Introduction

The HIV epidemic in sub-Saharan Africa continues to have significant effects on sex work populations with female sex workers (FSWs) being disproportionately affected (Prüss-Ustün et al., 2013). A systematic review and meta-analysis conducted in low- and middle-income countries showed the HIV prevalence for FSWs at 12% with the odds of being HIV infected at 13·5 (95% CI 10·0–18·1) (Baral et al., 2012). The prevalence of HIV within FSW populations in sub-Saharan Africa is higher than the prevalence observed in women in the general population. In South Africa, the HIV prevalence in FSWs is 45.1% compared to 25.3% in the general female population of reproductive age; 61.2% compared to 21.4% in Zimbabwe; 33.7% compared to 4.5% in Nigeria; and 45.1% compared to 7.7% in Kenya (Baral et al., 2012; Vandepitte et al., 2006).

In this review, the definition of sex work by UNAIDS was used: “Any agreement between two or more persons in which the objective is exclusively limited to the sexual act and ends with that and which involves preliminary negotiations for a price” (UNAIDS, 2000). This definition excludes transactional sex, which is the exchange of favours, gifts or money for sexual activity. Those who engage in transactional sex do not necessarily self-identify as sex workers or clients (Stoebenau, Heise, Wamoyi, & Bobrova, 2016) while sex workers clearly identify what they do as work or “business” which is distinct from their non-work lives (Chatterji, Murray, London, & Angelwicz, 2005; WHO, 2011b).

Unprotected sex and multiple sexual partnering are important risk factors in HIV transmission. In sub-Saharan Africa, and in most regions of the world, heterosexual transmission accounts for most HIV infections (UNAIDS, 2011). Prevention approaches for the reduction of sexual transmission of HIV are important in curbing the spread of the virus and the promotion of correct and consistent condom use continues to be an effective means of preventing sexual transmission of HIV particularly for sex workers (Charania et al., 2011). The effectiveness of condoms hinges on its consistent use and its non-breakage or slippage during sexual acts. Early antiretroviral treatment (treatment as prevention) and other antiretroviral-related biomedical methods effectively reduce HIV transmission for people living with HIV (PLWH) and their partners. However, condom promotion remains core to HIV-prevention programming and is cost-effective and acceptable as a public health approach for population level prevention (CATIE, 2013; Roger, 2016).

Condom use by FSWs with their regular and non-paying partners is lower than with their paying partners and this compromises HIV-prevention efforts for this target group (Bukenya, Vandepitte, & Kwirkiriza, 2013; R. Zhao, Wang, Fang, Li, & Stanton, 2008). Barriers to condom use by FSWs are multi-faceted and targeting the individual level alone will not suffice. Strategies addressing individual, social and...
gender issues related to HIV transmission and condom use within this population are necessary (Jana, Basu, Rotheram-Borus, & Newman, 2004; Varga, 1997).

Combining multiple prevention approaches comprising complementary biomedical, structural and behavioural strategies is recommended by the Joint United Nations Programme on HIV/AIDS (UNAIDS) for HIV-prevention interventions, especially those targeted at FSWs (UNAIDS, 2010). Behavioural interventions are designed to influence the actions undertaken by an individual, facilitating changes at the individual level and within networks and associated communities (Kok et al., 2015).

To date, only a few systematic reviews provide data on FSWs and their sexual behaviour in sub-Saharan Africa. Previous systematic reviews which have addressed relevant HIV-related issues globally and within sub-Saharan Africa on FSWs include: sex work, sexual risk factors for HIV and facility-based sexual and reproductive health (Dhana et al., 2014); size estimates of the FSW population globally (Vandepitte et al., 2006); sex workers’ mobility (Platt et al., 2013); community empowerment approaches (Kerrigan et al., 2013; Moore et al., 2014); sexually transmitted infections (STIs) and their control (Cwikel, Lazer, Press, & Lazer, 2008); impact of interventions on condom use in varied sexual partnerships, that is, youths, married/steady, casual and commercial (Foss, Hossain, Vickerman, & Watts, 2007); and HIV-prevention interventions in low- and middle-income countries in general (Hong & Li, 2008; Shahmanesh, Patel, Mabey, & Cowan, 2008).

A previous review (Chersich, Luchters, & Ntaganira, 2013) examined studies in sub-Saharan Africa aimed at reducing HIV transmission amongst FSWs. It broadly examined studies evaluating HIV-prevention strategies for FSWs within the region, but did not focus on behavioural interventions assessing the effectiveness and process outcomes related to condom use. FSWs bear a disproportionate HIV burden in sub-Saharan African and the effectiveness of correct and consistent condom use in the prevention of sexual transmission of HIV has been shown in various studies (Bukinya et al., 2013; Charania et al., 2011; Fitch et al., 2002; Weller, 2002). It is therefore crucial to review the design and effectiveness of behavioural interventions for FSWs in sub-Saharan Africa aimed at improving correct and consistent condom use to inform future research needs in HIV-prevention programmes. This review examines the intervention settings, delivery methods, intervention components and effect outcomes of behavioural interventions to improve correct and consistent condom use outcomes for the reduction of the sexual transmission of HIV infection among FSWs in sub-Saharan Africa, providing a new perspective on post-intervention condom use by FSWs and their sexual partners.

**Method**

A systematic review of behavioural interventions evaluating condom use outcomes was conducted to obtain insights into the effectiveness of different approaches adopted in interventions for the prevention of sexual transmission of HIV amongst FSWs in sub-Saharan Africa.

**Search strategy**

Relevant studies were identified by conducting a comprehensive search of multiple databases: PubMed, CINAHL, Web of Science and PsycINFO. The same sets of keywords were used to extract studies from each database. The first set included key words related to sex work (e.g., commercial sex worker, female sex worker and sex worker) and the second set included key words related to condom use, interventions, behaviour, STI or safe sex. A key word from the first set and a key word from the second set had to be in the title or abstract of the study. The search was limited to articles written in English, published between 1990 and September 2016, as most studies published before 1990 will not reflect the current circumstances and realities of the HIV epidemic within the region. Documentation of significant achievements in HIV prevention and management gained prominence in the 1990s and it has continuously evolved since then.

Titles and abstracts of the identified studies were exported into an Endnote X6 reference manager. Furthermore, a hand-search of references cited in all eligible studies and previous reviews was conducted to obtain additional articles (Chersich et al., 2013; Lutchers et al., 2008; Steen et al., 2000; E. Williams, Lamson, Efern, Weir, & Lamptey, 1992).

**Study selection**

Studies were eligible for inclusion if they were conducted among FSWs in any sub-Saharan African country; reported condom use as one of the behavioural outcome measures; were peer-reviewed primary research studies (e.g., editorials were excluded); and described the evaluation of the intervention, independent of the design, although limited to quantitative data.

During the selection of studies it became apparent that some authors distinguished between FSWs who self-identified as sex workers and those who did not. FSWs who self-identified as sex workers were the participants of interest and data from FSWs who did not self-identify were excluded. The judgement of authors was relied upon in the inclusion of studies based on their definition of the sex workers. For studies in which the authors did not identify this, we assessed the article for eligibility.

The selection of eligible articles from the databases was carried out; any disagreements were resolved by discussion until consensus was reached on relevant articles. The extent of agreement by both researchers was reflected by the kappa statistics of 0.66 showing good agreement in the selection of eligible studies (Cochrane, 2011). The selection procedure comprised three rounds: screening titles, screening abstracts, and full text analysis. A conservative approach was used; if one of the two researchers was in doubt based on the title, the article was taken to the next round, assessing the abstract. If one of the two researchers was in doubt based on the abstract, the article was taken to the next round, assessing the full text. The screening of the articles from the references was carried out by the first two authors, using the same procedure as described above.

**Data extraction and analysis**

Data extraction was carried out by the first two authors using a data extraction form. The form included outcome
measures (both effectiveness and process measures), target group, intervention setting, country, intervention and control description, study design, duration and follow-up measures (Appendix 1). As a result of not excluding studies based on their design, a heterogeneous set of studies was included in this review. The quality of the selected studies was assessed using the Effective Public Health Practice Project tool (EPHPP, 2009) by ranking based on the study design conforming to the EPHPP quality checklist (i.e., 1 = randomised controlled trial—RCT; 2 = controlled clinical trial—CCT; 3 = cohort analytic (two groups); 4 = case-control; 5 = cohort (one group); and 6 time series). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist was used to standardise the review approach and ensure relevant aspects of the review were included.

Results

Search outcome

The electronic search of the databases yielded 4,737 hits. After automated removal of duplicates, 4,506 articles remained for the title review (Figure 1). Of these, 4,318 articles were excluded based on title and another 100 articles were excluded based on the abstract. A total of 97 articles were left for full text analysis. This analysis yielded 17 eligible articles from the search. An in-depth review of the references of some identified articles within the search yielded an additional three articles that met the eligibility criteria.

![Study selection flow chart](image)

**Figure 1:** Study selection flow chart

Study design

The EPHPP quality checklist was used to assess and categorise the design of the studies into four groups. Five of the studies were evaluated using an RCT approach while the other interventions were evaluated using one group pre-post tests (n = 10), two group pre-post tests (n = 2), and time series designs (n = 3).

Loss to follow-up was reported in 12 out of the 18 interventions with attrition rates ranging from 6% to 63%. Interventions with longer implementation timeframes (i.e., above 1 year) had higher attrition rates than interventions with short implementation timeframes.

Effectiveness

The 20 eligible articles described 18 behavioural interventions on HIV prevention with condom use as an outcome measure and the interventions were carried out with FSWs within sub-Saharan African countries. Fifteen interventions within this review reported significant increase in (male) condom use.

The intervention strategies used for the behavioural components of the studies in the review varied. Twelve studies combined various methods for the delivery of condom use messages (Asamoah-Adu et al., 1994; Carney, Petal, Petersen, & Parry, 2016; Feldblum et al., 2005; Ghys et al., 2002; Lutchters et al., 2008; Nagot et al., 2005; Ngugi et al., 2007; Ngugi, Wilson, Sebstad, Plummer, & Moses, 1996; Odek et al., 2009; Parcesepea et al., 2016; Pickering, Quigley, Pépin, Todd, & Wilkins, 1993; B. G. Williams et al., 2003; E. Williams et al., 1992). The methods used included peer education, health education by project staff, and in one study (E. Williams et al., 1992) brothel managers and owners were included. Ten studies used peer education for delivery of condom use messages while six studies within the review used only health or programme staff for the delivery of condom use messages (Laga et al., 1994; Ray, van De Wijgert, Mason, Ndowa, & Maposhere, 2001; Steen et al., 2000; Thomsen et al., 2006; Walden, Mwangulube, & Makhumula-Nkoma, 1999; Wechsberg, Luseno, Lam, Parry, & Morojele, 2006).

Acceptability and increase in female condom use was measured in three of these studies in South Africa (Wechsberg et al., 2006), Zimbabwe (Ray et al., 2001) and Kenya (Thomsen et al., 2006) and these three studies showed increases in female condom use after the intervention. Acceptability and increased use of female condom were self-reported using structured questionnaires. A focus group discussion conducted in one of the studies showed that the main barrier to female condom use was clients’ distrust of the unfamiliar method (Ray et al., 2001).

All the studies used questionnaires as the quantitative method to assess outcomes and some studies validated the quantitative outcomes with qualitative studies (Ray et al., 2001; Walden et al., 1999).

Two studies in The Gambia (Pickering et al., 1993) and South Africa (B. G. Williams et al., 2003) showed no overall increase in condom use. The Gambian study recorded an initial increase in the first month and a subsequent decrease over the remaining five months of the intervention. Condom use with different FSW partner types (boyfriends, non-paying partners and paying clients) were evaluated in...
some interventions. Increased consistent use of condoms with clients of FSWs was reported in some studies, while one study showed a decline (Pickering et al., 1993). Three studies showed no significant increase (Steen et al., 2000; B. G. Williams et al., 2003) in consistent condom use. Increase in condom use for different FSW partner types was measured in some studies and consistent condom use was less with intimate partners of FSWs (boyfriends and non-paying regular partners) than with paying clients (Feldblum et al., 2005; Nagot et al., 2005; Ngugi et al., 2007; Odek et al., 2009; Raul et al., 2002; Ray et al., 2001; Steen et al., 2000; Thomsen et al., 2006; Wechsberg et al., 2006). Considerable loss to follow-up was reported in some of the studies with a few showing high attrition rates of greater than 50% (Feldblum et al., 2005; Ngugi et al., 2007; Ray et al., 2001; Walden et al., 1999; B. G. Williams et al., 2003).

The interventions evaluated had different time frames ranging from one month to four years. Seven studies measured increased condom use at intervals within the intervention time frame ranging from six months to three years (Laga et al., 1994; Ngugi et al., 2007; Odek et al., 2009; Pickering et al., 1993; Ray et al., 2001; Steen et al., 2000). Six of these seven studies showed increased condom use during the intervention time frame (see Table 1).

**Intervention content**

The intervention settings included brothels, bars, hotels, mining towns, clinics or communities where FSW reside. The intervention contents did not differ based on sex work setting or sex work type. However, a few studies (Feldblum et al., 2005; Ngugi et al., 2007; Odek et al., 2009; Steen et al., 2000; B. G. Williams et al., 2003; Yadav, Sasaki, & Ngugi, 2005) combined behavioural interventions with presumptive treatment of STIs.

A few studies reported the behavioural contents of the interventions and those studies that did included distribution of information, education and communication (IEC) materials on sexual risk reduction and consistent condom use (Feldblum et al., 2005; Ghys et al., 2002; Wechsberg et al., 2006); educational and skills building sessions (Asamoah-Adu et al., 1994; Odek et al., 2009; E. Williams et al., 1992); and post-test counselling, risk reduction sessions, condom promotion and distribution using peer mediation approaches and counselling by health staff (Asamoah-Adu et al., 1994; Feldblum et al., 2005; Laga et al., 1994; Lutchters et al., 2008; Nagot et al., 2005; Ngugi et al., 2007; Ngugi et al., 1996; Odek et al., 2009; Pickering et al., 1993; Ray et al., 2001; Steen et al., 2000; Thomsen et al., 2006; Walden et al., 1999). In one study, key influencers within the FSW environment were used for condom promotion and the dissemination of risk reduction messages, that is, brothel owners and managers (E. Williams et al., 1992). Two studies combined community empowerment activities within the behavioural interventions. (Carney et al., 2016; Odek et al., 2009) However, the added value of these components in relation to increased condom use was not evaluated in any of the studies.

**Process outcomes**

Process outcomes were reported by some studies within this review. Five studies conducted in Zaire (Laga et al., 1994), Côte d’Ivoire (Ghys et al., 2002) and Kenya (Ngugi et al., 2007; Raul et al., 2002; Yadav et al., 2005) linked the process outcomes to the effectiveness of the interventions.

Exposure to the interventions, number of clinic visits and number of peer-mediated sessions attended by the FSWs were linked to increase in condom use with paying clients, boyfriends and non-paying partners within five interventions (Ghys et al., 2002; Laga et al., 1994; Lutchters et al., 2008; Odek et al., 2009; Steen et al., 2000).

**Discussion**

Correct and consistent condom use has been identified as an effective means of preventing HIV transmission and spread (R. Zhao et al., 2008). However, its effectiveness can be limited by breakage and slippage during sexual acts due to incorrect use, although none of the included studies mentioned this explicitly. Measuring this outcome is key to determining the effectiveness of condom promotion activities within behavioural interventions (Ahmed, Grimes, Ross, Jan Risser, & Kessie, 2007).

The interventions measured self-reported condom use outcomes and all but two (Pickering et al., 1993; B. G. Williams et al., 2003) studies reported significant increases in condom use with clients of FSWs. Condom use with multiple FSW partner types were evaluated within the studies: regular non-paying partners, boyfriends and paying partners. Condom use with regular non-paying partners and boyfriends were reported to be lower and less consistent than condom use with paying partners. This finding is consistent with other studies reporting similar outcomes in condom use by FSWs with regular or non-paying clients (Johnson, Haefton, Fishbeina, Kaspzykb, & Montanob, 2001; Kayembe et al., 2008; Stoebenau, Hindin, Nathanson, Rakotoarison, & Razafintsimala, 2009; Voeten, Egesah, Varkevisser, & Habbema, 2007; Wang et al., 2007). This trend could compromise ongoing efforts to address the HIV epidemic in sub-Saharan Africa. A possible explanation for inconsistent condom use by FSWs with steady partners compared to paying clients may be the need to create a psychological distinction between their personal life and work life. Another explanation may be the fear of rejection by their steady partners and the fear of humiliation and physical violence (Ulibarri et al., 2012; Varga, 1997). Gender-based power imbalances within these relationships may also constrain the ability of FSWs to negotiate condom use out of fear of violent retribution (Ulibarri, Strathdee, Lozada, & Magis-Rodriguez, 2010). Hence, behavioural interventions should prioritise steady partners of FSWs and adopt approaches to address the reasons and vulnerabilities associated with inconsistent condom use with them.

The treatment as prevention approach to reduce HIV transmission rates by increasing identification, treatment and care has shown some potential. However, correct and consistent condom use remains a more effective approach since the effectiveness of treatment as prevention relies heavily on treatment adherence. Poor access to health care by FSWs, stigma, costs and drug resistant HIV strains continue to hinder treatment outcomes (Bekker et al., 2015). An overstatement of this approach can also result in negative public health impacts by encouraging more risky
sexual behaviour by FSWs and reversing achievements made thus far in the use of other effective HIV-prevention approaches like correct and consistent condom use (Smith, Powers, Kashuba, & Cohen, 2011; Venkatesh, Flanigan, & Mayer, 2011; WHO 2016).

The content of the behavioural interventions reviewed was diverse and included condom promotion, distribution and risk reduction; provision of information using peer educators, distribution of IEC materials, and counselling sessions on HIV testing and risk reduction with health workers or programme staff. The intervention types and delivery methods used did not vary with sex work type or setting. Alternatively, the ease of reach and participation in intervention activities differed with sex work settings. Sex workers within enclosed locations are easier to reach for sustained periods compared to those scattered within a community or town (Kerrigan et al., 2013; NACA, 2014). A delivery method common to most of the interventions within this review was peer mediation for risk reduction and condom promotion activities with free condoms provided by peers and health workers. Only one study using this method reported non-sustained increase in condom use within the intervention timeframe. This supports the findings from similar studies that condom promotion and distribution is an effective component of interventions aimed at increasing condom use among FSWs (Charania et al., 2011; Sandoy, Zyaambo, Michelo, & Fylkesnes, 2012) with additional benefits offered when mediated by peers (Ahmed et al., 2007; Weller, 2002; R. Zhao et al., 2008). The use of brothel owners, managers and pimps for condom promotion was used in only one study with demonstrated increase in condom use. Some studies have explored associations between condom use and social or environmental factors, including influence of gatekeepers and the working environment of FSWs (Li, Li, Stanton, Fang, & Zhao, 2010; Morisky, Stein, Chiao, Ksobiech, & Malow, 2006; Qiao et al., 2015; Yang et al., 2005). These studies showed that combined interventions that educate FSWs and improve gatekeeper support promote positive condom use outcomes in sex work settings and create a supportive environment for HIV-prevention efforts. A few studies conducted in Kenya (Ngugi et al., 2007; Odek et al., 2009; B. G. Williams et al., 2003; Yadav et al., 2005), South Africa, (Steen et al., 2000; B. G. Williams et al., 2003), and Madagascar (Feldblum et al., 2005) combined HIV/STI screening with presumptive treatment of STIs and condom promotion and reported consistent increase in condom use with clients with one exception which showed a decrease in condom use by casual partners (B. G. Williams et al., 2003). These finding extend those of some published studies reporting the possibility that FSWs who know their HIV/STI status take better care of their health by having fewer sexual partners and using condoms consistently (Morisky, Stein, Chiao, Ksobiech, & Malow, 2006; Qiao et al., 2015; Yang et al., 2005; J. Zhao, Song, & Ren, 2012).

Various environmental and structural approaches targeted at reducing the vulnerability of FSWs were included within the intervention mix of a few studies within this review. However, no study evaluated their added value in increasing condom use or any other outcome within the intervention. Environmental factors influencing the sexual behaviour of FSWs, that is, behaviour of pimps, brothel managers, and law enforcement agents as well as societal norms, laws and policies have been shown in other studies to significantly influence the outcome of interventions targeted at FSWs (Bartholomew, Parcel, Kok, Gottlieb, & Fernández, 2011). Recommendations by experts indicate that an integrated approach to HIV prevention that incorporates evaluated activities addressing structural and environmental factors in addition to individual factors that increase susceptibility to HIV infection and undermine prevention and treatment efforts is important and should be considered by programmers and researchers (Bekker et al., 2015; Charania et al., 2011; Kerrigan et al., 2013; Seeley et al., 2012; UNAIDS, 2010).

Most studies within the review used the cohort design (pre-test post-test) to achieve the set outcomes of behaviour change with FSWs. The cohort study by Thomsen et al. (2006) explained that the high possibility of cross-exposure within the small FSW community for the intervention necessitated the selection of the cohort (pre-test post-test) study design. Only three studies used an RCT design (Feldblum et al., 2005; Ray et al., 2001; Wechsberg et al., 2006) with the control groups being active controls exposed to a standard intervention mix. The intervention groups were exposed to the standard mix and additional intervention activities. When both the control and the intervention groups receive the standard intervention, significant behavioural effects are harder to detect in comparison with a waiting-list control group. Consistent with the three RCT studies and supported by existing literature, effects can only be seen if the intervention uses activities that are not yet part of the standard intervention in the control group (de Bruin et al., 2010).

Although the RCT design is preferred, individual randomisation of sex workers for behavioural interventions is difficult and impracticable within brothels and communities as the behavioural interventions are difficult to individualise. Participants within the same brothel/group can influence their peers irrespective of what type of intervention they receive. Cluster randomisation is more practicable but complicates design and analysis as it introduces dependence among individual units within the intervention.

Loss to follow-up was high in interventions with duration longer than one year mainly due to the high mobility of sex workers. The mobility of the FSW population makes it difficult to sustain interventions for longer periods suggesting that more creative approaches for engaging with sex workers who are mobile could also be considered (e.g., mobile phones, maintaining contact information or setting up linkages with clinics in different cities). For researchers to be able to assess the effectiveness of interventions, the interventions need to be carried out continuously within a particular location to ensure that new entrants to that location are exposed to the intervention and can replace those who have been lost to follow-up. The mobility of sex workers further distorts the validity of some studies, especially long term studies, as high attrition rates of about 50% were reported in some of the studies (Feldblum et al., 2005; Ngugi et al., 2007; Ray et al., 2001; Walden et al., 1999).

Limitations

A limitation of this systematic review is the exclusion of studies on women who did not self-identify as sex workers.
The definitions used by the authors and their judgment were relied upon to exclude interventions carried out with high-risk women who were not explicit about the nature of their work and sexual behaviour. The inclusion and exclusion criteria—searching for published studies only as well as only articles published in English—might have led to the exclusion of other relevant studies. The use of self-reported data in the studies may have limited the reporting of risk behaviour and condom use outcomes due to social stigma and social desirability bias.

Over the past decade, tremendous changes to HIV programming have occurred in sub-Saharan Africa. Studies carried out before these changes in HIV programming occurred, may be limited in scope and application due to the low understanding of HIV infection among the population and the limited programming prevalent within the period.

**Recommendation for research and practice**

Similar reviews of condom use outcomes in behavioural interventions amongst FSWs in other regions of the world are limited. It is important to explore this further and provide much needed information on the effectiveness of condom promotion activities in these regions to inform future research. The integration of individual, environmental and structural approaches within HIV-prevention programming facilitates correct and consistent condom use and other important drivers such as reduction of stigma, discrimination, violence and police harassments (WHO, 2011a).

Furthermore, HIV-prevention interventions targeting FSWs should address correct and consistent condom use with regular partners and with their paying clients to enhance prevention efforts against HIV/AIDS.

**Conclusion**

Behavioural interventions promoting consistent condom use amongst FSWs have been shown to be effective in the adoption of appropriate condom use behaviours. Consistent and correct use of condoms remains one of the most effective methods for the reduction of sexual transmission of HIV. Thus condom promotion components of behavioural interventions are important to enhance HIV-prevention efforts. Sufficient evidence exists illustrating the effectiveness of behavioural interventions targeting consistent condom use by FSWs with their sexual partners. HIV-prevention programmes should, in addition to behavioural interventions with condom use, also incorporate other biomedical, social and structural components that address pertinent issues within the sex workers’ environment affecting their risks and behaviour.

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**References**

Adu-Oppong, A., Grimes, R.M., Ross, M.W., Risser, J., & Kessie, G. (2007). Social and behavioral determinants of consistent condom use among female commercial sex workers in Ghana. *AIDS Education and Prevention, 19*(2), 160–172. https://doi.org/10.1521/aeap.2007.19.2.160

Asamoah-Adu, A., Weir, S., Pappoe, M., Kanisi, N., Neeqayu, A., & Lamptey, P. (1994). Evaluation of a targeted AIDS prevention intervention to increase condom use among prostitutes in Ghana. *AIDS (London, England), 8*(2), 239–246. https://doi.org/10.1097/00002030-199402000-00012

Baral, S., Beyrer, C., Muesing, K., Potash, T., Wirtz, A. L., Decker, M. R., ... Kendig, D. (2012). Burden of HIV among female sex workers in low-income and middle-income countries: A systematic review and meta-analysis. *Lancet, 12*(7), 538–549. https://doi.org/10.1016/S1473-3099(12)70066-X

Bartholomew, L. K., Parcel, G. S., Kok, G., Gottlieb, N. H., & Fernandez, M. E. (2011). Planning *Health Promotion Programs: an Intervention Mapping Approach* (3rd ed.). San Francisco, CA: Jossey-Bass.

Bekker, L., Johnson, L., Cowan, F., Oiers, C., Besada, D., Hillier, S., & Cates, W., Jr. (2015). Combination HIV prevention for female sex workers: What is the evidence? *Lancet, 385*(9962), 72–87. https://doi.org/10.1016/S0140-6736(14)60974-0

Bukenya, J., Vandepitte, J., & Kiwiriza, M. (2013). Condom use among female sex workers in Uganda. *AIDS Care, 25*(6), 767–774.

Carney, T., Petersen Williams, P. M., & Parry, C. D. H. (2016). Ithubalethu-intervention to address drug use and sexual hiv risk patterns among female commercial sex workers in Durban, South Africa. *Journal of Psychoactive Drugs, 48*(4), 303–309. https://doi.org/10.1080/02757521.2016.1208855

Charania, M. R., Crepaz, N., Guenther-Gray, C., Henny, K., Liao, A., Willis, L. A., & Lyles, C. M. (2011). Efficacy of structural-level condom distribution interventions: A meta-analysis of U.S. and international studies, 1998–2007. *AIDS and Behavior, 15*(7), 1283–1297. https://doi.org/10.1007/s10461-010-9812-y

Chatterji, M., Murray, N., London, D., & Angelwicz, P. (2005). The factors influencing transactional sex among young men and women in 12 sub-Saharan countries. *Social Biology, 52*, 56–72.

Chersich, M. F., Luchtiers, S., & Ntaganira, I. (2013). Priority interventions to reduce HIV transmission in sex work settings in sub-Saharan Africa and delivery of these services. *International AIDS & Society, 16*(1), 17980. doi:10.7448/IAS.16.1.17980

Cochrane. (2011). *Handbook for Systematic Reviews of Interventions* (Vol. 5.1.0). John Wiley & Sons Ltd.

Cwikel, J. G., Lazer, T., Press, F., & Lazer, S. (2008). Sexually transmissible infections among female sex workers: An international review with an emphasis on hard-to-access populations. *Sexual Health, 5*(1), 9–16. https://doi.org/10.1071/S01461-010-9812-y

de Bruin, M., Viechtbauer, W., Schaalma, H. P., Kok, G., Abraham, C., & Hospeers, H. J. (2010). Standard care impact on effects of highly active antiretroviral therapy adherence interventions. *Archives of Internal Medicine, 170*(3), 240–250. https://doi.org/10.1001/archinternmed.2009.536

Dhana, A., Luchtiers, S., Moore, L., Yves, L., Roy, A., Scorgie, A., & Chersich, M. F. (2014). Systematic review of facility-based sexual and reproductive health services for female sex workers in Africa. *Globalization and Health, 10*(46). doi:https://doi.org/10.1186/1744-8603-10-46

Feldblum, P. J., Hatzell, T., Van Damme, K., Nasution, M., Rasamindrakotroka, A., & Grey, T. W. (2005). Results of a randomised trial of male condom promotion among Madagascar sex workers. *Sexually Transmitted Infections, 81*(2), 166–173. https://doi.org/10.1136/sti.2004.010074

Fitch, J. T., Stine, C., Hager, W. D., Mann, J., Adam, M. B., & McHlhaney, J. (2002). Condom effectiveness: Factors that influence risk reduction. *Sexually Transmitted Diseases, 29*(12), 811–817. https://doi.org/10.1097/00002664-200212000-00013

Foss, A. M., Hossain, M., Vickerman, P. T., & Watts, C. H. (2007). A systematic review of published evidence on intervention impact on condom use in sub-Saharan Africa and Asia. *Sexually Transmitted Infections, 83*(7), 510–516. https://doi.org/10.1136/sti.2007.027144
Ghys, P. D., Diallo, M. O., Ettiègne-Traoré, V., Kalé, K., Tawl, O., Caraël, M., ... Greenberg, A. E. (2002). Increase in condom use and decline in HIV and sexually transmitted diseases among female sex workers in Abidjan, Cote d’Ivoire, 1991±1998. AIDS (London, England), 16(2), 251–258. https://doi.org/10.1007/s10461-002-2030-0

Hong, Y., & Li, X. (2008). Behavioral studies of female sex workers in China: A literature review and recommendation for future research. AIDS and Behavior, 12(4), 623–636. https://doi.org/10.1007/s10461-007-9287-7

Jana, S., Basu, I., Rotheram-Borus, M., & Newman, P. (2004). THE SONAGACHI PROJECT: A Sustainable community intervention program. AIDS Education and Prevention, 16(5), 405–414. https://doi.org/10.1521/aepa.16.5.405.48734

Johnson, B. L., von Haefton, I., Fishbein, M., Kasprrzyk, D., & Montano, D. (2001). Factors influencing IDU and non-IDU female commercial sex workers' intentions to always use condoms for vaginal sex with their regular partner. Psychology Health and Medicine, 6(2), 207–222. https://doi.org/10.1080/13548505123901

Kayembe, P. K., Mapatano, M. A., Busangu, A. F., Nyanjwe, J. K., Musema, G. M., Kibungu, J. P., ... Mayala, G. M. (2008). Determinants of consistent condom use among female commercial sex workers in the Democratic Republic of Congo: Implications for interventions. Sexually Transmitted Infections, 84(3), 202–206. https://doi.org/10.1136/sti.2007.028324

Kerrigan, D., Kennedy, C., Morgan-Thomas, R., Sushena Reza-Paul, Johnson, B. L., von Haefton, I., Fishbein, M., Kasprzyk, D., & Kayembe, P. K., Mapatano, M. A., Busangu, A. F., Nyandwe, J. (2010). A multilevel intervention: a systematic review of the peer-reviewed evidence. AIDS and Behavior, 14(3), 399. https://doi.org/10.1007/s10461-008-9485-y

Morisky, D., Stein, J. A., Chiao, C., Ksobtieh, K., & Malow, R. (2006). Impact of a social influence intervention on condom use and sexually transmitted infections among establishment-based female sex workers in the Philippines: A multilevel analysis. Health Psychology, 25(5), 595–603. https://doi.org/10.1037/0278-6133.25.5.595

Nagot, N., Ouedraogo, A., Ouangre, A., Cartoux, M., Defer, M. C., & Meda, N. (2005). Is sexually transmitted infection management among sex workers still able to mitigate the spread of HIV infection in West Africa? Sexually Transmitted Infection Management, 39(4), 454–458.

Ngugi, E., Chakkalackal, M., Sharma, A., Bukusi, E., Njorge, B., Kimani, J., ... Bwayo, J. J. (2007). Sustained changes in sexual behavior by female sex workers after completion of a randomized HIV prevention trial. Acquired Immune deficiency Syndromes, 45(5), 588–594.

Ngugi, E., Wilson, D., Sebstad, J., Plummer, F. A., & Moses, S. (1996). Focused Peer mediated educational programs among female sex workers to reduce sexually transmitted disease and Human Immunodeficiency virus transmission in Kenya and Zambawe. Infectious Diseases, 17(4), S240–S247. https://doi.org/10.1093/infdis/174.Supplement_2.S240

Odek, W. O., Busza, J., Morris, C. N., Cleland, J., Ngugi, E. N., & Ferguson, A. G. (2009). Effects of micro-enterprise services on HIV risk behaviour among female sex workers in Kenya's urban slums. AIDS and Behavior, 13(3), 449–461. https://doi.org/10.1007/s10461-008-9485-y

Parcesepe, A. M., L’Engle, K. L., Martin, S. L., Green, S., Sinkele, S., Suchindran, C., ... Kingola, N. (2016). The impact of an alcohol harm reduction intervention on interpersonal violence and engagement in sex work among female sex workers in Mombasa, Kenya: Results from a randomized controlled trial. Drug and Alcohol Dependence, 161, 21–28. https://doi.org/10.1016/j.drugalcdep.2015.12.037

Pickering, H., Quigley, M., Pépin, J., Todd, J., & Wilkins, A. (1993). Effects of post test Counselling on Condum use amongst Prostitutes in the Gambia. AIDS (London, England), 7(271), 271–273.

Platt, L., Grenfell, P., Fletcher, A., Sorhaindo, A., Jolley, E., Rhodes, T., & Bonell, C. (2013). Systematic review examining differences in HIV, sexually transmitted infections and health-related harms between migrant and non-migrant female sex workers. Sexually Transmitted Infections, 89(4), 311–319. https://doi.org/10.1136/sextrans-2012-050491

Prüss-Ustün, A., Wolf, J., Driscoll, T., Degenhardt, L., Neira, M., & Calleja, J. M. G. (2013). HIV due to female sex work: Regional and global estimates. PLoS One, 8(5), e63476. https://doi.org/10.1371/journal.pone.0063476

Qiao, S., Li, X., Zhang, C., Zhou, Y., Shen, Z., & Tang, Z. (2015). Social support and condom use among female sex workers in China. Health Care for Women International, 36(7), 7. https://doi.org/10.1080/07399332.2014.971952

Ray, S., van De Wijgert, J., Mason, P., Ndowa, F., & Maposhere, R. (2009). Effects of micro-enterprise services on HIV risk behaviour among female sex workers in Kenya’s urban slums. AIDS and Behavior, 10(3), 581–592.

Rogé, A. J. (2016). Sexual activity without condoms and risk of HIV transmission in serodifferent couples when the HIV-positive partner is using suppressive antiretroviral therapy. Journal of the American Medical Association, 316(2), 171–181.

Sandy, I. F., Zyaambo, C., Micheo, C., & Fylkesnes, K. (2012). Targeting condom distribution at high risk places increases condom utilization-evidence from an intervention study in Livingston, Zambia. BMC Public Health, 12(10). https://doi.org/10.1186/1471-2458-12-10

NACA. (2014). National Guidelines for Implementation of HIV Prevention Programs for Female Sex Workers in Nigeria. Abuja, Nigeria: National Agency for the Control of AIDS (NACA)
Seeley, J., Watts, C. H., Kippax, S., Russell, S., Heise, L., & Whiteside, A. (2012). Addressing the structural drivers of HIV: A luxury or necessity for programmes? Journal of the International AIDS Society, 15(Suppl 1), Suppl 1), 17397. https://doi.org/10.7448/IAS.15.3.17397

Shahmanesh, M., Patel, V., Mabey, D., & Cowan, F. (2008). Effectiveness of interventions for the prevention of HIV and other sexually transmitted infections in female sex workers in resource poor setting: A systematic review. Tropical Medicine & International Health, 13(5), 659–679. https://doi.org/10.1111/j.1365-3156.2008.02040.x

Smith, L., Powers, K. A., Kashuba, A. D., & Cohen, M. S. (2011). ‘HIV-1 treatment as prevention: The good, the bad, and the challenges’ Current Opinion in HIV and AIDS. AIDS. (London, England), 5(4), 315–325

Steen, R., Vuyelaste, B., DeCoito, T., Ralepeli, S., Fehler, G., Conley, J., … Ballard, R. (2000). Evidence of declining STD prevalence in a South African Mining community following a core-group intervention. Sexually Transmitted Diseases, 27(1), 1–8. https://doi.org/10.1097/00007435-200001000-00001

Stoebenau, K., Heise, L., Wamoyi, J., & Bobrova, N. (2016). Revisiting Thomsen, S. C., Ombidi, W., Toroitich-Ruto, C., Wong, E. L., Tucker, Smith, L., Powers, K. A., Kashuba, A. D., & Cohen, M. S. (2011). Ulibarri, M. D., Strathdee, S. A., Lozada, R., Magis-Rodriguez, C., G., … & Razafintsalama, V. (2009). But then he became my sipa’: The implications of relationship fluidity for condom use among women sex workers in Antananarivo, Madagascar. American Journal of Public Health, 99(5), 811–819. https://doi.org/10.2105/AJPH.2007.118422

Thomsen, S. C., Ombidi, W., Toroitich-Ruto, C., Wong, E. L., Tucker, H. O., & Homan, R. (2006). A prospective study assessing the understanding of “transactional sex” in sub-Saharan Africa: A review and synthesis of the literature. Social Science & Medicine, 168, 186–197. https://doi.org/10.1016/j.socscimed.2016.09.023

Stoebenau, K., Hindin, M. J., Nathanson, C. A., Rakotoarison, C. G., … & Razafintsalama, V. (2009). But then he became my sipa’: The implications of relationship fluidity for condom use among women sex workers in Antananarivo, Madagascar. American Journal of Public Health, 99(5), 811–819. https://doi.org/10.2105/AJPH.2007.118422

UNAIDS. (2000). Regional UNAIDS workshop on sex work in Westentral Africa. Abidjan, Côte d’Ivoire: UNAIDS.

UNAIDS. (2010). Combination HIV prevention: tailoring and coordinating biomedical, behavioural and structural strategies to reduce new HIV infections. Retrieved from http://www.unaids.org/sites/default/files/media_assets/jc2007_combination_prevention_paper_en_pdf.pdf

UNAIDS. (2011). World AIDS Day Report 2011. How to get to zero: Faster, Smarter, Better. Geneva: UNAIDS.

Vandepitte, J., Lyeria, R., Dallabetta, G., Crabbe, F. M., Alary, M., & Buvé, A. (2006). Estimates of the number of female sex workers in different regions of the world. Sexually Transmitted Infections, 82(Suppl 3), i18–i35.

Varga, C. A. (1997). The condom conundrum: barriers to condom use among commercial sex workers in Durban, South Africa. The African Journal of Public Health, 1, 174–188.

Venkatesh, K. A., Flanigan, T. P., & Mayer, K. H. (2011). Is expanded HIV treatment preventing new infections? Impact of antiretroviral therapy on sexual risk behaviors in the developing world. AIDS (London, England), 25(18), 1939–1949. https://doi.org/10.1097/QAD.0b013e328348ced

Voeten, H. A., Egesah, O. B., Varkevisser, C. M., & Habbema, J. D. (2007). Female sex workers and unsafe sex in urban and rural Nyanza, Kenya: Regular partners may contribute more to HIV transmission than clients. Tropical Medicine & International Health, 12(2), 174–182.

Walden, V. M., Mwangulube, K., & Makhumula-Nkhoma, P. (1999). Measuring the impact of a behaviour change intervention for commercial sex workers and their potential clients in Malawi. Health Education Research, 14(4), 545–554. https://doi.org/10.1093/her/14.4.545

Wang, C., Hawes, S. E., Gaye, A., Sow, P. S., Ndoye, I., Manhart, L. E., … Kiviat, N. B. (2007). HIV prevalence, previous HIV testing, and condom use with clients and regular partners among Senegalese commercial sex workers. Sexually Transmitted Infections, 83(7), 534–540. https://doi.org/10.1136/sti.2007.027151

Wechsberg, W. M., Luseno, W. K., Lam, W. K., Parry, C. D., & Morojele, N. K. (2006). Substance Use, Sexual risk and Violence; HIV prevention intervention with sex workers in Pretoria. AIDS and Behavior, 10(2), 131–137. https://doi.org/10.1007/s10461-005-9036-8

Weller, S. (2002). Condom effectiveness in reducing heterosexual HIV transmission. Cochrane database.

WHO. (2011a). HIV prevention in generalized epidemics: optimal interventions for Global Fund applications : recommendations for a public health approach. Geneva: WHO. Retrieved from http://www.who.int/hiv/pub/prevention/hiv/prevention2011/en/ [Accessed 23 March 2015]

WHO. (2011b). Preventing HIV among sex workers in sub-Saharan Africa: A literature review. Retrieved from http://apps.who.int/iris/bitstream/10665/44549/1/9789241501279_eng.pdf

WHO. (2016). Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Retrieved from http://apps.who.int/iris/bitstream/10665/208825/1/9789241549684_eng.pdf?ua=1

Williams, B. G., Taljaard, D., Campbell, C. M., Gouws, E., Ndlovu, L., Van Dam, J., … Auvert, B. (2003). Changing patterns of knowledge, reported behaviour and sexually transmitted infections in a South African gold mining community. AIDS (London, England), 17(14), 2009–2017. https://doi.org/10.1007/s00020-00309260-00011

Williams, E., Lamson, N., Efem, S., Weir, S., & Lamprey, P. (1992). Implementation of an AIDS prevention program among prostitutes in the Cross river state of Nigeria. AIDS (London, England), 6(2).

Yadav, G., Saksin, R., & Ngugi, E. (2005). Associations of sexual risk taking among Kenyan female sex workers after enrollment in an HIV-1 prevention trial. Acquired Immune Deficiency Syndromes, 439, 329–333.

Yang, H., Li, X., Stanton, B., Fang, X., Zhao, R., Dong, B., … Hong, Y. (2005). Condom use among female sex workers in China: Role of gatekeepers. Sexually Transmitted Diseases, 32(9), 572–580. https://doi.org/10.1097/01.olq.0000175418.48665.95

Zhang, H., Liao, M., Nie, X., Pan, R., Wang, C., Ruan, S., … Jiang, B. (2011). Predictors of consistent condom use based on the Information-Motivation-Behavioral Skills (IMB) model among female sex workers in Jinan, China. BMC Public Health, 11(1), 113. https://doi.org/10.1186/1471-2458-11-113

Zhao, J., Song, F., & Ren, S. (2012). Predictors of condom use behaviors based on the Health Belief Model (HBM) among female sex workers: A cross-sectional study in Hubei province, China. PLoS One, 7(11), e94542.

Zhao, R., Wang, B., Fang, X., Li, X., & Stanton, B. (2008). Condom use and self-efficacy among female sex workers with steady partners in China. AIDS Care, 20(7), 782–790. https://doi.org/10.1080/09540120701694030
### Appendix: Table 1: Intervention details

| Study | Location | Sex work setting | Sample size | Delivery method | Study design | Intervention strategy and duration | Process outcomes | Follow-up of effect outcomes | Loss to follow-up | Effect outcomes (behaviour) |
|-------|----------|------------------|-------------|-----------------|-------------|------------------------------------|------------------|-----------------------------|------------------|----------------------------|
| E. Williams, et al. (1992) | Cross Rivers state, Nigeria | Brothels and hotels | \(N = 139\) | Managers, property owners, chariadies, programme staff | Cohort (one group pre + post (before and after)) | 1 year Condom distribution educational sessions | Not reported | 1 year | \(N = 37\) lost to follow-up after 1 year | Self-reported condom use (always use condom increased from 12% to 24%) |
| Asamoah-Adu et al. (1994) | Ghana | Bars and communities | \(N = 72\) original cohort + \(n = 176\) expanded group + \(n = 106\) new recruits | Local health workers, peer educators | Cohort analytic (two group pre + post) | 4 years Health education on HIV prevention, condom promotion and distribution | Not reported | \(N = 72\); 1 year & 4 years \(n = 176\); 3 years | \(N = 28\) for pilot; \(n = 141\) for pilot + expanded | Self-reported condom use with clients (\(N = 72\); 6% baseline, 71%, 6 months follow-up & 56% after 3 years), \(N = 176\); 44% baseline 66% 3 years follow-up), \(N = 106\); baseline 86% |
| Pickering, et al. (1993) | The Gambia | Rural and urban bars | \(N = 31\) | Local field workers, healthcare workers | Cohort (one group pre + post (before and after)) | 6 months Post-test counselling, HIV/STI screening & management and free condom distribution | Not reported | 2–5 months | Subset of a larger study and only those available were part of this study | Percentage increase in condom use was 1.9% (95% CI: 2.8 to 6.6) in the first month and fell by a mean of 6.4% (95% CI: 14 to 12) between the second and fifth months. The decrease in usage was significant using Wilcox signed rank test (\(p = 0.03\)) |
| Ngugi, et al. (2007); Raul, et al. (2002); Yadav, Saskin, & Ngugi (2005) | Kenya | Night clubs, bars, and communities | \(N = 466\) | Peer educators, local health workers | Time series & randomised placebo-controlled trial | 2 years, 4.5 years Free condom distribution, peer & clinic risk reduction counselling, STI screening, presumptive STI treatment | Not reported | Yadav: Mean duration of follow-up = 760 days for a total of 965.6 person years of follow-up and mean number of visits. Home-based FSWs, 8519 days; nightclub-based FSWs, 870.4 days, bar based 644.4; \(p < 0.001\) | \(N = 294\) | Client condom use increased with all groups. Home-based FSWs showed the greatest improvements in condom use over time (relative risk [RR], 1.8; 95% confidence interval [CI], 1.2–2.7; multivariate Poisson regression for correlated data; casual client condom use also increased from 2.6/5 to 3.7/5 on the semi-quantitative scale; \(P < 0.001\). After trial termination, condom use increased from 3.7/5 to 4.3/5; \(P < 0.001\). |
| Odek, et al. (2009) | Nairobi, Kenya | Communities | \(N = 307\) | Peer educators, social and health workers | Cohort (one group pre + post (before and after)) | 2 years Peer education on risk reduction, presumptive treatment with 1 g azithromycin, condom promotion & supply, microenterprise training & services | Not reported | 18–23 months | \(N = 80\) | Self-reported weekly mean number of all sexual partners changed from 3.28 (SD 2.45) at baseline to 1.84 (SD 2.15) at end line (\(P < 0.001\)). Weekly mean number of casual partners changed from 1.96 (SD 1.86) to 0.73 (SD 0.98) over the follow-up period (\(P < 0.001\)). Consistent condom use with regular partners increased by 18.5% and remained above 90% with casual partners. |
### Appendix. Table 1: Intervention details (continued)

| Study            | Location          | Sex work setting  | Sample size | Delivery method | Study design                  | Intervention strategy and duration | Process outcomes                                                                 | Follow-up of effect outcomes | Loss to follow-up | Effect outcomes (behaviour) |
|------------------|-------------------|-------------------|-------------|----------------|-------------------------------|------------------------------------|--------------------------------------------------------------------------------|-----------------------------|--------------------|-----------------------------|
| Steen, et al. (2000) | South Africa     | Mining town       | N = 407     | Health workers  | Cohort (one group pre + post (before and after) | 9 months | STI screening and presumptive treatment with 1g azithromycin, condom promotion and risk reduction counselling | Condom use with partner was greater in women with more than three clinic visits during the intervention | Follow-up rates were 69%, 48% and 32% respectively for visits 2, 3 and 4. Median interval between visits was 29 days (17–195 days) | Not reported | Condom use with all clients during the woman’s last working day increased significantly from 2% at the first visit to 7.4%, 27.6% and 33% at the second, third and fourth visits respectively (chi-square for trend P < 0.00001. No significant change was noted in condom use with regular partners. |
| Luchters, et al. (2008)  | Mombasa, Kenya    | Bars, street, and guest houses | N = 503    | Peer educators, project & health staff  | Cohort (one group pre + post (before and after) | 5 years | Group peer sessions, condom promotion, HIV & STI screening and management | Those exposed more to the intervention showed more positive behaviour change; number of women reporting for HIV testing increased with peer education exposure | 5 years | Not reported | Individuals exposed to peer education had more consistent condom use with clients (86.2% versus 64.0%; P = 0.001). Peers were 2.3 times more likely to suggest condom use (95%CI = 1.0–5.5; P = 0.05) and 1.7 times more likely to refuse clients unwilling to use condoms (95%CI = 1.0–2.8; P = 0.04). |
| Wechsberg, et al. (2006)  | Pretoria, South Africa | Hotels          | N = 93     | Project and health staff | Randomised control trial | 1 month | Condom promotion, risk reduction messaging, condom negotiation and assertiveness | Not reported | 1 month | N = 13 | At baseline, 94% in Group A and 92% in Group B and 1 month follow-up (97% and 82%, respectively) reported condom use with clients. Always use condoms in past month with boyfriends was 36% in Group B and increased from 23% to 33% Group A. Use of male condom with a boyfriend during last sexual act increased from 28% to 55% in Group A, and from 44% to 48% in Group B. Group A increased from 3% to 48% in female condom use with boyfriends, and Group B increased from 20% to 40%. Use of female condoms with clients increased from 13% to 61% in Group B and 12% to 68% in Group A. |
| Ray, et al. (2001)  | Zimbabwe          | Brothels         | N = 149    | Project and health staff | Randomised control trial | 10 months | Condom promotion and distribution, counselling on safe sex practices and risk reduction, STI screening and management | A total of 1 enrolment and 5 follow-up visits per person | 10 months (10 weeks per individual) | Group A: n = 90; at fifth and sixth visits n = 56 and 42 Group B; n = 50; at fifth and sixth visits n = 30 and 26 | Consistent male condom use with clients increased from 0% to 52% in Group A and from 0% to 82% in Group B between enrolment and first follow-up 2 weeks later and remained high throughout the study. Female condom use in Group A with clients consistently was (3–9%), and use of either condom was less common with boyfriends than with clients throughout the study (8–39% for different study, groups, visits, and types of condom). |
### Appendix. Table 1: Intervention details (continued)

| Study | Location | Sex work setting | Sample size | Delivery method | Study design | Intervention strategy and duration | Process outcomes | Follow-up of effect outcomes | Loss to follow-up | Effect outcomes (behaviour) |
|-------|-----------|------------------|-------------|-----------------|-------------|----------------------------------|------------------|----------------------------|----------------|-----------------------------|
| Laga et al. (1994) | Zaire | Communities | $N = 531$ | Project and health staff | Time series | 3 years STD screening, monthly interviews, condom promotion | The more regular clinic attendees were the most consistent condom users | Median duration of follow up per woman is 23 months scheduled visits/counselling outcomes: <50% ($N = 22$), 50-75% ($n = 111$), 76-90% ($n = 178$), >90% ($n = 220$) | Not reported | Mean number of weekly clients without condom use declined from 22 at 6 months, to 20, 14, and 7 at 12, 24, and 36 months respectively. |
| Ngugi i et al. (1996) | Kenya & Zimbabwe | Communities | $N = 299$ | Peer educators and project staff | Cohort (one group pre + post (before and after)) | Peer education, STD screening and management, condom promotion and distribution | Not reported | Not reported | Not reported | Self-reported condom use in Kenya: “Always use condom” increased from 4.6% at baseline to 36.5% at follow-up. |
| Thomsen et al. (2006) | Malawi | Bars | $N = 242$ | Peer educators | Cohort (two groups pre + post (before and after)) | 4 months Peer education, condom promotion & distribution | Not reported | Not reported | $N = 126$ | In active group, condom use with paying partner increased (90.3% compared to 66.7% and 70% in the inactive group. condom use with regular non-paying partners did not show increase from the baseline data. |
| Feldblum et al. (2005) | Madagascar | Communities | $N = 1,000$ | Peer educators & health workers | Randomised control trial | 6 months Peer education and risk reduction counselling by peers or healthcare workers, condom promotion & distribution, STI screening, presumptive treatment with ciprofloxacin and azithromycin | Not reported | Behavioural interview at baseline, 2, 4 & 6 months, STI screening at baseline & 6 months | $N = 44$ for peer only & $n = 55$ for peer & clinic | Logistic regression analyses of reported condom use revealed that women in the peer + clinic arm used condoms more consistently, both with clients and with non-paying partners. The OR for condom use with clients increased from 59.7% (89/149) just before female condoms were introduced, to 67.1% (100/149) at the last visit ($p = 0.04$). 42% (25 of 60) of the previously inconsistent condom users became consistent users at the final visit. Within specific partner types, we only saw a change in consistent condom use with regular clients (94–99%; $p = 0.05$). |
| Nagot et al. (2005) | Burkina Faso | Communities | $N = 377$ | Peer educators & health workers | Cohort (one group pre + post (before and after)) | 6 months Peer education, HCT, STI screening | Not reported | Mean follow-up = 72 | Not reported | Condom use increased but to a lesser extent with steady partners. 28% self-reported use of condoms at baseline; hazard ratio and confidence intervals were used to report condom use increase. |
### Appendix. Table 1: Intervention details (continued)

| Study | Location | Sex work setting | Sample size | Delivery method | Study design | Intervention strategy and duration | Process outcomes | Follow-up of effect outcomes | Loss to follow-up | Effect outcomes (behaviour) |
|-------|----------|------------------|-------------|-----------------|-------------|------------------------------------|-----------------|-----------------------------|------------------|----------------------------|
| Ghys, et al. (2002) | Côte d’Ivoire | Bars, hotels, N = 2,281 | Peer educators, clinic health workers | Time series | 4 years, peer education, counselling and STI screening | More women who had attended the clinic + community-based peer education reported more condom use with their most recent client (91% vs. 77% in 1993, 87% vs. 72% in 1995, and 95% vs. 89% in 1997; all \( P < 0.05 \)) | Not reported | Not reported | In 1992, 20% of female sex workers reported consistent use of condoms during their most recent working day; by 1998 this proportion had increased to 78%. |
| Carney, et al. (2016) and Parcesepe et al. (2016) | Durban, South Africa | Bars, hotels, truck shops, streets N = 457 | Peer educators, outreach workers | Cohort (one group pre + post (before and after)) | Education about HIV, condom demonstration, provision of necessary referrals and skills acquisition training | Not reported | The median number of follow-up contacts per participant was 3 (IQR: 1–10). While there was no allocated follow-up period between baseline and follow-up, almost all were conducted within a year from baseline | Not reported | FSWs reported having significantly fewer sexual partners (\( z = -16.05; p < 0.001 \)) over time; also a reduction in the number of times participants engaged in vaginal (\( z = -13.44; p < 0.001 \)), anal (\( z = -2.82; p = 0.005 \)), and oral (\( z = -8.07; p < 0.001 \)) sex. While there was no change in the number of times that protection was used during vaginal (\( z = 10.51; p = 0.61 \)) and oral sex (\( z = 13.42; p = 0.19 \)), oral sex was significantly more protected (\( z = -3.23; p = 0.001 \)). In addition, participants reported trading sex significantly less frequently (\( z = -13.65; p < 0.001 \)). |
| B. G. Williams et al. (2003) | Carletonville, South Africa | Mining houses N = 121 | Peer educators, clinic staff | Cohort (one group pre + post (before and after)) | 2 years Peer education, free condom distribution, syndromic management of STIs, and presumptive STI treatment | Not reported | Not reported | N = 28 for FSW | There was some improvement in knowledge of HIV; ever used condom increased from 69.7 to 77.2 (AOR 1.45, \( P = 0.4 \)). However, condom use with casual partners showed a decrease (54.3 to 41.9 (AOR 0.57, \( P < 0.07 \)). |