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Female Condom Use in the Rural Sex Industry in China: Analysis of Users and Non-users at Post-Intervention Surveys

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Abstract

Changes in sexual attitudes and behaviors and resurgence of the sex industry in China have increased concerns about HIV/AIDS and STI epidemics. Little attention has been paid to the significant and growing sex industry in rural China. Promotion of barrier protection in this context is most effective to prevent STIs and pregnancy. The female condom (FC) is a barrier method that gives women more autonomy in its application, and has other advantages, but has been little promoted and tested in high risk contexts in China. The China/U.S. Women's Health Project was designed to promote FC use in addition to male condoms (MC) through outreach intervention conducted in sex-work establishments in rural and small urban towns in southern China, using the original prototype FC1. The study used quantitative and qualitative methods to document the pre-intervention context, intervention delivery process, and post-intervention outcomes of FC use. In this paper we compare post-intervention FC users and non-users in the first study sites, two rural towns in a single county in Hainan Province. Examination of cross-sectional 6-month and 12-month surveys indicated that, despite relatively high MC use, about one-third of the women in sex-work establishments in these rural towns had adopted FC at each post-intervention survey.

Compared to non-users, FC users were more likely to be freelance woman in boarding houses, more sexually experienced, married with children, more sexually active in the prior month, and more exposed to the intervention. The rural context hampered intervention implementation, particularly the significant limits in health and human resources available to manage prevention of HIV/STIs among women in the sex industry. These challenges highlight the need to better understand the context of the rural sex industry and capacity of local resources for better prevention efforts and the benefits that new prevention technologies like FC can offer.

Keywords

female condom; sex workers; China; HIV/AIDS prevention; establishment-based intervention

INTRODUCTION

Sexually transmitted infections (STI), including HIV/AIDS, have become major health concerns in China in recent decades resulting from tremendous changes in sexual attitudes and behaviors and resurgence of the sex industry (Pan, Huang, Shi et al., 2008; Liao & Li, 2009; Wang, Liao, Weeks et al., 2008; Wang, 2008). This creates potential for a massive upsurge of HIV through heterosexual contact. An estimated 740,000 people are living with HIV/AIDS in China, and 48,000 were newly infected in 2009, including 42.2% through heterosexual transmission (Press Office of China Ministry of Health, Nov. 30, 2009).

Little attention has been paid to the rapidly growing sex industry in rural areas of China (Fang, et al., 2008; Hong & Li, 2008; Liao, et al., 2006; Liao & Li, 2009; Wong & Wang, 2003), though it has significant potential to accelerate the national epidemics of STIs and HIV. Several factors contribute to this growing rural sex industry. The massive movement of Chinese from rural to urban areas and from one rural area to another in search of work has skyrocketed, creating opportunities, and in some cases necessity, for migrant labor participation in sex work (Chen, et al., 2009; Liao & Li, 2009). Many migrant laborers have limited education, are unskilled, and have extremely little knowledge of basic health; also, the rural areas offer few local resources for health and life necessities. Calls have increased for understanding the multiple, complex situations of rural sex workers and for development of multi-level interventions to offer them new options for prevention (Fang, et al., 2008; Liao, Schensul, & Wolffers, 2003).

One new technology is the female condom (FC), a barrier product that women can use to prevent HIV/STIs and pregnancy by inserting it into the vagina (Female Health Company, 2008). Use of FC still requires negotiation with male partners, but it gives women more autonomy to use compared to male condoms (MC). The FC has been proven acceptable to women of all ages and multiple situations around the world, including in rural contexts, and has been shown to decrease STI incidence and increase protected sex (Choi, Gregorich, Anderson, Grinstead, & Gomez, 2003; Mantell, et al., 2001; Thomsen, et al., 2006). Addition of the FC as an HIV/STI prevention option could begin to fill the gap in MC use and increase overall protected sex among women engaged in sex work. This gap can be quite substantial, as indicated by a recent report of 15 HIV/AIDS surveillance sites in China from 2004–2008, revealing wide variation among sex workers in reported consistent MC use in last month across the five years, from 2.8% to 95.6%, with the yearly median rate from 59.8% to 73.7% (Wang, et al., 2009).

Very limited research on FC acceptability has been conducted in China. One such study assessed short-term acceptability in terms of satisfaction of the Reality FC in a clinical reproductive health setting among married couples (Xu, et al., 1998). This study found that

in 30 couples who used it at least 10 times each, 90% found it acceptable for contraception, 87% found it easy to use, and over half (55%) preferred it to MC. Another study assessed improvement in FC knowledge, attitudes, and likes or dislikes of FC performance after introducing it to woman sex workers in a period of two months, but did not provide details on how many FCs delivered were actually used, nor the context of FC adoption (Cheng, et al., 2002). No known studies have assessed FC use in combination with MC use among sex workers in rural China.

The China/U.S. Women's Health Project aimed to promote FC use along with MC through an intervention that includes outreach to different types of sex-work establishments in four typical rural and small urban towns in southern China. The study assessed acceptability and adoption of FC after exposure to a community-based educational, skills-enhancement, and support intervention conducted in sex work establishments by local health educators and care workers (Weeks, et al., 2010). The study used quantitative and qualitative methods to document the pre-intervention context, the intervention delivery process, and outcomes of the program on FC use.

In this paper we compare demographic and risk characteristics and intervention exposure of FC users and non-users in our first study site, which included two rural towns in a single county in Hainan Province, China. Cross-sectional surveys were conducted at three time points, including baseline (pre-intervention) and post-intervention at 6 months and 12 months after baseline, with women working in sex work establishments in the two towns. We will explore factors related to FC use and their significance for developing prevention intervention programs with multiple prevention options for woman sex workers.

METHODS

Settings and Sample Baseline Characteristics

The two rural towns, referred to here as FS and YF towns to protect their identity and that of the study participants, are located within the same county approximately 40 miles from each other. Both towns have about 20,000 local residents and hundreds of migrant laborers from other parts of the province or other provinces. The amount and types of sex establishments have been changing since the sex industry began in these two towns in the early 1990's (Liao & Li, 2009; Liao, et al., 2003). During the period of our project, there were three types of establishments in FS: roadside restaurants, hair-dressing/massage parlors and boarding houses. The first two types were managed by a boss or owner; the third included single-room apartment houses rented by freelance sex workers. The women in boarding houses were older on average and more likely to be married than those in the other types of establishments. YF had only two types of establishments: hair-dressing/massage parlors and boarding houses.

When the China/U.S. Women's Health Project started in late 2007, there were 13 establishments in FS and 15 in YF. But two more hair-dressing parlors opened in YF during the period of the project. During our formative research period, the county level CDC and local township hospital outreach workers and our two project ethnographers enumerated women in sex work establishments in these towns. They estimated 90–100 women working in these establishments in each town during our study period.

Design of the Project

FC Intervention Design—We implemented a multi-level community intervention, primarily conducted in sex work establishments, to introduce and promote FC in combination with MC for HIV/STI prevention. The goal of the intervention was to change

the environment of risk and prevention within the sex work establishments to achieve community-wide increase in overall protected sex among women in the local sex industry. We used the original prototype FC1. The intervention was mainly accomplished through outreach to the establishments, with a project hotline and local community women's center as backup for individual women if they wanted one-on-one project support. The intervention teams in each town consisted of three part-time female health practitioners from the township hospitals and one full-time health educator hired by the project.

The intervention plan was to educate no less than 80% of women in the establishments. The local teams were asked to conduct outreach at least twice per week. After the initial eight weeks starting in June 2008, outreach continued to support FC users, educate women who came later, and deliver free MC and FC. Outreach staff filled out a structured form for every outreach encounter in each establishment and documented issues in the delivery process.

Sessions were usually conducted with a small group of women in the establishments. The intervention consisted of an educational session about FC using an illustrated flip-chart and a demonstration of FC insertion using a plastic model vagina or the hands. Women were encouraged to practice FC insertion in the model. Those who were willing to try it were given 3–5 FC. Staff encouraged them to practice insertion at least 1–2 times before trying it with a partner. Follow-up support sessions mainly focused on troubleshooting and delivering more FC for those who wanted to continue using it, or providing FC education to new women who wished to learn about and try it. Staff also delivered other educational materials and MC.

Continuous outreach to the establishments in both towns lasted about one year, divided into two 6-month phases. The intensity of the outreach was gradually reduced from the first phase (June to November, 2008) to the second (December, 2008 to May, 2009) (Weeks, et al., 2010).

Intervention Evaluation Design—This study was designed to test a multi-level intervention expected to change the community and establishment contexts, resulting in some degree of general FC adoption within the sex worker population in these towns and establishments, despite known migration and turn-over of individual sex workers (Weeks, Liao, Li, et al., 2010). Because of anticipated significant migration, the study was not designed to recruit and track a cohort of women. Further, all sex workers in the study towns were intended to receive the locally delivered establishment-based intervention; thus, the study design precluded recruitment of a non-intervention comparison group. Instead, we used the three time-point cross-sectional surveys to assess community-wide change across establishments. We hypothesized that several individual level (e.g., demographic, sexual risk, intervention exposure) and contextual factors (e.g., establishment type, town) would be associated with greater FC use among sex workers in these towns.

Survey sampling was designed to capture nearly the total target population (80% or more) in each town to measure FC use and assess which subsectors of the sex worker population chose to use the FC by the follow-up assessments. However, because a small number of establishments only allowed limited project access and some women refused participation because they were busy with clients or other activities, we recruited a convenience sample with quota characteristics corresponding to the women in the towns, and achieved the targeted sample size (minimum 75 per town).

Women working in the sex establishments who were at least 16 years of age and who self reported having been sexually active in the previous 30 days (regardless of partner type) were eligible to participate in the surveys at each time point. Participants were recruited in

their establishments and screened for eligibility. At the two follow-up surveys, we attempted to track which women had attended previous surveys by using unique ID codes and asking women to bring back a project card with their ID written on it. Women who could show a project ID card would be eligible for follow-up surveys even if they had not been sexually active in the last 30 days. Interviewers obtained informed consent from eligible volunteers, and performed a face to face interview using a structured questionnaire.

Survey participants received a non-cash gift incentive (e.g., silk scarf, health and beauty products) worth approximately 80 yuan (about \$12 US) for completing the survey. All study protocols received full review and approval by an Institutional Review Board (IRB) at both the U.S. and Beijing partnering institutions. Hainan staff and partners were trained and agreed to abide by protocols of the U.S. and Beijing IRBs.

Measures

The questionnaire measured: demographics and migration history; knowledge of STIs, HIV/AIDS, MC and FC; use of MC and FC (ever, prior 30 days); sexual relationships (partner types and number); protected and unprotected vaginal sex with primary and paying partner(s) (“guests”) in the last 30 days; history and current symptoms of STI, HIV status, reproductive and sexual history, contraceptive and preventive practices; and exposure to project intervention and sources of condoms.

“FC users” are respondents who reported: (a) knowing about FC, and (b) having used FC at least once; “FC non-users” are women who had heard of FC but had never used it during sexual intercourse. (Women who had never heard of FC were excluded from the analyses here.) The proportion of protected sex in the last 30 days is the reported number of a vaginal sex acts with either MC or FC divided by the total reported number of vaginal sex acts in that same period, which ranged from “100% protected” to “nil protected.” Only vaginal sex was measured in this study because prior research with this same population in these towns indicated extremely low reported anal sex (Liao, Schensul, Wolffers, 2003; Weeks, Liao, Abbott, et al., 2007).

Several measures assessed women’s longevity in the town and their potential and actual exposure to project intervention. “Having participated in a previous survey” at 6 months refers to participation in our baseline survey, and at 12 months, either the baseline or 6-month surveys, or both. Exposure to the intervention was measured by asking if they “know about the Women’s Health project,” (i.e., by name), and “know about the flip chart” (one intervention tool project outreach staff used) before the interviewer showed it to her. “Times participated in FC education” indicates how often she attended sessions outreach staff delivered at her establishment. This intervention “dose” is a cumulative count of the two phases of intervention; so if a woman stayed in the town longer, she might have more opportunities to participate than those who stayed a shorter time. Thus, at the 12-month survey, women who had been in town for the full year might have been exposed to intervention at any point over that period. “Learned FC insertion with the vaginal model” indicates the respondent practiced this after the staff demonstration during the educational session. “Practiced FC insertion” means a woman followed the intervention instructions to practice insertion on her own before use with a partner.

Data Analysis

To conduct our analysis for this paper, we combined data from the two rural towns at each of the three cross-sectional survey time points to compare FC users with non-users at follow-up. Because FC was not available in these towns prior to our study and no women had used it prior to our intervention, we report all women in the baseline sample as non-

users (Tables 1 and 2). Our primary outcome variable is FC use/non-use, as defined above, at the 6-month and 12-month time points with women who reported having ever heard of FC at that time point.

Statistical analyses were conducted to compare characteristics and exposure to intervention of the independent groups of FC users and non-users. We conducted analyses separately at each follow-up survey because the time point samples were not independent. Wilcoxon rank-sum test was used for non-normally distributed continuous variables, Student's *t*-test was used for normally distributed continuous variables, and χ^2 -test was used for variables measured in proportions. Statistical significance was accepted at $p < 0.05$, and all analyses were conducted using SAS 9.1 software (SAS Institute, Cary, NC, USA).

RESULTS

We included in our analyses 152 baseline surveys, 112 6-month (6-m) surveys, and 111 12-month (12-m) surveys from women in the two rural towns combined (Table 1). These samples included women who reported prior 30 day sex with either a primary or paying male partner. Follow-up samples only included women who had ever heard about FC.

Some overlap between the three cross-sectional samples was identified (reported in Table 3 below). At the 6-m survey, 49 participants (43.8%) reported having participated in the baseline survey. At the 12-m survey, 37 women (33.3%) indicated that they had participated in the baseline, 50 (45.0%) in the 6-m, and 22 (19.8%) in both.

Our baseline survey showed that, compared with women of YF ($n=77$), women in FS ($n=75$) were slightly younger (mean age 26 in FS, 27 in YF), included fewer ethnic minorities (47% in FS, 61% in YF), and were more sexually active (mean number of sex acts in the last 30 days: 18.9 in FS, 9.0 in YF) (not reported in the table). Though all women were recruited from establishments in which sex work takes place, the proportion of women who reported having had commercial clients in the prior 30 days was about 85% in FS, but only 60% in YF. At baseline, 54.7% of FS women reported using MC during every sexual encounter in the past 30 days, compared to 36.4% of YF women. Further, 25.3% of FS women but only 10.4% of YF women reported ever having heard of FC at baseline.

Participants in the 12-m survey were older (median age 25 at baseline and 6-m. vs. 28 at 12-m), slightly more were from boarding houses (32.2% at baseline; 29.9% at 6-m; 39.7% at 12-m), and fewer were single (59.9% at baseline; 61.7% at 6-m; 44.4% at 12-m). Among women included in these analyses who had heard of FC at follow-up, 35 (29.2%) at 6-m and 34 (30.4%) at 12-m had tried FC at least once, and 20 (16.7%) at 6-m and 19 (17.0%) at 12-m reported using FC more than once. (We excluded from analysis eight women at 6-m and one at 12-m who were previous survey participants who knew about FC but had no sexual activity in the prior 30 days.)

FC Users' and Non-users' Characteristics and Prior 30 Day Risks

As shown in Table 1, compared with non-users, FC users at both 6-m and 12-m were more likely to be freelance woman in boarding houses. The majority was married and had children. They had a slightly longer history of sexual activity and were more likely to have used a long-term contraceptive (IUD or tube ligation), though some of these differences had no statistical significance.

When current sexual relations and sexual activities were compared (Table 2), FC users reported more sex acts on average in the prior 30 days. The mean proportion of protected

sex was not significantly different between users and non-users, but fewer FC users reported never using protection during sex in the last 30 days.

FC Delivery and FC Use

Project staff across the two towns delivered 818 FC and more than 9,000 MC during the one-year intervention. Among FC users, 21 women at 6-m and 9 at 12-m reported using FC in the last 30 days. At 6-m, 21 women reported to have used 58 FC in the previous month, with a mean of 2.8 FC per user. These 21 women were from 14 different establishments across the two towns. On average, women used FC equally with paying (2.6 per user) and primary (2.4 per user) partners.

However, at the 12-m survey, the reported number of FC used in the last 30 days was 65, a mean of 7.3 per user by 9 women from 6 establishments across the two towns. Women used more FC with paying partners (8.6 per user) than primary partners (1.7 per user). Four women from one boarding house used nearly 74% of all FC with their paying partners at the 12-m survey, with one woman reporting having used 39 FC in the previous month. This suggests that over time, a small number of higher risk women used FC to fill a need for an additional barrier option with their paying partners.

FC Knowledge

We asked seven questions about preventive functions and use of FC. No significant differences were identified between users and non-users in the proportions of correct answers and the mean knowledge score at the 6-m survey, though users' median knowledge score was higher than non-users' (6.0 vs. 5.0, $p < 0.01$). However, the proportions of correct answers to the two questions specific for FC use, i.e. "does lubricant use help to reduce problems of FC use" and "should female condoms be used by a woman and male condoms by the man at the same time to achieve maximum protection," were much lower than those of other questions. Statistically significant differences in the proportion of correct answers to these two questions were identified between users and non-users at the 12-m survey (58.8% vs. 40.3% for the lubricant item; 38.2% vs. 16.9% for the dual condom item).

Outreach Activities and Participation

Staff completed 234 outreach encounters to the 30 establishments in the two towns during the two phases of intervention, with 103 in phase one (between baseline and 6-m surveys) and 131 in phase two (between 6-m and 12-m surveys). On average, the number of outreach encounters to each establishment was slightly higher in FS than in YF (median 9 times in FS, 7 in YF). Also, in FS outreach was conducted evenly across the two phases, but in YF more outreach was done in phase two (75 times, 64%) than in phase one (43 times, 36%).

Self-reported participation in project activities is shown in Table 3. As reported above, some women returned for follow-up surveys at each time point, indicating their longer stay in the town. This was most evident in FC users at the 12-m survey. Exposure to project intervention also varied by users and non-users. Though the vast majority of women were aware of the project, FC users were significantly more likely at both 6-m and 12-m to recognize the demonstration flip chart, have learned FC insertion in a model, and have practiced it before use according to project intervention instructions. At 12-m, FC users also reported having participated in FC education significantly more times than non-users.

DISCUSSION

These analyses show that about one-third of the women working in sex establishments in the two rural towns adopted FC after education and FC delivery. FC users were more likely to

be sexually experienced. In particular, several women reporting very high risk, namely, older sex workers living in the boarding houses and having unprotected sex with multiple paying partners, appeared to incorporate FC into their routine prevention practices when MC use was inadequate. This comparison also indicated that FC users were more likely to have been exposed to the project intervention in their sex work establishments, particularly by the 12-month assessments.

Overall, adoption of FC in these two towns did not seem to be very high, and FC users did not show a significantly higher proportion of protected sex in the prior 30 days, although they seemed less likely to be totally without protection than non-users. The relatively high level of MC use and other contextual factors might partially explain this finding. Our baseline survey indicated that over 70% of the women in FS used MC with paying partners every time in the last 30 days. This level of MC use was higher than that reported above from the 2004–2008 sentinel surveillance sites, which was as low as 13.9% in Hainan province in 2008 (Wang, et al., 2009). Despite this generally high rate of MC use among FS sex workers, many good MC users were not using condoms with their primary partners (boyfriends and husbands), and many women in both towns continue to be inconsistent MC users with paying partners, creating an important need for FC to further reduce the rates of overall unprotected sex. Comparison of the 6-month and 12-month surveys indicated that FC increasingly became a viable alternative barrier method particularly among the 30% who were not good MC users and who had higher rates of unprotected sex.

Data from this study compared with earlier studies in these same towns showed much improvement among sex workers in MC knowledge, attitudes and behavior and the existence of an enabling environment for MC use (Liao, et al., 2006; Liao & Li, 2009; Liao, et al., 2003; Weeks, et al., 2007). This introduction of FC, a challenging new product in itself, created a complicated situation for women in the two towns to choose from multiple prevention options. As a result, one year of intervention might not be enough for many women to adopt this new tool, and one year of evaluation may be insufficient to determine the role of FC or measure the effect of the intervention for increasing FC use. Dissemination and adoption of a very new and relatively complex prevention tool, which is unlike anything else these women have used before, may require a longer time to take hold.

The results of this study might indicate a paradox in FC promotion. Most of the repeat FC users tended to be women who were slightly older and with a family to support. If this is true, they are the women with less capacity to afford a costly prevention product like the FC. Thus, a comprehensive program to make FC available to those at highest risk or most likely to adopt the product must include ongoing provision of affordable or free FC to some potential users (Kaler, 2004; Mantell, et al., 2006; Vijayakumar, Mabude, Smit, Beksinska, & Lurie, 2006; Weeks, et al., 2010).

The rural context created important impediments to implementation of prevention intervention to deliver and support the adoption of FC among sex workers. Our project revealed the significant limits of health and human resources in these rural communities to manage prevention of HIV/STIs among women in the sex industry in general. Though many preventive projects had been implemented over the past 15 years, the local health providers who were trained and experienced from those projects have changed over time. Our project started for the most part with local intervention team members who were new to the work of conducting prevention intervention. Further, most of the local project intervention staff were young, and some were unmarried with no prior sexual or reproductive experience themselves. This was the first time for most of them to work in an intervention within the complicated context of sex-work establishments. Capacity building for efforts such as this intervention, and sustainability of that capacity, are challenges everywhere. These

challenges highlight the importance of and need for more research to better understand the characteristics and social dynamics of the rural sex industry in China and other developing countries, and the availability of local resources to build, implement, and maintain site-based prevention efforts in sex work establishments to promote FC and other woman-initiated prevention options.

This analysis of our first study sites has some limitations. Despite general differences in overall demographic and sex risk characteristics among sex workers in these two rural towns, to achieve a large enough sample size at each time point to compare FC users and non-users we combined the two towns' samples for our analyses here. The small sample size prohibited using a multi-variate model. Additionally, significant sex worker migration and the resulting need to use a cross-sectional design, despite inclusion of the near total local sex worker population at each assessment, limited our ability to test causal relationships among factors to explain FC use or non-use. However, the project's findings can contribute to the promotion of FC, along with MC, within the complex context of the sex industry in resource limited rural settings. This is greatly needed in China and other developing countries.

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References

- Chen X, Stanton B, Li X, Fang X, Lin D, Xiong Q. A comparison of health-risk behaviors of rural migrants with rural residents and urban residents in China. *American Journal of Health Behavior*. 2009; 33(1):15–25. [pii]. 10.5555/ajhb.2009.33.1.15 [PubMed: 18844517]
- Cheng YM, Li ZH, Wang XM, Wang SY, Hu LZ, Xie YY, Huang XL, Xu LF, Wu YZ, Zheng SL, Liu YL. Introductory study on female condom use among sex workers in China. *Contraception*. 2002; 66(3):179–185.10.1016/S0010-7824(02)00350-5 [PubMed: 12384207]
- Choi KH, Gregorich SE, Anderson K, Grinstead O, Gomez CA. Patterns and predictors of female condom use among ethnically diverse women attending family planning clinics. *Sexually Transmitted Diseases*. 2003; 30(1):91–98. 00007435-200301000-00018 [pii]. [PubMed: 12514450]
- Fang X, Li X, Yang H, Hong Y, Stanton B, Zhao R, Dong B, Liu W, Zhou Y, Liang S. Can variation in HIV/STD-related risk be explained by individual SES? Findings from female sex workers in a rural Chinese county. *Health Care for Women International*. 2008; 29(3):316–335.10.1080/07399330701738382 [PubMed: 18350430]
- Female Health Company. Working with the Female Condom. 2008. from <http://www.femalehealth.com/images/miniguide.pdf>
- Hong Y, Li X. Behavioral studies of female sex workers in China: A literature review and recommendation for future research. *AIDS & Behavior*. 2008; 12(4):623–636.10.1007/s10461-007-9287-7 [PubMed: 17694431]
- Kaler A. The future of female-controlled barrier methods for HIV prevention: Female condoms and lessons learned. *Culture, Health & Sexuality*. 2004; 6(6):501–516.10.1080/13691050410001701948
- Liao SS, He QY, Choi KH, Hudes ES, Liao JF, Wang XC, Liu M, Pan WL, Mandel J. Working to prevent HIV/STIs among women in the sex industry in a rural town of Hainan, China. *AIDS & Behavior*. 2006; 10:S35–S45.10.1007/s10461-006-9143-1 [PubMed: 16823627]
- Liao, SS.; Li, F. Changes of sex-industry in a rural town of South China: A follow-up observation in the past 10 years. In: Huang, Y.; Pan, S., editors. *Series of sexuality research in China*. Taiwan: Wan You Publishing House; 2009. p. 196-207.

- Liao SS, Schensul JJ, Wolffers I. Sex-related health risks and implications for interventions with hospitality women in Hainan, China. *AIDS Education & Prevention*. 2003; 15(2):109–121. [PubMed: 12739788]
- Mantell JE, Dworkin SL, Exner TM, Hoffman S, Smit JA, Susser I. The promises and limitations of female-initiated methods of HIV/STI protection. *Social Science & Medicine*. 2006; 63(8):1998–2009.10.1016/j.socscimed.2006.05.008 [PubMed: 16814912]
- Mantell JE, Hoffman JA, Weiss E, Adeokun L, Delano G, Jagha T, Exner TM, Stein ZA, Karim QA, Scheepers E, Atkins K, Weiss E. The acceptability of the female condom: Perspective of family planning providers in New York City, South Africa, and Nigeria. *Journal of Urban Health*. 2001; 78(4):658–668.10.1093/jurban/78.4.658 [PubMed: 11796812]
- Pan, S.; Huang, Q.; Shi, M.; Wang, X.; Mao, L.; Zhang, N.; Wang, D.; Du, J.; Wang, G.; Hou, R.; Huang, Y.; Jin, Y. The accomplishment of a sexuality revolution in China—Preliminary report of a comparison study between 2000 and 2006. Taiwan: Wan You Publishing House; 2008.
- Thomsen S, Ombidi W, Toroitich-Ruto C, Wong E, Tucker H, Homan R, Kingola N, Luchters S. A prospective study assessing the effects of introducing the female condom in a sex worker population in Mombasa, Kenya. *Sexually Transmitted Infections*. 2006; 82(5):397–402.10.1136/sti.2006.019992 [PubMed: 16854997]
- Vijayakumar G, Mabude Z, Smit J, Beksinska M, Lurie M. A review of female-condom effectiveness: Patterns of use and impact on protected sex acts and STI incidence. *International Journal of STD & AIDS*. 2006; 17(10):652–659. [PubMed: 17059633]
- Wang L, Ding Z, Ding G, Guo W, Wang L, Qin Q, Li D, Wang L, Yan R, Hei F. Data analysis of national HIV comprehensive surveillance sites among female sex workers from 2004 to 2008. *China Journal of Preventive Medicine*. 2009; 43:1009–1015.
- Wang Y, Liao SS, Weeks MR, Jiang JM, Abbott M, Zhou YJ, He B, Liu W, Mosack KE. Acceptability of hypothetical microbicides among women in sex establishments in rural areas in Southern China. *Sexually Transmitted Diseases*. 2008; 35(1):102–110.10.1097/OLQ.0b013e31814b8546 [PubMed: 17767093]
- Wang, Y. Unpublished dissertation. Peking Union Medical College/Chinese Academy of Medical Sciences; Beijing, China: 2008. HIV/AIDS related knowledge, attitudes and sexual behaviors among Li and Han youth in Hainan Province: The influence of mobility, gender and sex-related community context.
- Weeks MR, Hilario H, Li J, Coman E, Abbott M, Sylla LN, Corbett M, Dickson-Gomez J. Multi-level social influences on female condom use and adoption among urban United States women. *AIDS Patient Care & STDs*. 2010; 24(5):297–309.10.1089/apc.2009.0312 [PubMed: 20438372]
- Weeks MR, Liao SS, Abbott M, He B, Zhou YJ, Jiang JM, Liu W, Wang Y. Opportunities for woman-initiated HIV prevention methods among female sex workers in Southern China. *Journal of Sex Research*. 2007; 44(2):190–201. [PubMed: 17599276]
- Weeks MR, Liao SS, Li F, Li J, Dunn J, He B, He Q, Feng W, Wang Y. Challenges, strategies and lessons learned from a participatory community intervention study to promote female condoms among rural sex workers in southern China. *AIDS Education and Prevention*. 2010; 22(3):253–272.10.1521/aeap.2010.22.3.252
- Wong WCW, Wang Y. A qualitative study on HIV risk behaviors and medical needs of sex workers in a China/Myanmar border town. *AIDS Patient Care & STDs*. 2003; 17(8):417–422.10.1089/108729103322277439 [PubMed: 13678543]
- Xu JX, Leeper MA, Wu Y, Zhou XB, Xu SY, Chen T, Yang XL, Zhuang LQ. User acceptability of a female condom (Reality) in Shanghai. *Advances in Contraception*. 1998; 14(4):193–199. [PubMed: 10075288]

Comparison of Demographic Characteristics, Sexual and Reproductive Health History between FC Users and Non-users (Numbers (percents) except where indicated) ^a

Table 1

	Survey at Baseline		Survey at 6-m after Baseline		Survey at 12-m after Baseline	
	Total N=152	FC Users N=35	Non-users N=77	FC Users N=34	Non-users N=77	Non-users N=77
Mean age (median)	26.9 (25.0)	29.0 (26.0)	27.3 (25.0)	31.1 (31.5)	29.1 (27.0)	
Age range	16 – 50	17 – 43	17 – 48	17 – 43	17 – 48	
Never married	91 (59.9)	16 (45.7)	48 (62.3)	10 (29.4) *	39 (50.6) *	
Education above primary school	84 (55.3)	22 (62.9)	46 (59.7)	21 (61.8)	56 (72.7)	
Han ethnicity	70 (46.1)	21 (60.0)	42 (54.5)	23 (67.6)	46 (59.7)	
From FS town	75 (49.3)	20 (57.1)	40 (51.9)	19 (55.9)	41 (53.2)	
From YF town	77 (50.6)	15 (42.9)	37 (48.1)	15 (44.1)	36 (46.8)	
From boarding houses	49 (32.2)	17 (48.6) *	21 (27.3) *	21 (61.8) **	26 (33.8) **	
Sexual and reproductive history:						
Mean age at first sex act (range)	18.7 (13 – 25)	18.4 (14 – 23)	18.9 (13 – 23)	18.8 (12 – 23)	18.8 (16 – 24)	
Median years sexually active (range)	8.2 (<1 – 27)	8.0 (1.0 – 24)	6.0 (<1 – 30)	15.0 (<1 – 26)	8.0 (1.0–25)	
Median age initiated sex work (range)	24.2 (14 – 40)	24.0 (16 – 38)	23.0 (16 – 40)	29.0 (17 – 39)	26.0 (16 – 45)	
Median years of sex work (range)	2.8 (<1 – 14)	2.5 (<1 – 15)	2.0 (<1 – 13)	3.0 (<1 – 16)	2.0 (<1 – 14)	
Never pregnant	51 (33.6)	9 (25.7)	27 (35.1)	5 (14.7)	19 (24.7)	
Ever had an abortion	31 (20.4)	15 (42.9)	35 (45.4)	19 (55.9)	37 (48.1)	
Never had a child	47 (31.0)	16 (45.7)	48 (62.3)	10 (29.4) *	40 (51.9) *	
Ever used a male condom	138 (90.8)	35 (100)	74 (96.1)	34 (100.0)	74 (96.1)	
Sterilized	28 (18.4)	11 (31.4) *	11 (14.3) *	9 (26.5)	12 (15.6)	
Ever used IUD	46 (30.3)	14 (40.0)	26 (33.8)	20 (58.8)	30 (39.0)	

^aWomen in the study who had sex with persons who were neither primary nor paying partners were excluded from these analyses.

* p<0.05

** p<0.01

Table 2

Sexual Relations and Activities in the Past 30 Days (Numbers (percents) except where indicated) ^a

	Survey at Baseline		Survey at 6-m after Baseline		Survey at 12-m after Baseline	
	Total N=152	FC Users N=35	Non-users N=77	FC Users N=34	Non-users N=77	Non-users N=77
Had commercial sex partners in last 30 days	111 (73.0)	31 (88.6)	57 (74.0)	28 (82.4)	58 (75.3)	
Had an emotional (primary) partner in last 30 days	89 (58.6)	19 (54.3)	44 (57.2)	22 (64.7)	45 (58.5)	
Mean sex acts in last 30 days (median)	13.9 (7.0)	23.2 (17.0)**	12.6 (8.0)**	21.4 (10.5)	15.2 (10.0)	
Currently using IUD	17 (11.2)	6 (17.1)	11 (14.3)	10 (29.4)	15 (19.5)	
Used male condom in last 30 days	120 (79.0)	33 (94.3)	65 (84.4)	32 (94.1)	67 (87.0)	
Use FC in last 30 days	0 (0.0)	21 (60.0)	0 (0.0)	9 (26.5)	0 (0.0)	
Mean proportion of protected sex last 30 days	0.65	0.82	0.70	0.78	0.77	
100% protected sex	69 (45.4)	18 (51.4)	39 (50.6)	16 (47.1)	44 (57.1)	
Nil protected sex	31 (20.4)	1 (2.9)	11 (14.3)	1 (2.9)	9 (11.7)	

^aWomen in the study who had sex with persons who were neither primary nor paying partners were excluded from these analyses.

**
p<0.01

Table 3

Self-reported Participation in the Project Activities (Numbers (percents))

	Survey at 6-m after Baseline		Survey at 12-m after Baseline	
	FC Users n=35	Non-users n=77	FC Users n=34	Non-users n=77
Participated in previous survey	16 (45.7)	33 (42.9)	24 (70.6)	41 (53.2)
Knows the project	25 (71.4)	42 (62.7)	23 (67.6)	44 (57.1)
Recognized the intervention flip chart	28 (80.0) **	40 (51.9) **	21 (61.8) *	28 (36.4) *
Never participated in FC education by the outreach team	0 (0.0)	1 (1.3)	0 (0.0)	10 (13.0)
Mean times participated in FC education (median)	2.4 (2.0)	2.5 (2.0)	3.5 (3.0) **	1.7 (1.0) **
Learned FC insertion in a vaginal model	26 (74.3) **	25 (32.5) **	22 (64.7) **	20 (26.0) **
Practiced FC insertion	21 (60.0) **	13 (16.9) **	17 (50.0) **	12 (15.6) **

*
p<0.05**
p<0.01