Commercial sex and condom use among involuntary male bachelors: some evidence from an exploratory survey in rural China

Abstract: Using data from a survey conducted in a rural district in Anhui province, China, this study analyzes commercial sex experiences and condom use among involuntary male bachelors, and compares them to those observed among married men in the same age groups. Our findings indicate that both at the first and last sexual intercourse, the prevalence of commercial sex among unmarried men is significantly higher than the level reported among married men; marital status being almost the only significant variable for predicting the likelihood to resort to commercial sex. It is also suggested that, while the vast majority of sexual intercourses are still unprotected, the condom use rate is even lower among unmarried men than among the married, and that condom use rate is also strongly associated with the knowledge of Sexually Transmitted Diseases' (STDs), age, education and income. This means that in a context of a male marriage squeeze, commercial sex is becoming one of the important ways for the male bachelors to meet their sexual needs, and that they are obviously facing much higher risks of transmission of sexual infections with less condom use as compared to married men, this situation posing a severe challenge to public health.

Key Words: Commercial Sex, Condom Use, Sex Imbalance, Marriage Squeeze

BACKGROUND

Due to the traditional son preference combined with the development of technology for prenatal sex determination, China has been facing an increasingly imbalanced sex ratio at birth (SRB) since the 1980's, reaching 118.1 boys for 100 girls in 2010 (China National Bureau of Statistics2012). Consequently, as these children will grow up, the subsequent shortage of females will lead to an increasing "male marriage squeeze", with annually at least 10 percent of men in surplus on the marriage market in the coming decades (Das Gupta & Li, 1999; Guo, 2000; Chen, 2001; Li & Jiang et al., 2006).

In China, marriage is almost universal and the idea that "everybody should get married" is still widely prevalent (so called "universal marriage system") (Xinqin Research Institute, 2008). Meanwhile, with the practice of marrying up (so called "gradient marriage model") in which women usually get married with men who have a higher socioeconomic status, men with a lower socioeconomic status can hardly find women to get married with (Li et al., 1986). Although this is nothing new in China, the growing shortage of women and the increasing cost of marriage for men have made the problem more acute (Yang et al., 2012a; 2012b; Attané et al. 2013).

As explained in a previous research, the characteristics of marriage-squeezed men are as follows: older than 28 years old, mostly located in remote rural areas, with low levels of education and income, and lacking social capitals (Yang et al., 2012a, 2012b). Under this social background of "universal marriage system" and "gradient marriage model", being singlehood makes people be facing a great pressure from

society and family (Wei, Jin & Li, 2008; Li & Li, 2008). In Chinese society, If possible, men will get married as could as they can even if they are actually gays. A study indicates more than 90% of Chinese men who had same-sex sexual orientation were yet married with a woman in order to hide their real sexual orientation (Y.H. Li, 1998; Liu & Lu, 2005). Therefore, we can infer that those unmarried men aged above 28 are involuntarily staying bachelorhood and could be defined as “involuntary bachelors”.

Very little is currently known on the sexual practices among those male bachelors in today’s China (Li et al. 2010; Liu et al. 1998), especially those marriage-squeezed men who remain unmarried against their will (i.e. the “involuntary” male bachelors). To try to anticipate the situation that will be faced by a growing number of involuntary Chinese male bachelors near future, we have conducted in 2008 a survey entitled “Reproductive health and family life of involuntary male bachelors in rural China” in a rural district of Anhui province, on which the present article is based. The purpose of this article is to reveal the characteristics of commercial sex which is specifically defined here as the sexual intercourse with female partners (e.g. prostitutes) and condom use among these “involuntary” male bachelors when having commercial sex in comparison to that among the married men in the same age groups, in order to comprehend the consequences of sex imbalance followed by “marriage squeeze” at individual level and assess potential impact of which on public health.

LITERATURE REVIEW

Sexuality of Involuntary Male Bachelors and Public Health

In China's cultural context, marriage remains in most cases a prerequisite for family formation and, in rural society particularly, the legitimate setting for sexual activity (McMillan 2006; Sun et al., 2009). Under the above-mentioned circumstances, i.e. the reduced availability of female sexual partners within marriage, the involuntary bachelors are likely to look for satisfying alternatives to heterosexual partnered-sex within marriage. For instance, it was reported that the frequency of masturbation and the prevalence of same-sex sexual behaviour tend to be higher among involuntary male bachelors than among married men (Yang et al., 2012a, 2012b). Also, it was indicated that male bachelors have higher rates of unprotected sex with casual partners, with increased risks in HIV (Human Immunodeficiency Virus)/AIDS (Acquired Immure Deficiency Syndrome) and STDs' (Sexual Transmitted Diseases) transmission (Merli & Hertog et al., 2006; Merli & Hertog, 2010). While commercial sex –which may be adopted to compensate for the absence of heterosexual partnered-sex within marriage– although illegal, is more and more widespread in contemporary transitional China (Zuo Q. et al., 2003; Liu B. et al., 2007; Li B. et al., 2008; Wen B. et al., 2012), condom use during commercial sexual intercourses is becoming a major concern for public health.

Actually, existing research indicates that unprotected commercial sex is one of the major ways for HIV/AIDS and STDs' transmission. For instance, a study on sub-Saharan countries suggests that the morbidity due to HIV/AIDS among the

female sexual workers not using condoms is significantly higher than among the others (Morison et al., 2001). Other studies on Asian countries and others areas where HIV infections have developed quickly, indicate similar results (Mills et al., 1998). Therefore, a high prevalence of unprotected commercial sex among an increasing number of involuntary male bachelors in China is likely to accelerate HIV/AIDS and STDs' transmission, with a significant impact on public health.

On Commercial Sex, Condom Use and Associated Factors

The prevalence of commercial sex as estimated in the relevant literature varies much across regions and population groups. Available research indicates that it ranges from 2% to 46% in other countries and areas including United States, Thailand, Africa and Latin America, and from 4% to 32% in urban China. It was also indicated that factors such as knowledge of HIV/AIDS and STDs, attitudes, age, marital status, living arrangements, income and educational levels are correlated with the likelihood to resort to commercial sex (Celentano & Nelson, 1993; Parrado & Flippen, et al., 2004; W.D. Cai et al., 2006; Carael & Slaymaker, et al., 2006; Wang & Li et al., 2007; Garenne, 2008; B. Li et al., 2008; B. Wen et al., 2012).

Condom use rate among people experiencing commercial sex also varies much across countries and regions, but these variations depend partly on the legal status of prostitution. In Nevada where prostitution is legal, for instance, sex workers systematically use condom as it is a legal prescription. But in Zimbabwe, where prostitution is illegal, only 44% of male clients and 45% of sex workers report using condom when having commercial sex (Wilson et al., 1989; Albert & Warner, et al.,

1995). Relevant literature indicates that the condom use rate when having commercial sex is even lower in China, ranging from 7.5% to 36% (Liu B., 2007; Li B. et al., 2008; Wen B. et al., 2012). As for the resort to commercial sex itself, condom use when experiencing commercial sex is also correlated with various factors including knowledge of HIV/AIDS and STDs, and income and educational levels (Morris & Pramualratana, et al., 1995; Ford & Wirawan, et al., 1996; Zuo Q. et al., 2003; Lau & Tang, et al., 2003; Wen B. et al., 2012; Liu B. et al., 2007).

STUDY DESIGN

Survey and Data

The data used in this study is from a survey entitled "Reproductive health and family life of involuntary male bachelors in rural China" conducted in a rural district (called JC district in this study) of CH city in Anhui province in 2008. This county was selected for two major reasons: firstly because, due to the traditional patriarchal system, Confucian culture and son preference are still very prevalent in this area, sex ratio at birth is very imbalanced. Secondly, because the county is representative of rural China's social and demographic situation (Attané et al. 2013).

As 28 year-old is an important threshold for rural men as beyond it, their chance to get married is apparently less than younger men(Yang et al., 2012a, 2012b), the samples in this survey are defined as "the rural men aged above 28". The survey sample was selected randomly from the family planning administration registers in several villages attached administratively to the JC County. The county was divided into three zones, in which six townships or villages were selected, two in each zone.

Four administrative villages were then randomly selected in each of these townships or villages, i.e. a total of 24 villages. Finally, 15 single men were drawn in each village in order to obtain a total of 360 single men aged 28 years or above were selected initially. Then, as the survey was purpose-designed to study the characteristics of single men, so they were intentionally overrepresented in the sample: a ratio of 3:2 was applied to select the sample of married from that of singles. In total, 665 men were approached to complete the questionnaire. 38 of these withdrew during the process (a dropout rate of 5.7%). Six other questionnaires (0.9%) were withdrawn from the survey because they had been filled too quickly (in less than 20 minutes), which left a total of 621 usable questionnaires (93.4% of the initial sample), of whom 44.6% (277) are married and 55.4% (344) are single.

To guarantee anonymity to respondents and allow them to feel free in their responses, the CAPI (Computer-assisted personal interviewing) method was used. However, an interviewer was present to give technical assistance to the respondent when necessary, but sat in front of him so that he could not see the computer screen. Before starting the process, an interviewer read to each respondent the regulations concerning privacy protection, and informed on the possibility to withdraw at any time. In cases where the respondent was illiterate (38 cases) or had a low educational level, with the consent of those illiterate respondents, the interviewer read the questions, explained how to answer and helped them complete the survey.

Measurements

In most existing research, commercial sex and condom use are measured by

calculating the behaviour frequency within a time frame (e.g. the 12 months preceding the survey), and only few of them adopt the likelihood at the first or the last sexual intercourses as a measurement criteria (Carael & Slaymaker, et al., 2006; Parrado & Flippen, et al., 2004; Garenne, 2008). Considering that the involuntary male bachelors surveyed have a much lesser access to sexual activity than the married (Attané et al. 2013; Li et al. 2010), so the time frame criterion is not fully satisfying. On the contrary, the first sexual intercourse, which occurs only once in lifetime, and the last sexual intercourse, which is the most recent one, are well likely to be reminded by a majority of men (Wellings et al., 2001). In addition, questions about risky sexual behaviour within a given partnered-sex intercourse (i.e. the first and the most recent ones) are key variables for modelling population patterns of HIV/AIDS and STDs' transmission (Anderson, Wilson, Doll, Jones & Barker, et al. 1999; Darroch, Landry & Oslak,et al. 1999; Calazans, Araujo & Venturi et al., 2005). Therefore, four key variables, which have also proved to be reliable and valid in a pilot survey[1], were designed in the present study: "Commercial sex at the first sexual intercourse", "Commercial sex at the last sexual intercourse", "Condom use at the first sexual intercourse" and "Condom use at the last sexual intercourse", and measured by two questions including two categories each.

As suggested in existing research, attitude regarding sexuality should be

[1]The Institute for Population and Development Studies, Xi'an Jiaotong University conducted a pilot survey in YC district, LH city of Henan Province in 2007. This survey finally got data from in-depth interviews with 22 involuntary male bachelors, 12 members of these bachelors' family, 3 group discussions with community administrators and villagers and 119 valid questionnaires of bachelors.

measured by using categorical variables (Kerstin, Michael & Peter, 2003; Garenne, 2008). Therefore, in the present study, the ordinal variable on "attitude toward commercial sex" is measured by using a five-point item ranging from "1=totally unacceptable" to "5=totally acceptable". Knowledge on HIV/AIDS and STDs is measured with scores obtained from the relevant questions inspired from existing research and have proved to be valid and reliable (Wen B. et al., 2012; Zuo Q. et al., 2003). In our survey, Cronbach's alpha for HIV/AIDS scale is 0.75, 0.78 for STDs scale. The higher the scores, the better the level of knowledge about HIV/AIDS and STDs.

Beside, the variables describing socio-economic and individual characteristics such as "Marital status" and "Age" are included in the model, and are designed to reflect the characteristics of the target group. Considering the relationship between sexual behaviour and marital status, "Marital status" was measured by using the following two categories: "0=Unmarried, divorced or widowed" and "1=married or cohabitating with a partner". As explained above, twenty-eight years old is considered as a threshold age for male marriage, after which chances of marrying are significantly reduced (Li and Li 2008). The age of 35 year-old is another important threshold for rural men, beyond which chances to get married are almost zero (Yang et al., 2012a, 2012b). We therefore measured "Age" by using the two following categories: "0=28-35 years old" and "1=older than 35 years old".

Other socio-economic variables such as "Educational level" and "Monthly personal income" have also proved to be associated with the likelihood to experience

commercial sex and condom use behaviour (Celentano & Nelson, et al., 1993; Parrado & Flippen, et al., 2004; B. Liu et al., 2007; Garenne2008). They were therefore included in the present study.

The basic information on the above-described variables is presented in Table 1.

Table 1 here.

Analysis Strategies

In order to describe the characteristics of the resort to commercial sex and condom use among the unmarried men in a context of reduced availability of female sexual partners within marriage, this study has adopted the crosstab and independent sample t test methods to compare the prevalence of commercial sex at the first and the last sexual intercourses and condom use rate at the first and last sexual intercourses between different groups.

In order to determine the factors associated with commercial sex experiences, this study is based on two groups of models with respectively “first commercial sex experience” and “last commercial sex experience” used as the dependent variables, “attitudes toward commercial sex”, “knowledge of HIV/AIDS”, “knowledge of STDs” used as the independent variables, and “marital status” “age”, “education” and “monthly personal income” used as the control variables.

According to the same principle, this study is based on two other groups of models in order to determine the relationship between commercial sex experience and condom use. In these models, “condom use at the first sexual intercourse” and “condom use at the last sexual intercourse” were used as the independent variables,

“knowledge of HIV/AIDS”, “knowledge of STDs” as the independent variables, and “commercial sex at the first/last sexual intercourse” “marital status”, “age”, “education” and “monthly personal income” as the control variables.

There are about 24.5% of men in the total sample who reported that they never had any sexual intercourse and then skipped and did not answer the items on commercial sex, meanwhile the non response rates on commercial sex items are about 15%, therefore the missing data on items about commercial sex experience both at the first and the last sexual intercourses reaches about 40%. However, as explained by Hua (2012), the missing data on the binary variable with the percentage below 40% is appropriately treated with pairwise deletion. Therefore, we adopted pairwise deletion method to treat the missing data on the items about commercial sex.

The block regression models described above give a better description of the different roles played by the dependent and control variables than a single multivariate regression. In this case, the odds ratios of the dependent variables (when control variables are not included) indicate a rough impact of the dependent variables on the independent variable. But when new control variables are included, the adjusted odds ratios of the dependent variables indicate a net impact of the dependent variables on the independent variable. Such an analytical strategy is commonly adopted in sociological studies (see for instance: Selim, Fincke, Ren, Lee, Rogers, Miller, Skinner, Linzer & Kazis, 2004).

RESULTS

Prevalence of Commercial Sex

The prevalence of commercial sex experience at the first and last sexual intercourses, differences in behaviours between unmarried and married men and their respective characteristics are presented in table 2. First, the prevalence of commercial sex experience at the first and last sexual intercourse among unmarried men is significantly higher than the married. Second, knowledge of STDs is significantly higher among the unmarried men who reported commercial sex at their last sexual intercourse than among those who did not reported such an experience. In addition, among the married men both at their first and their last sexual intercourse, the mean values of attitudes toward commercial sex are higher among those who reported a commercial sex experience than among those who did not,

Table 2 here

Significant differences are also reported between married and unmarried men in condom use rate both at their first and last sexual intercourse (table 3), the condom use rate at the first sexual intercourse being significantly lower among unmarried men than among the married. However, the unmarried men who used condom at their first sexual intercourse obtain significantly higher scores for knowledge of HIV/AIDS and STDs than those who did not. In addition, the condom use rate is significantly higher among the younger unmarried men (aged 28-35 years old) than among the older (aged 35 and above); a higher comdom use rate is also observed among the wealthier ones (with a monthly personal income above 1000 Yuan), as compared to the poorer (with

a monthly personal income of 1000 Yuan and below). It is also suggested that the mean scores obtained for knowledge of HIV/AIDS and STDs by the unmarried men who used condom at their last sexual intercourse are significantly higher than among those who did not use condom. The condom use rate is also significantly higher among the younger unmarried men (aged 28-35) than among the older (aged 35 or older),

Similar relationships are observed among married men, with significantly higher scores of knowledge of STDs obtained among those who used a condom at their first sexual intercourse than among the others, condom use rate being still higher among wealthier than the poorer. Married men who reported at least one commercial sex experience are also more likely to use a condom at their last sexual intercourse. Finally, the scores obtained for their knowledge of STDs is significantly higher than among those who did not use condom, and the condom use rate is significantly greater among the younger married men (aged 28-35) than among those aged 35 or above.

Table 3 here

Factors Associated with Commercial Sex

The regression results of the factors associated with behaviours at the first and last commercial sexual intercourse are presented in Tables 4.

In models A1-A2, “attitudes toward commercial sex”, “knowledge of HIV/AIDS” and “knowledge of STDs” are not strongly associated with commercial sex experience, no matter if the control variables are included or not. Among the control variables, only “marital status” is strongly associated with “commercial sex”,

meaning that unmarried men are more likely to engage in commercial sex at their first sexual intercourse than the married.

In models B1-B2, “attitudes toward commercial sex”, “knowledge of HIV/AIDS”, and “Knowledge of STDs” are not strongly associated with commercial sex, no matter if the control variables are included or not. Among the control variables, “marital status” and “monthly personal income” are strongly associated with commercial sex at the last sexual intercourse, meaning that unmarried men are more likely to engage in commercial sex at their last sexual intercourse than the married, and that the men with a monthly personal income higher than 1000 Yuan are more likely to engage in commercial sex at their last sexual intercourse than those with monthly personal income 1000 Yuan and below.

When the independent and control variables are integrated step by step into the regression models, the value of Cox & Snell R^2 and Nagelkerke R^2 become higher, indicating an increase in the explanatory power of the models.

Table 4 here

Relationship between Commercial Sex and Condom Use

The factors associated with condom use at the first and last sexual intercourse are presented in Table 5.

In models C1-C2, “knowledge of STDs” is strongly associated with condom use at the first sexual intercourse while “knowledge of HIV/AIDS” is not, no matter if the control variables are included or not, meaning that men with higher scores for knowledge of STDs are more likely to use condom at their first sexual intercourse.

Regarding the influence of the control variables, “marital status”, “age” and “monthly personal income” are indicated to be strongly associated with condom use, meaning that unmarried men are more likely than the married to use condom at their first sexual intercourse; the younger men (aged 28-35) are more likely to use condom at their first sexual intercourse than the older (aged 35 or older), as well as the wealthier ones (with a monthly personal income higher than 1000 Yuan), as compared to the poorer ones; “education” however, has no significant impact on condom use.

In models D1-D2, the variable “knowledge of HIV/AIDS” has no significant impact on condom use, while “knowledge of STDs” is strongly associated with it, no matter if the control variables included or not, meaning that men with higher scores for knowledge of STDs are more likely to use condom at their last sexual intercourse. When the control variables are included in the model, the impact of “knowledge of STDs” becomes non-significant, while “marital status” and “age” are strongly associated with condom use. This means that the impact of “knowledge of STDs” on condom use is adjusted by “marital status” and “age”, with unmarried and younger men being more likely than the married and the older to use condom at their last sexual intercourse.

When the independent and control variables are integrated step by step into the regression models, the value of Cox & Snell R2 and Nagelkerke R2 becomes higher, indicating an increase in the explanatory power of the models.

Table 5 here

DISCUSSIONS AND CONCLUSIONS

Marriage Squeeze and the Prevalence of Commercial Sex

The above analyses indicate that unmarried men report a prevalence of commercial sex experience which is significantly higher than that of the married, both at their first and last sexual intercourse (with percentages of 10.4% and 1.4%, 13.3% and 1.9% respectively). Overall, our results are rather consistent with those from other existing research conducted in China (ranging from 4-10%) (W.D., Cai et al., 2006; Wang & Li et al., 2007; B. Li et al., 2008; B. Wen et al., 2012). They are not completely comparable however, as the men surveyed here do not belong to strictly similar socio-economic groups (most of the available studies for China focus on urban migrants, while the present survey targeted only rural men). It is noteworthy however that variations in the likelihood to resort to commercial sex across different groups have been evidenced by other existing studies focusing on other countries in the world (Parrado & Flippen, et al., 2004; Carael & Slaymaker, et al., 2006; Garenne, 2008), as suggested above in the literature review.

The results from our regression analysis indicate that marital status is almost the only significant variable for predicting the experience of commercial sex both at the first and last sexual intercourse (actually, the explanatory power of the models is greatly improved when marital status is included, as shown above). This means that in a context of male marriage squeeze, which is translating into a reduced availability of female sexual partners within marriage, commercial sex is suggested to be one of the important ways for the involuntary bachelors to meet their sexual needs (Attané et al.

2013). However, the unmarried men's likelihood to resort to commercial sex is not uniform and depends mainly on their income level: the monthly personal income is actually a strong determinant of the likelihood of experiencing commercial sex, the higher it is, the higher such a likelihood – this result being consistent with findings from other existing research (Celentano & Nelson, 1993； Parrado & Flippen, et al., 2004; B. Liu et al., 2007).

There is a conclusion obtained from above analyses that in the future, an increase in the prevalence of commercial sex could go in parallel with the increasing shortage of women in the marriage market, resort to commercial sex acting actually as a compensation practice. Such a trend could however have various undesirable effects both on the preservation of human rights and the fight against human trafficking on the side of the sex-workers, and also on public health.

Commercial Sex, Condom Use and Public Health

Actually, at their first and last sexual intercourse, unmarried and married men reported condom use rate below 20%, which is lower than levels observed in other existing research (Wilson & Chiroro, et al., 1989; B. Liu et al., 2007; B. Li et al., 2008; B. Wen et al., 2012). The condom use rate is even lower among the unmarried men at their first sexual intercourse, at only 7.8%, half the level observed among the married: 13.4%. The gap persists at the last sexual intercourse, but is narrower: 12.8% and 16.2% respectively, suggesting that involuntary male bachelors are facing higher risks when having sex. That being said, this situation may pose various challenges in terms of public health, and especially in terms of HIV/AIDS and STDs transmission, as the

vast majority of commercial sex intercourses experienced by the involuntary male bachelors are still unprotected (see Table 3 above), and with the lower levels of knowledge of HIV/AIDS and STDs.

Our regression analysis also indicates that condom use is strongly associated with knowledge of STDs, in particular among unmarried men. However, given the great difference in knowledge of STDs between unmarried and married men, the marital status has an adjusted impact on the relationship between "knowledge of STDs" and "condom use". Although the descriptive analysis indicates that the knowledge of STDs has a more sensitive impact on condom use among unmarried men, those with higher scores of knowledge of STDs are therefore more likely to use condom, and this is even more apparent at their last sexual intercourse.

Our descriptive analysis indicates that the married men who reported commercial sex experience are more likely to use condom both at their first and last sexual intercourse than those who did not reported commercial sex – but such a relationship does not exist for unmarried men. This difference can be explained by the fact that married men, who are supposed to have a regular sexual partner (namely their spouse) are eager to protect her from HIV/AIDS and STDs' transmission – a similar phenomena is also evidenced by other existing research (Vanwesenbeeck, De Graaf & Van Zessen, 1993).

Both descriptive and regression analyses indicate that the younger men and those with a higher educational level (who are expected to have a higher level of knowledge of HIV/AIDS and STDs) are more likely to use condom, which is consistent with

situations observed elsewhere (Morris & Pramualratana, et al., 1995; B. Liu et al., 2007). It is noteworthy however that condom use is strongly dependent on income level, the men with a higher monthly income being more likely to use condom – this being also evidenced in the latter regression analysis and again consistent with findings from other existing research (Morris & Pramualratana, et al., 1995; B. Liu et al., 2007). Actually, the comparatively high cost of one box of condoms (about 15-30 Yuan) might actually be a burden to many rural men with poor socio-economic resources, impeding condom use. This is an important issue to be considered for addressing HIV/AIDS and STDs' transmission in China.

There is another conclusion drawn from above analyses: In comparison to the higher prevalence of commercial sex, the condom use rate among unmarried men is relatively lower, which lead to a high risk in commercial sex behaviours of involuntary male bachelors, may pose potential risks on public health, especially on HIV/AIDS and STDs transmission; and the condom use rate among forced male bachelors is strongly associated with their knowledge of STDs, age, education and monthly income.

LIMITATIONS AND FUTURE WORK

A first limitation of this study is about the sample and data. Because the issues addressed concern personal privacy, the number of missing data is relatively high, although the CAPI method was used. E.g. the missing data on items of commercial sex experience both at the first and the last sexual intercourse is about 40% (considering the skip response, the actual missing data is about 15%), which might

influence the stability of the results.

A second limitation is about the survey itself, as it was not designed to address specifically the issue of commercial sex among the involuntary male bachelors in rural China. Actually, the limited number of questions about commercial sex asked in the questionnaire and the limited scope they cover only give quite general information on behaviours associated with commercial sex.

A third limitation is about measurements. This present study only considers the first and the last sexual intercourses for measuring commercial sex experiences and condom use, although most similar existing research commonly adopts the frequency within a time frame as the measurement, which makes the results from this present study partly incomparable.

A future study should be to conduct a survey among the rural-urban migrants on a much bigger sample, as well as to conduct in-depth interviews among involuntary male bachelors who reported commercial sex experience.

References

Albert, A. E., D. L. Warner, et al. (1995). "Condom use among female commercial sex workers in Nevada's legal brothels." American Journal of Public Health 85(11): 1514-1520.

Anderson, JE. Wilson, R. Doll, L., Jones T. S & Barker P. (1999). Condom Use and HIV Risk Behaviors among U.S. Adults: Data from a National Survey, Family Planning Perspectives 31(1):24-28

Ann O, William WD. (1998). Social cultural and political aspects, AIDS, 12 (suppl A) :189 - 190.

Attané I. (2013) The demographic masculinisation of China. Hoping for a son… Dordrecht: Springer [forthcoming].

Attané I., Zhang Q.L., Li S.Z. & Yang X.Y. (2013) “How bachelorhood affects men's sexuality in a context of female shortage: some evidence from an exploratory survey in rural Anhui, China”, The China Quarterly [forthcoming in September issue]

Cai W.D., Tan G.J. & Luo X.R. (2006). A survey on knowledge and behaviors of AIDS among migrants in Shenzhen City, Journal of Public Health and Preventive Medicine (in Chinese), 17(6):103-104

Calazans, G.; Araujo, T.W.; Venturi, G.; França, I.J. (2005). Factors associated with condom use among youth aged 15-24 years in Brazil in 2003, AIDS, 19 (p):42-50

Carael, M., E. Slaymaker, et al. (2006). Clients of sex workers in different regions of the world: hard to count. Sexually Transmitted Infections, 82(3): 26-33.

Celentano, D. D., K. E. Nelson, et al. (1993). Behavioral and sociodemographic risks for frequent visits to commercial sex workers among northern Thai men. AIDS (London, England)

7(12): 1647.

Chen, Y.H.& Ullrich, M. (2001). Chinese male overpopulation-scale, structure, influence factors and development trends analysis, Marketing and Population Analysis (in Chinese), 3:1-11.

Darroch J.E., Landry D.J.& Oslak S. (1999). Age Differences Between Sexual Partners in the United States, Family Planning Perspectives 31(4):160-167

Das Gupta, M. & Li, S. Gender bias in China, South Korea and India 1920~1990: The effects of war, famine, and fertility decline[J], Development and Change 1999, 30(3),pp: 619~652.

Ford, K., D. N. Wirawan, et al. (1996). "Behavioral interventions for reduction of sexually transmitted disease/HIV transmission among female commercial sex workers and clients in Bali, Indonesia." AIDS, 10(2):213-222

Garenne, P. M. L. a. M. "Clients of Commercial Sex Workers in Zambia: Prevalence, Frequency, and Risk Factors." (The Open Demography Journal, 2008, 1, 1-10).

Guo, Z.G., Deng, G.S (2000). Study on marriage squeeze in China, Marketing and Population Analysis (in Chinese), 3: 1-16.

Hua L.L. Simulated Comparison of Different Treat Methods on Missing Data. A Thesis submitted to Zhengzhou University for Master Degree (in Chinese), 2012

Kerstin E. E. S., Michael P.C. & Peter A.V. (2003). Methodological Challenges in Research on Sexual Risk Behavior: I. Item Content, Scaling, and Data Analytical Options, Annual Behavioral Medicine, 26(2): 76–103

Lau, J. T. F., A. S. Y. Tang, et al. (2003). "The relationship between condom use, sexually

transmitted diseases, and location of commercial sex transaction among male Hong Kong clients." Aids 17(1): 105.

Li Shuzhuo, Zhang Qunlin, Yang Xueyan and Attané I. (2010), “Male Singlehood, Poverty and Sexuality in Rural China: An Exploratory Survey”, ***Population-E***, 65(4), 679-694

Li B., Wang Y., Zhang F., Gao B., Yong L.Z. & Wei L.Q. (2008). A Study on extramarital sexual intercourse and condom use related factors among floating population, Chinese Journal of Public Health (in Chinese), 24(7): 791-792

Li Z. & Wei S.Z.(1986). Gradient marriage problem, The Contemporary Youth Studies (in Chinese) , (9):21-28

Li, S.Z. Jiang, Q.B. & Feldman, W. M. (2006). Gender preference and social development.(in Chinese), Beijing: China Social Sciences Literature Press.

Li, S. Z., & Li, Y. (2008). The pressures and strategies of male bachelors in rural China: An exploratory study in YC of Henan Province. Youth Study, 11, 15-26. (In Chinese)

Li, Y.H. (1998). *The subculture of same-sex sexuality*, Beijing: China Today Press (In Chinese).

Liu B., Lv Y.P., Wan L.S. & Ren X.L. (2007). Analysis on influential factors of extramarital, commercial sexual behaviors and condom use of STD patients in Jiangxi Province, Contemporary Preventive Medicine (in Chinese), 34(14): 2606-2608

Liu, D.L. & Lu, L.G. (2005). *The Study on Chinese Same-sex sexuality (in Chinese),* Beijing: Chinese Society Press.

McMillan, J, Sex, Science and Morality in China (New York: Routledge, 2006), 191 p.

Merli, M. Giovanna & Hertog, Sara, Masculine sex ratios, population age structure and the potential spread of HIV in China. Demography Research, 2010 (22):63-94

Merli, M.G., Hertog, S., Wang, B., and Li, J. (2006). Modeling the spread of HIV/AIDS in China: The role of sexual transmission. Population Studies 60(1): 1-22.

Mills S, Saidel T, Bennett A , et al . (1998). HIV risk behavioral surveillance: a methodology for monitoring behavioral trends, AIDS, 12 :153 - 159.

Morison, L., H. A. Weiss, et al. (2001). "Commercial sex and the spread of HIV in four cities in sub-Saharan Africa." AIDS, 15(4): 61-69

Morris, M., A. Pramualratana, et al. (1995). "The relational determinants of condom use with commercial sex partners in Thailand." AIDS, 9(5):507-515

National Bureau of Statistics of China (2011). The main data for the sixth national population census, http://www.stats.gov.cn/zgrkpc/dlc/yw/t20110428_402722384.htm

Parrado, E. A., C. A. Flippen, et al. (2004). "Use of commercial sex workers among Hispanic migrants in North Carolina: implications for the spread of HIV." Perspectives on Sexual and Reproductive Health 36(4): 150-156.

Vanwesenbeeck I, De Graaf R, Van Zessen G, Straver CJ, Visser JH. Protection styles of prostitutes' clients: intentions, behavior, and considerations in relation to AIDS. Journal of Sex Educcation and Therapy. 1993, 19(2):79-92.

Wang, B., X. Li, et al. (2007). "HIV-related risk behaviors and history of sexually transmitted diseases among male migrants who patronize commercial sex in China." Sexually Transmitted Diseases 34(1): 1.

Wei Y., Jin X.Y. & Li S.Z. (2008) Stress and Coping Strategies in Families among

Forced Unmarried Men: Evidence from YC County in Rural Henan China, Population and Development, 5:2-13.

Wellings K, Nanchahal K, Macdowall W, McManus S, Erens B, Mercer CH, Johnson AM, Copas AJ, Korovessis C & Fenton KA, Field J.(2001).Sexual behavior in Britain: early heterosexual experience. Lancet, 358(9296):1843-50.

Wen B., Li Y.Y., Zhou Y., Wu J.Q & Zhao R. (2012). Commercial sexual behavior among migrants in Shenzhen city, Chinese Journal of Public Health (in Chinsese), 28 (3): 391-392

Wilson, D., P. Chiroro, et al. (1989). "Sex worker, client sex behaviour and condom use in Harare, Zimbabwe." AIDS care 1(3): 269-280

Xinqin Research Institute. (2008). The Chinese awareness of marriage, http://report.searchina.net.cn/art/report342.htm [2008-10-20/2011/07/05]

Yang XY, Attané I., Li SZ, Zhang QL (2012) Masturbation as a compensation for partnered-sex among enforced male bachelors in rural China — findings from a survey conducted in a context of a deficit of females. Journal of Men's Health, 9(4) 220-229.

Yang XY, Attané, I, Li SZ & Zhang QL, (2012a) On Same-sex Sexual Behaviors Among Male Bachelors in Rural China: Evidence From a Female Shortage Context, American Journal of Men’s Health, 6(2):108-119

Zuo Q., Shan G.L., He B., Zhang, K.L., Liu M.& Liu D.H. (2003) Analysis on the Correlation between Men' Commercial Sex Behavior Patterns and Their Personality., Health Psychology Journal (in Chinese), 11(5): 328-330

Table 1 Basic information of all Variables

Variables	Description	Frequency (Ratio) /Mean (S.D.)	Min /Max
Commercial sex at the first sexual intercourse??	No	366 (95.6%）	0/1
	Yes	17（4.4%）	
Condom use at the first sexual intercourse?	No	557（89.7%）	0/1
	Yes	64（10.3%）	
Commercial sex at the last sexual intercourse?	No	353（94.6%）	0/1
	Yes	20（5.4%）	
Condom use at the last sexual intercourse	No	532（85.7%）	0/1
	Yes	89（14.3%）	
Attitudes toward commercial sex	Five-point item ranging from “totally unacceptable” to “totally acceptable”	3.89（1.06）	1/5
Knowledge of HIV/AIDS	Five items	3.13（1.10）	1/5
Knowledge of STDs	Three items	2.56（0.78）	1/3
Marital Status	Unmarried	344(55.4%)	0/1
	Married	277(44.6%)	
Age	28-35	231（37.2%）	0/1
	Older than 35	390（62.8%）	
Education	Primary school and under	212（34.1%）	0/1
	High school and above	409（65.9%）	
Monthly personal income	1000 Yuan and below	390（62.8%）	0/1
	Higher than 1000 Yuan	231（37.2%）	

Table 2 Comparison of commercial sex experience between unmarried and married men

Commercial sex at the first sexual intercourse?	**Unmarried (Frequency +Ratio/ Mean+S.D.)**		**Married (Frequency +Ratio/ Mean+S.D.)**	
	No	Yes	No	Yes
	112（89.6%）	13（10.4%）	254（98.4%）	4（1.6%）
Chi^2 (Unmarried and married)	Chi^2=15.55***（p=0.000）			
Attitudes toward commercial sex	3.96（1.07）	4.08(1.04)	4.22(0.98)	5.0(0.00)
F test (if commercial sex)	F=0.01（p=0.93）		F=8.31**（p=0.004）	
Knowledge of HIV/AIDS	3.15(1.24)	3.17(1.27)	3.52(0.90)	3.75(0.96)
F test (if commercial sex)	F=0.11（P=0.74）		F=0.001（p=0.98）	
Knowledge of STDs	2.57(0.76)	2.77(0.60)	2.83(0.54)	3.00(0.00)
F test (if commercial sex)	F=3.77*（p=0.056）		F=1.98（p=0.16）	
Age: 28-35	50（90.9%）	5（9.1%）	93（96.9%）	3（3.1%）
Older than 35	62（88.6%）	8（11.4%）	161（99.4%）	1（0.6%）
Chi^2 (if commercial sex)	Chi^2=0.18（p=0.67）		Chi^2=2.48（p=0.12）	
Education: Primary school and under	50（94.3%）	3（5.7%）	31（100%）	0（0%）
High school and above	62（86.1%）	10（13.9%）	223（98.2%）	4（1.8%）
Chi^2 (if commercial sex)	Chi^2=2.22（p=0.14）		Chi^2=0.56（p=0.46）	
Monthly personal income: 1000 Yuan and below	67（90.5%）	7（9.5%）	121（98.4%）	2（1.6%）
Higher than 1000 Yuan	45（88.2%）	6（11.8%）	133（98.5%）	2（1.5%）
Chi^2 (if commercial sex)	Chi^2=0.17（p=0.68）		Chi^2=0.01（p=0.93）	

To be continued

Table 2 Comparison of commercial sex experience between unmarried and married men

Commercial sex at the last sexual intercourse?	**Unmarried (Frequency +Ratio/ Mean+S.D.)**		**Married (Frequency +Ratio/ Mean+S.D.)**	
	No	Yes	No	Yes
	98（86.7%）	15（13.3%）	255（98.1%）	5（1.9%）
Chi^2 (Unmarried and married)	Chi^2=20.001***（p=0.000）			
Attitudes toward commercial sex	65（89.0%）	8（11.0%）	213（99.1%）	2（0.9%）
F test (if commercial sex)	33（82.5%）	7（17.5%）	42（93.3%）	3（6.7%）
Knowledge of HIV/AIDS	Chi^2=0.96（p=0.33）		Chi^2=6.49*（p=0.011）	
F test (if commercial sex)	3.92（1.07）	4.07(1.22)	4.22(0.99)	4.80(0.45)
Knowledge of STDs	F=0.00（p=0.996）		F=3.86+（p=0.05）	
F test (if commercial sex)	3.13(1.28)	3.43(1.09)	3.51(0.90)	3.60(0.55)
Age: 28-35	F=0.55（P=0.45）		F=1.40（p=0.23）	
Older than 35	2.56(0.76)	2.93(0.26)	2.83(0.54)	3.00(0.00)
Chi^2 (if commercial sex)	F=21.92***（p=0.000）		F=2.47（p=0.11）	
Education: Primary school and under	46（88.5%）	6（11.5%）	94（96.9%）	3（3.1%）
High school and above	52（85.2%）	9（14.8 %）	161（98.8%）	2（1.2%）
Chi^2 (if commercial sex)	Chi^2=0.25（p=0.62）		Chi^2=1.12（p=0.29）	
Monthly personal income: 1000 Yuan and below	42（91.3%）	4（8.7%）	29（93.5%）	2（6.5%）
Higher than 1000 Yuan	56（84.6%）	11（73.3%）	226（98.7%）	3（1.3%）
Chi^2 (if commercial sex)	Chi^2=1.41（p=0.24）		Chi^2=3.83+（p=0.050）	
Chi^2 (Unmarried and married)	59（86.8%）	9（13.2%）	122（97.6%）	3（2.4%）
Attitudes toward commercial sex	39（86.7%）	6（13.3%）	133（98.5%）	2（1.5%）
F test (if commercial sex)	Chi^2=0.00（p=0.99）		Chi^2=0.29（p=0.59）	

Note: ＋p<0.1, *p<0.05, **p<0.01, ***p<0.001

Table 3 Comparison on condom use between unmarried and married men

Condom use at the first sexual intercourse?	**Unmarried (Frequency +Ratio/ Mean+S.D.)**		**Married (Frequency +Ratio/ Mean+S.D.)**	
	No	Yes	No	Yes
	317（92.2%）	27（7.8%）	240（86.6%）	37（13.4%）
Chi^2 Test (Unmarried and Married)	Chi^2=5.027*（p=0.025）			
Commercial sex at the first sexual intercourse: No	89（79.5%）	23（20.5%）	219（99.1%）	2（0.9%）
Yes	9（69.2%）	4（30.8%）	35（94.6%）	2（5.4%）
Chi^2 Test (If use condom)	Chi^2=0.072（p=0.40）		Chi^2=4.21*（p=0.04）	
Knowledge of HIV/AIDS	2.84（1.16）	3（0.93）	3.44（0.96）	3.47（0.92）
F test (if commercial sex)	F=4.04*（p=0.046）		F=0.08（p=0.78）	
Knowledge of STDs	2.35（0.87）	2.70（0.61）	2.77（0.62）	2.89（0.39）
F test (if commercial sex)	F=22.95***（p=0.000）		F=6.30*（p=0.013）	
Age: 28-35	110（85.3%）	19（14.7%）	86（84.3%）	16（15.7%）
Older than 35	207（96.3%）	8（3.7%）	154（88.0%）	21（12.0%）
Chi^2 (if commercial sex)	Chi^2=13.51***（p=0.000）		Chi^2=0.75（p=0.38）	
Education: Primary school and under	162（93.6%）	11（6.4%）	36（92.3%）	3（7.7%）
High school and above	155（90.6%）	16（9.4%）	204（85.7%）	34（14.3%）
Chi^2 (if commercial sex)	Chi^2=1.07（p=0.30）		Chi^2=1.26（p=0.26）	
Monthly personal income: 1000 Yuan and below	244（95.3%）	12（4.7%）	123（91.8%）	11（8.2%）
Higher than 1000 Yuan	73（83.0%）	15（17.0%）	117（81.8%）	26（18.2%）
Chi^2 (if commercial sex)	Chi^2=13.83***（p=0.000）		Chi^2=5.95*（p=0.015）	

To be continued

Table 3 Comparison on condom use between unmarried and married men

Condom use at the last sexual intercourse?		**Unmarried (Frequency +Ratio/ Mean+S.D.)**		**Married (Frequency +Ratio/ Mean+S.D.)**	
		No	Yes	No	Yes
		300（87.2%）	44（12.8%）	232（83.8%）	45（16.2%）
Chi^2 Test (Unmarried and Married)		Chi^2=1.49（p=0.22）			
Commercial sex at the last sexual intercourse:	No	65（66.3%）	33（33.7%）	213（83.5%）	42（16.5%）
	Yes	8（53.3%）	7（46.7%）	2（40.0%）	3（60.0%）
Chi^2 Test (If use condom)		Chi^2=0.96（p=0.33）		Chi^2=6.49*（p=0.011）	
Knowledge of HIV/AIDS		2.77（1.15）	3.34（0.99）	3.41（0.97）	3.63（0.82）
F test (if commercial sex)		t=-2.99**（p=0.003）		t=-1.37（p=0.17）	
Knowledge of STDs		2.32（0.88）	2.77（0.57）	2.76（0.62）	2.91（0.36）
F test (if commercial sex)		F=57.40***（p=0.000）		F=11.25**（p=0.001）	
Age:	28-35	98（76.0%）	31（24.0%）	78（76.5%）	24（23.5%）
	Older than 35	202（94.0%）	13（6.0%）	154（88.0%）	21（12.0%）
Chi^2 (if commercial sex)		Chi^2=23.38***（p=0.000）		Chi^2=6.30*（p=0.012）	
Education:	Primary school and under	161（93.1%）	12（6.9%）	36（92.3%）	3（7.7%）
	High school and above	139（81.3%）	32（18.7%）	196（82.4%）	42（17.6%）
Chi^2 (if commercial sex)		Chi^2=10.69**（p=0.001）		Chi^2=2.44（p=0.12）	
Monthly personal income:	1000 Yuan and below	238（93.0%）	18（7.0%）	118（88.1%）	16（11.9%）
	Higher than 1000 Yuan	62（70.5%）	26（29.5%）	114（79.7%）	29（20.3%）
Chi^2 (if commercial sex)		Chi^2=29.76***（p=0.000）		Chi^2=3.53（p=0.60）	

Note: ＋p<0.1, *p<0.05, **p<0.01, ***p<0.001

Table 4 Factors associated with commercial sex

Dependent variable: commercial sex at the first sexual intercourse (reference: no)	**Model A1**	**Model A2**
Attitudes toward commercial sex	1.10	1.16
Knowledge of HIV/AIDS	0.76	0.73
Knowledge of STDs	1.57	1.97
Marital Status (Reference: unmarried)		
Married		0.09**
Age (Reference: 28-35)		
Older than 35		1.34
Education (Reference: Primary school and under)		
High school and above		4.20+
Monthly personal income (Reference: 1000 Yuan and below)		
Higher than 1000 Yuan		0.88
2 Log Likelihood	129.37	110.73
Cox & Snell R^2	0.003	0.05
Nagelkerke R^2	0.008	0.18
Dependent variable: commercial sex at the last sexual intercourse (reference: no)	**Model B1**	**Model B2**
Attitudes toward commercial sex	1.02	1.14
Knowledge of HIV/AIDS	0.78	0.76
Knowledge of STDs	3.65	6.37+
Marital Status (Reference: unmarried)		
Married		0.09***
Age (Reference: 28-35)		
Older than 35		1.34
Education (Reference: Primary school and under)		
High school and above		1.19
Monthly personal income (Reference: 1000 Yuan and below)		
Higher than 1000 Yuan		0.001*
2 Log Likelihood	143.85	122.40
Cox & Snell R^2	0.009	0.069
Nagelkerke R^2	0.027	0.199

Note: ＋p<0.1, *p<0.05, **p<0.01, ***p<0.001

Table 5 Commercial sex and the condom use

Dependent variable: condom use at the first sexual intercourse (reference: no)	**Model C1**	**Model C2**
Knowledge of HIV/AIDS	0.87	0.72+
Knowledge of STDs	2.04*	1.45
Commercial sex at the first sexual intercourse (Reference: no)		
Yes		2.07
Marital Status (Reference: unmarried)		
Married		0.58
Age (Reference: 28-35)		
Older than 35		0.54*
Education (Reference: Primary school and under)		
High school and above		0.79
Monthly personal income (Reference: 1000 Yuan and below)		
Higher than 1000 Yuan		2.39*
2 Log Likelihood	357.51	286.62
Cox & Snell R^2	0.013	0.061
Nagelkerke R^2	0.027	0.104
Dependent variable: condom use at the last sexual intercourse (reference: no)	**Model D1**	**Model D2**
Knowledge of HIV/AIDS	1.15	0.93
Knowledge of STDs	2.12**	1.48
Commercial sex at the first sexual intercourse (Reference: no)		
Yes		2.16
Marital Status (Reference: unmarried)		
Married		0.33***
Age (Reference: 28-35)		
Older than 35		0.42***
Education (Reference: Primary school and under)		
High school and above		1.38
Monthly personal income (Reference: 1000 Yuan and below)		
Higher than 1000 Yuan		1.69+
2 Log Likelihood	454.41	333.61
Cox & Snell R^2	0.035	0.11
Nagelkerke R^2	0.062	0.17

Note: ＋p<0.1, *p<0.05, **p<0.01, ***p<0.001