beijing, 2012. http://www.unaids.org/en/dataanalysis/knowyourresponse/countryprogressreports/2012countries/ce_CN_Narrative_Report%5B1%5D.pdf. Accessed 16 Sep 2013.
- Chen XS, Wang QQ, Yin YP, Liang GJ, Jiang N, Yang LG, et al. Prevalence of syphilis infection in different tiers of female sex workers in China: implications for surveillance and interventions. *BMC Infect Dis*. 2012;12:84.
- Chen X-S, Liang G-J, Wang Q-Q, Yin Y-P, Jiang N, Zhou Y-J, et al. HIV prevalence varies between female sex workers from different types of venues in Southern China. *Sex Transm Dis*. 2012;39:868–70.
- Zhao J, Cai W-D, Chen L, Zhao J-K, Gan Y-X, Zi Y-Y, et al. A comparison of HIV infection and related risks among male sex workers in different venues in Shenzhen, China. *AIDS Behav*. 2011;15:635–42.
- Huang Y, Henderson GE, Pan S, Cohen MS. HIV/AIDS risk among brothel-based female sex workers in China: assessing the terms, content, and knowledge of sex work. *Sex Transm Dis*. 2004;31:695–700.
- Hong FC, Zhou H, Cai YM, Pan P, Feng TJ, Liu XL, et al. Prevalence of syphilis and HIV infections among men who have sex with men from different settings in Shenzhen, China: implications for HIV/STD surveillance. *Sex Transm Infect*. 2009;85:42–4.
- Gill B, Okie S. China and HIV: a window of opportunity. *N Engl J Med*. 2007;356:1801–5.
- Moon S, Van Leemput L, Durier N, Jambert E, Dahmane A, Jie Y, et al. Out-of-pocket costs of AIDS care in China: are free antiretroviral drugs enough? *AIDS Care*. 2008;20:984–94.
- Hu W, Jiang H, Chen W, He SH, Deng B, Wang WY, et al. Malnutrition in hospitalized people living with HIV/AIDS: evidence from a cross-sectional study from Chengdu, China. *Asia Pac J Clin Nutr*. 2011;20:544–50.
- Lau J, Yu X, Mak W, Cheng Y, Lv Y, Zhang J. Suicidal ideation among HIV+ former blood and/or plasma donors in rural China. *AIDS Care*. 2010;22:946–54.
- Huang L, Li L, Zhang Y, Li H, Li X, Wang H. Self-efficacy, medication adherence, and quality of life among people living with HIV in Hunan Province of China: a questionnaire survey. *J Assoc Nurses AIDS Care*. 2013;24:145–53.
- Hong Y, Poon AN, Zhang C. HIV/STI prevention interventions targeting FSWs in China: a systematic literature review. *AIDS Care*. 2011;23(Suppl 1):54–65.
- Chen Y, Latkin C, Celentano DD, Yang X, Li X, Xia G, et al. Delineating interpersonal communication networks: a study of

- the diffusion of an intervention among female entertainment workers in Shanghai, China. *AIDS Behav.* 2012;16:2004–14.
36. Kang D, Tao X, Liao M, Li J, Zhang N, Zhu X, et al. An integrated individual, community, and structural intervention to reduce HIV/STI risks among female sex workers in China. *BMC Public Health.* 2013;13:717.
 37. Liao M, Bi Z, Liu X, Kang D, Fu J, Song Q, et al. Condom use, intervention service utilization and HIV knowledge among female sex workers in China: results of three consecutive cross-sectional surveys in Shandong Province with historically low HIV prevalence. *Int J STD AIDS.* 2012;23:e23–9.
 38. Chen HT, Liao Q. A pilot study of the NGO-based relational intervention model for HIV prevention among drug users in China. *AIDS Educ Prev.* 2005;17:503–14.
 39. Huang Y, Abler L, Pan S, Henderson GE, Wang X, Yao X, et al. Population-based sexual behavior surveys in China: Liuzhou compared with other prefectural cities. *AIDS Behav.* 2014;18(2).
 40. Weir SS, Li J, Edwards JK, Gandhi AD, Yingying H, Suchindran CM, et al. Exploring venue-associated risk: a comparison of multiple partnerships and syphilis infection among women working at entertainment and service venues. *AIDS Behav.* 2014;18(2).
 41. Weir SS, Pan S, Huang Y, Zhang N, Gandhi AD, Chen XS. Brief non-commercial sexual encounters among patrons of entertainment venues in Liuzhou, China. *AIDS Behav.* 2014;18(2).
 42. Youchun Z, Brown JD, Muessig KE, Feng XX, He WZ. Sexual health knowledge and health practices of female sex workers in Liuzhou, China, differ by size of venue. *AIDS Behav.* 2014;18(2).
 43. Wang W, Muessig KE, Li M, Zhang Y. Networking activities and perceptions of HIV risk among male migrant market vendors in China. *AIDS Behav.* 2014;18(2).
 44. Zhang N, Abler L, Bao Y, Pan S. Understanding the meaning of short-term, Yiyeqing relationships and how they are formed: implications for condom use in Liuzhou, China. *AIDS Behav.* 2014;18(2).
 45. Gu J, Bai Y, Lau JT, Hao Y, Cheng Y, Zhou R, et al. Social environmental factors and condom use among female injection drug users who are sex workers in China. *AIDS Behav.* 2014;18(2).
 46. Hong Y, Zhang C, Li X, Fang X, Lin X, Zhou Y, et al. HIV testing behaviors among female sex workers in Southwest China. *AIDS Behav.* 2012;16:44–52.
 47. Wang B, Li X, Stanton B, Yang H, Fang X, Zhao R, et al. Vaginal douching, condom use, and sexually transmitted infections among Chinese female sex workers. *Sex Transm Dis.* 2005;32:696–702.
 48. Jin X, Smith K, Chen RY, Ding G, Yao Y, Wang H, et al. HIV prevalence and risk behaviors among male clients of female sex workers in Yunnan, China. *J Acquir Immune Defic Syndr.* 2010;53:131–5.
 49. Xiao Z, Noar SM, Zeng L. Systematic review of HIV prevention interventions in China: a health communication perspective. *Int J Public Health.* 2013. doi:10.1007/s00038-013-0467-0.
 50. Zou H, Xue H, Wang X, Lu D. Condom use in China: prevalence, policies, issues and barriers. *Sex Health.* 2012;9:27–33.
 51. Li S, Huang H, Cai Y, Ye X, Shen X, Shi R, et al. Evaluation of a school-based HIV/AIDS peer-led prevention programme: the first intervention trial for children of migrant workers in China. *Int J STD AIDS.* 2010;21:82–6.
 52. Chen LX, Liang H, Yang XB. Meta-analysis on the effects of health education towards HIV/AIDS high-risk behavior, knowledge, and related attitude among floating population in China. *Zhonghua Liu Xing Bing Xue Za Zhi.* 2012;33:99–105.
 53. Morisky DE, Urada LA. Organizational policy recommendations for control of STI/HIV among female sex workers in China: regular examination of workers in social hygiene clinics. *AIDS Care.* 2011;23:83–95.
 54. Wang Q, Yang P, Gong XD, et al. Syphilis prevalence and high risk behaviors among female sex workers in different settings. *Chin J AIDS STDs.* 2009;15:398–400.
 55. Yang P, Wang Q, Peng H. A survey of syphilis and HIV infection in medium-low-income female sex workers. *China J Lepr Skin Dis.* 2009;25:174–6.
 56. Hao C, Liu H, Sherman SG, Jiang B, Li X, Xu Y, Jiang Z, Zang C. Typology of older female sex workers and sexual risk for HIV infection in China: a qualitative study. *Cult Health Sex.* 2014;16:47–60.
 57. Liu Q, Zhuang K, Henderson GE, Shenglong Q, Fang J, Yao H, et al. The organization of sex work in low- and high-priced venues with a focus on the experiences of ethnic minority women working in these venues. *AIDS Behav.* 2014;18(2).
 58. Yang L, Zhou M, Sherliker P, Cai Y, Peto R, Wang L, et al. Alcohol drinking and overall and cause-specific mortality in China: nationally representative prospective study of 220,000 men with 15 years of follow-up. *Int J Epidemiol.* 2012;41:1101–13.
 59. Shuper PA, Joharchi N, Irving H, Rehm J. Alcohol as a correlate of unprotected sexual behavior among people living with HIV/AIDS: review and meta-analysis. *AIDS Behav.* 2009;13:1021–36.
 60. Li Q, Li X, Stanton B. Alcohol use and sexual risk behaviors and outcomes in China: a literature review. *AIDS Behav.* 2010;14:1227–36.
 61. Wang B, Li X, Stanton B, Zhang L, Fang X. Alcohol use, unprotected sex, and sexually transmitted infections among female sex workers in China. *Sex Transm Dis.* 2010;37:629–36.
 62. Chen Y, Li X, Zhou Y, Wen X, Wu D. Perceived peer engagement in HIV-related sexual risk behaviors and self-reported risk-taking among female sex workers in Guangxi, China. *AIDS Care.* 2013;25:1114–21.
 63. Choi SY, Chen KL, Jiang ZQ. Client-perpetuated violence and condom failure among female sex workers in southwestern China. *Sex Transm Dis.* 2008;35:141–6.
 64. Yi H, Mantell JE, Wu R, Lu Z, Zeng J, Wan Y. A profile of HIV risk factors in the context of sex work environments among migrant female sex workers in Beijing, China. *Psychol Health Med.* 2010;15:172–87.
 65. Fang X, Li X, Yang H, Hong Y, Zhao R, Dong B, et al. Profile of female sex workers in a Chinese county: does it differ by where they came from and where they work? *World Health Popul.* 2007;9:46–64.
 66. Choi SY, Holroyd E. The influence of power, poverty and agency in the negotiation of condom use for female sex workers in mainland China. *Cult Health Sex.* 2007;9:489–503.
 67. Ghose T, Swendeman DT, George SM. The role of brothels in reducing HIV risk in Sonagachi, India. *Qual Health Res.* 2011;21:587–600.
 68. Kim JC, Watts CH, Hargreaves JR, Ndhlovu LX, Phetla G, Morison LA, et al. Understanding the impact of a microfinance-based intervention on women's empowerment and the reduction of intimate partner violence in South Africa. *Am J Public Health.* 2007;97:1794–802.
 69. Pronyk PM, Hargreaves JR, Kim JC, Morison LA, Phetla G, Watts C, et al. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet.* 2006;368:1973–83.
 70. Rojanapithayakorn W. The 100 % condom use programme in Asia. *Reprod Health Matters.* 2006;14:41–52.
 71. Kerrigan D, Ellen JM, Moreno L, Rosario S, Katz J, Celentano DD, et al. Environmental-structural factors significantly

- associated with consistent condom use among female sex workers in the Dominican Republic. *AIDS*. 2003;17:415–23.
72. Kerrigan D, Moreno L, Rosario S, Gomez B, Jerez H, Barrington C, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. *Am J Public Health*. 2006;96:120–5.
 73. Burki TK. Discrimination against people with HIV persists in China. *Lancet*. 2011;377:286–7.
 74. Chan KY, Yang Y, Li ZR, Stoope MA, Reidpath DD. Interrelationships between HIV/AIDS and risk behavior prejudice among medical students in Southern China. *Curr HIV Res*. 2009;7:601–11.
 75. Liu Y, Canada K, Shi K, Corrigan P. HIV-related stigma acting as predictors of unemployment of people living with HIV/AIDS. *AIDS Care*. 2012;24:129–35.
 76. Cao H, He N, Jiang Q, Yang M, Liu Z, Gao M, et al. Stigma against HIV-infected persons among migrant women living in Shanghai, China. *AIDS Educ Prev*. 2010;22:445–54.
 77. Sullivan SG, Xu J, Feng Y, Su S, Xu C, Ding X, et al. Stigmatizing attitudes and behaviors toward PLHA in rural China. *AIDS Care*. 2010;22:104–11.
 78. Wu Z, Sun X, Sullivan SG, Detels R. Public health HIV testing in China. *Science*. 2006;312:1475–6.
 79. Du J, Lombardi C, Evans E, Jiang H, Zhao M, Meng YY. A mixed methods approach to identifying factors related to voluntary HIV testing among injection drug users in Shanghai, China. *Int J Infect Dis*. 2012;16:e498–503.
 80. Xu T, Yan ZH, Duan S, Wang CH, Rou KM, Wu ZY. Psychosocial well-being of children in HIV/AIDS-affected families in Southwest China: a qualitative study. *J Child Fam Stud*. 2009;18:21–30.
 81. Abler L, Henderson G, Wang X, Avery M, Zhang Y, Pan S. Affected by HIV stigma: interpreting results from a population survey of an urban center in Guangxi, China. *AIDS Behav*. 2014;18(2).
 82. Wang D, Operario D, Hong Q, Zhang H, Coates T. Intervention to train physicians in rural China on HIV/STI knowledge and risk reduction counseling: preliminary findings. *AIDS Care*. 2009;21:468–72.
 83. Li L, Cao H, Wu Z, Wu S, Xiao L. Diffusion of positive AIDS care messages among service providers in China. *AIDS Educ Prev*. 2007;19:511–8.
 84. Williams AB, Wang H, Burgess J, Wu C, Gong Y, Li Y. Effectiveness of an HIV/AIDS educational programme for Chinese nurses. *J Adv Nurs*. 2006;53:710–20.
 85. Wu S, Li L, Wu Z, Liang LJ, Cao H, Yan Z, et al. A brief HIV stigma reduction intervention for service providers in China. *AIDS Patient Care STDS*. 2008;22:513–20.
 86. Wu Z, Detels R, Ji G, Xu C, Rou K, Ding H, et al. Diffusion of HIV/AIDS knowledge, positive attitudes, and behaviors through training of health professionals in China. *AIDS Educ Prev*. 2002;14:379–90.
 87. Li L, Guan J, Liang LJ, Lin C, Wu Z. Popular opinion leader intervention for HIV stigma reduction in health care settings. *AIDS Educ Prev*. 2013;25:327–35.
 88. Li L, Wu Z, Liang LJ, Lin C, Guan J, Jia M, et al. Reducing HIV-related stigma in health care settings: a randomized controlled trial in China. *Am J Public Health*. 2013;103:286–92.
 89. Li L, Liang LJ, Lin C, Wu Z, Rotheram-Borus MJ. NIMH Collaborative HIV/STD Prevention Trial Group. HIV prevention intervention to reduce HIV-related stigma: evidence from China. *AIDS*. 2010; 24:115–22.
 90. Li L, Rotheram-Borus MJ, Lu Y, Wu Z, Lin C, Guan J. Mass media and HIV/AIDS in China. *J Health Commun*. 2009;14:424–38.
 91. Allison S, Bauermeister JA, Bull S, Lightfoot M, Mustanski B, Shegog R, et al. The intersection of youth, technology, and new media with sexual health: moving the research agenda forward. *J Adolesc Health*. 2012;51:207–12.
 92. Ybarra ML, Bull SS, Prescott TL, Korchmaros JD, Bangsberg DR, Kiwanuka JP. Adolescent abstinence and unprotected sex in CyberSenga, an Internet-based HIV prevention program: randomized clinical trial of efficacy. *PLoS ONE*. 2013;8:e70083.
 93. Kawichai S, Celentano D, Srithanaviboonchai K, Wichajarn M, Pancharoen K, Chariyalertsak C, et al. NIMH Project Accept (HPTN 043) HIV/AIDS community mobilization (CM) to promote mobile HIV voluntary counseling and testing (MVCT) in rural communities in Northern Thailand: modifications by experience. *AIDS Behav*. 2012;16:1227–37.
 94. Sweat M, Morin S, Celentano D, Mulawa M, Singh B, Mbwambo J, et al. Community-based intervention to increase HIV testing and case detection in people aged 16–32 years in Tanzania, Zimbabwe, and Thailand (NIMH Project Accept, HPTN 043): a randomised study. *Lancet Infect Dis*. 2011;11: 525–32.
 95. Khumalo-Sakutukwa G, Morin SF, Fritz K, Charlebois ED, van Rooyen H, Chingono A, et al. Project Accept (HPTN 043): a community-based intervention to reduce HIV incidence in populations at risk for HIV in sub-Saharan Africa and Thailand. *J Acquir Immune Defic Syndr*. 2008;49:422–31.
 96. Zhang T, Tian X, Ma F, Yang Y, Yu F, Zhao Y, et al. Community based promotion on VCT acceptance among rural migrants in Shanghai, China. *PLoS ONE*. 2013;8:e61016.
 97. Li L, Comulada WS, Wu Z, Ding Y, Zhu W. Providers' HIV-related avoidance attitude and patient satisfaction. *Health Expect*. 2013;16(1):105–12.
 98. Li L, Liang LJ, Wu Z, Lin C, Wen Y. Individual attitudes and perceived social norms: reports on HIV/AIDS-related stigma among service providers in China. *Int J Psychol*. 2009;44:443–50.
 99. Lin C, Li L, Wan D, Wu Z, Yan Z. Empathy and avoidance in treating patients living with HIV/AIDS (PLWHA) among service providers in China. *AIDS Care*. 2012;24(11):1341–8.
 100. Yu XN, Lau JT, Mak WW, Cheng YM, Lv YH, Zhang JX. Risk and protective factors in association with mental health problems among people living with HIV who were former plasma/blood donors in rural China. *AIDS Care*. 2009;21:645–54.
 101. Hua J, Emrick CB, Golin CE, Liu K, Pan J, Wang M, et al. HIV and Stigma in Liuzhou, China. *AIDS Behav*. 2014;18(2).
 102. Ying-Xia Z, Golin CE, Bu J, Emrick CB, Zhang N, Li MQ. Coping Strategies for HIV-related Stigma in Liuzhou, China. *AIDS Behav*. 2014;18(2).
 103. Huang D, Sangthong R, McNeil E, Chongsuvivatwong V, Zheng W, Yang X. Effects of a phone call intervention to promote adherence to antiretroviral therapy and quality of life of HIV/AIDS patients in Baoshan, China: a randomized controlled trial. *AIDS Res Treat*. 2013;2013:580974.
 104. Li L, Ji G, Liang LJ, Ding Y, Tian J, Xiao Y. A multilevel intervention for HIV-affected families in China: together for empowerment activities (TEA). *Soc Sci Med*. 2011;73:1214–21.
 105. Shiu CS, Chen WT, Simoni J, Fredriksen-Goldsen K, Zhang F, Zhou H. The Chinese life-steps program: a cultural adaptation of a cognitive-behavioral intervention to enhance HIV medication adherence. *Cogn Behav Pract*. 2013;20:202–12.
 106. Simoni JM, Chen WT, Huh D, Fredriksen-Goldsen KI, Pearson C, Zhao H, et al. A preliminary randomized controlled trial of a nurse-delivered medication adherence intervention among HIV-positive outpatients initiating antiretroviral therapy in Beijing, China. *AIDS Behav*. 2011;15:919–29.
 107. Wang H, Zhou J, Huang L, Li X, Fennie KP, Williams AB. Effects of nurse-delivered home visits combined with telephone calls on medication adherence and quality of life in HIV-infected heroin users in Hunan of China. *J Clin Nurs*. 2010;19:380–8.

108. Williams AB, Wang H, Burgess J, Li X, Danvers K. Cultural adaptation of an evidence-based nursing intervention to improve medication adherence among people living with HIV/AIDS (PLWHA) in China. *Int J Nurs Stud*. 2013;50:487–94.
109. Safren SA, Otto MW, Worth JL, Salomon E, Johnson W, Mayer K, et al. Two strategies to increase adherence to HIV antiretroviral medication: life-steps and medication monitoring. *Behav Res Ther*. 2001;39:1151–62.
110. Williams AB, Fennie KP, Bova CA, Burgess JD, Danvers KA, Dieckhaus KD. Home visits to improve adherence to highly active antiretroviral therapy: a randomized controlled trial. *J Acquir Immune Defic Syndr*. 2006;42:314–21.
111. Yu X, Lau JT, Mak WW, Cheng Y, Lv Y, Zhang J. A pilot theory-based intervention to improve resilience, psychosocial well-being, and quality of life among people living with HIV in Rural China. *J Sex Marital Ther*. 2014;40(1):1–16.
112. Ji G, Qi R, Wang H, Feng C, Leng J. A “planting and eating soybean” project for people living with HIV/AIDS in rural Anhui: a pilot study in China. *AIDS Care*. 2010;22:126–32.