Cochrane
Library

Cochrane Database of Systematic Reviews

Behavioral interventions for improving contraceptive use among women living with HIV (Review)

Lopez LM, Grey TW, Chen M, Denison J, Stuart G

Lopez LM, Grey TW, Chen M, Denison J, Stuart G.
Behavioral interventions for improving contraceptive use among women living with HIV.
Cochrane Database of Systematic Reviews 2016, Issue 8. Art. No.: CD010243.
DOI: [10.1002/14651858.CD010243.pub3](https://doi.org/10.1002/14651858.CD010243.pub3).

www.cochranelibrary.com

TABLE OF CONTENTS

ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
SUMMARY OF FINDINGS	3
BACKGROUND	5
OBJECTIVES	6
METHODS	6
RESULTS	8
Figure 1.	9
Figure 2.	11
Figure 3.	12
Figure 4.	13
DISCUSSION	16
AUTHORS' CONCLUSIONS	17
ACKNOWLEDGEMENTS	18
REFERENCES	19
CHARACTERISTICS OF STUDIES	23
DATA AND ANALYSES	38
Analysis 1.1. Comparison 1 Family planning intervention versus usual care, Outcome 1 Use of contraceptives (non-condom) per visit.	39
Analysis 1.2. Comparison 1 Family planning intervention versus usual care, Outcome 2 Reported pregnancy incidence per 100 women-years.	39
Analysis 2.1. Comparison 2 Peer education versus standard care, Outcome 1 Using LARC.	40
Analysis 2.2. Comparison 2 Peer education versus standard care, Outcome 2 Using other modern contraception.	40
Analysis 2.3. Comparison 2 Peer education versus standard care, Outcome 3 Knew IUD effective in preventing pregnancy.	40
Analysis 3.1. Comparison 3 HIV prevention and family planning versus usual care, Outcome 1 Contraceptive use (6 and 12 months pooled).	41
Analysis 3.2. Comparison 3 HIV prevention and family planning versus usual care, Outcome 2 Unprotected sex (6 and 12 months pooled).	41
Analysis 4.1. Comparison 4 Integrated family planning versus routine care, Outcome 1 Reported new use of contraceptives per 100 women-years.	42
Analysis 4.2. Comparison 4 Integrated family planning versus routine care, Outcome 2 Reported pregnancies per 100 women-years.	42
Analysis 5.1. Comparison 5 Integrated family planning: enhanced versus basic, Outcome 1 Use of modern contraceptive method at 12 to 14 months.	42
Analysis 5.2. Comparison 5 Integrated family planning: enhanced versus basic, Outcome 2 Reported differences in use of modern contraceptives (baseline to follow-up).	42
Analysis 6.1. Comparison 6 Integrated family planning services versus routine care, Outcome 1 Reported family planning use (end of project).	43
Analysis 6.2. Comparison 6 Integrated family planning services versus routine care, Outcome 2 Reported pregnancy (final project year).	43
Analysis 7.1. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 1 Use of hormonal contraceptives at 1 year.	44
Analysis 7.2. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 2 Discontinued chosen hormonal contraceptive by 1 year.	44
Analysis 7.3. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 3 Use of condoms or spermicide at 1 year.	45
Analysis 7.4. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 4 Pregnancy.	45
Analysis 8.1. Comparison 8 Informational video + discussion: HIV+ versus HIV-, Outcome 1 Use of hormonal contraceptives after intervention.	46
Analysis 8.2. Comparison 8 Informational video + discussion: HIV+ versus HIV-, Outcome 2 Incident pregnancy after intervention.	47
Analysis 9.1. Comparison 9 Family planning counseling and free contraceptives: HIV+ versus HIV-, Outcome 1 Reported hazard ratios from multivariate Cox models.	48

Analysis 9.2. Comparison 9 Family planning counseling and free contraceptives: HIV+ versus HIV-, Outcome 2 Reported pregnancy incidence per 100 women-years.	48
Analysis 9.3. Comparison 9 Family planning counseling and free contraceptives: HIV+ versus HIV-, Outcome 3 Use of modern contraceptive (injectable, IUD, pills, condoms).	48
Analysis 9.4. Comparison 9 Family planning counseling and free contraceptives: HIV+ versus HIV-, Outcome 4 Reported consistent condom use.	48
ADDITIONAL TABLES	49
APPENDICES	52
WHAT'S NEW	55
HISTORY	55
CONTRIBUTIONS OF AUTHORS	56
DECLARATIONS OF INTEREST	56
SOURCES OF SUPPORT	56
INDEX TERMS	56

[Intervention Review]

Behavioral interventions for improving contraceptive use among women living with HIV

Laureen M Lopez¹, Thomas W Grey², Mario Chen³, Julie Denison⁴, Gretchen Stuart⁵

¹Clinical and Epidemiological Sciences, FHI 360, Durham, North Carolina, USA. ²Social and Behavioral Health Sciences, FHI 360, Durham, North Carolina, USA. ³Biostatistics, FHI 360, Durham, North Carolina, USA. ⁴International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, USA. ⁵Department of Obstetrics and Gynecology, University of North Carolina School of Medicine, Chapel Hill, North Carolina, USA

Contact: Laureen M Lopez, Clinical and Epidemiological Sciences, FHI 360, 359 Blackwell St, Suite 200, Durham, North Carolina, 27701, USA. llopez@fhi360.org.

Editorial group: Cochrane Fertility Regulation Group.

Publication status and date: New search for studies and content updated (no change to conclusions), published in Issue 8, 2016.

Citation: Lopez LM, Grey TW, Chen M, Denison J, Stuart G. Behavioral interventions for improving contraceptive use among women living with HIV. *Cochrane Database of Systematic Reviews* 2016, Issue 8. Art. No.: CD010243. DOI: [10.1002/14651858.CD010243.pub3](https://doi.org/10.1002/14651858.CD010243.pub3).

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background

Contraception services can help meet the family planning goals of women living with HIV as well as prevent mother-to-child transmission. Due to antiretroviral therapy, survival has improved for people living with HIV, and more HIV-positive women may desire to have a child or another child. Behavioral interventions, involving counseling or education, can help women choose and use an appropriate contraceptive method.

Objectives

We systematically reviewed studies of behavioral interventions for HIV-positive women intended to inform contraceptive choice, encourage contraceptive use, or promote adherence to a contraceptive regimen.

Search methods

Until 2 August 2016, we searched MEDLINE, CENTRAL, Web of Science, POPLINE, ClinicalTrials.gov and ICTRP. For the initial review, we examined reference lists and unpublished project reports, and we contacted investigators in the field.

Selection criteria

Studies evaluated a behavioral intervention for improving contraceptive use for family planning (FP). The comparison could have been another behavioral intervention, usual care, or no intervention. We also considered studies that compared HIV-positive versus HIV-negative women. We included non-randomized studies as well as randomized controlled trials (RCTs).

Primary outcomes were pregnancy and contraception use, e.g. uptake of a new method or improved use or continuation of current method. Secondary outcomes were knowledge of contraceptive effectiveness and attitude about contraception or a specific contraceptive method.

Data collection and analysis

Two authors independently extracted the data. One entered the data into RevMan and a second verified accuracy. We evaluated RCTs according to recommended principles. For non-randomized studies, we examined the quality of evidence using the Newcastle-Ottawa Quality Assessment Scale. Given the need to control for confounding factors in non-randomized studies, we used adjusted estimates from the models when available. Where we did not have adjusted analyses, we calculated the odds ratio (OR) with 95% confidence interval (CI). Due to varied study designs and interventions, we did not conduct meta-analysis.

Main results

With three new reports, 10 studies from seven African countries met our eligibility criteria. Eight non-randomized studies included 8980 participants. Two cluster RCTs had 7136 participants across 36 sites. Three studies compared a special FP intervention versus usual care, three examined FP services integrated with HIV services, and four compared outcomes for HIV-positive and HIV-negative women.

In four studies with high or moderate quality evidence, the special intervention was associated with contraceptive use or pregnancy. A study from Nigeria compared enhanced versus basic FP services. All sites had integrated FP and HIV services. Women with enhanced services were more likely to use a modern contraceptive method versus women with basic services (OR 2.48, 95% CI 1.31 to 4.72). A cluster RCT conducted in Kenya compared integrated FP and HIV services versus standard referral to a separate FP clinic. Women with integrated services were more likely to use more effective contraception (adjusted OR 1.81, 95% CI 1.24 to 2.63). Another cluster RCT compared an HIV prevention and FP intervention versus usual care in Kenya, Namibia, and Tanzania. Women at the special intervention sites in Tanzania were more likely to use highly effective contraception (adjusted OR 2.25, 95% CI 1.24 to 4.10). They were less likely to report unprotected sex (no condom use) at last intercourse (adjusted OR 0.23, 95% CI 0.14 to 0.40). Across the three countries, women at the special intervention sites were less likely to report any unprotected sex in the past two weeks (adjusted OR 0.56, 95% CI 0.32 to 0.99). A study in Côte d'Ivoire integrated HIV and FP services. HIV-positive women had a lower incidence of undesired pregnancy, but not overall pregnancy, compared with HIV-negative women (1.07 versus 2.38; reported $P = 0.023$).

Authors' conclusions

The studies since 2009 focused on using modern or more effective methods of contraception. In those later reports, training on FP methods and counseling was more common, which may strengthen the intervention and improve the ability to meet clients' needs. The quality of evidence was moderate from the more recent studies and low for those from the 1990s.

Comparative research involving contraceptive counseling for HIV-positive women is limited. The FP field needs better ways to help women choose an appropriate contraceptive and continue using that method. Improved counseling methods are especially needed for limited resource settings, such as clinics focusing on people living with HIV.

PLAIN LANGUAGE SUMMARY

Family planning programs for women living with HIV

Background

Family planning services can help women with HIV use birth control and prevent unwanted pregnancies. People with HIV are living longer due to better treatment. More HIV-positive women will want to choose whether and when to have a child.

Methods

We ran computer searches for studies of family planning (FP) programs for HIV-positive women until 2 August 2016. The services could be compared to a different program, usual care, or no counseling. Studies could also compare HIV-positive and HIV-negative women. We tried to find results adjusted for factors that affect the outcomes. Otherwise, we used unadjusted data. We assessed the research quality.

Results

We included three new studies for a total of 10. These studies from seven African countries had 16,116 participants. Three studies compared an enhanced FP program versus usual care, three looked at FP services combined with HIV care, and four studied HIV-positive versus HIV-negative women.

For four studies of good quality, the special program was related to birth control use or pregnancy. In Nigeria, sites combined FP and HIV services. Women with enhanced FP services used modern birth control more often than women with basic FP services. A study in Kenya compared FP combined with HIV care versus referral to a separate FP clinic. Women with combined services used more effective birth control more often than those referred elsewhere for FP. One study in Kenya, Namibia, and Tanzania tested an HIV prevention and FP program. Women with the special program in Tanzania used effective birth control more often than women who had usual care. Also, they were more likely to report condom use during the most recent sex. Overall, women with the prevention program were less likely to have had unprotected sex in the past two weeks. A study from Côte d'Ivoire combined HIV testing with FP services. Pregnancy rates were similar for HIV-positive and HIV-negative women, but HIV-positive women had fewer unwanted pregnancies.

Authors' conclusions

Studies since 2009 were better quality than those from the 1990s. Training on FP and counseling was more common, which could strengthen the FP services. Research was still limited on birth control counseling for HIV-positive women. Better counseling methods would help women choose and use a birth control method. The need is especially great in areas with few resources, such as HIV clinics.

SUMMARY OF FINDINGS

Summary of findings for the main comparison.

Enhanced family planning compared with standard services for improving contraceptive use

Patient or population: women with need for family planning (FP)

Settings: clinic

Intervention: enhanced family planning services

Comparison: basic or standard services

Outcomes	Relative effect (95% CI)	Participants (study)	Quality of the evidence (GRADE)	Intervention
Contraceptive use (modern method)	OR 2.48 (1.31 to 4.72)	335 women (McCarraher 2011)	Moderate	FP integrated into HIV services: enhanced vs basic services
Contraceptive use: more effective method	Adjusted OR 1.81 (1.24 to 2.63)	18 sites; 3584 women (Grossman 2013)	Moderate	FP integrated into services vs referral to separate clinic
Contraceptive use: highly effective method	Tanzania sites, adjusted OR 2.25 (1.24 to 4.10)	18 sites (6 per country); 3522 women (Bachanas 2016)	High	HIV prevention and FP intervention vs usual care
Condom use: unprotected last sex	Tanzania sites, adjusted OR 0.23 (0.14 to 0.40)			
Condom use: any unprotected sex in past 2 weeks	All sites, adjusted OR 0.56 (0.32 to 0.99)			

CI: Confidence interval; **FP:** family planning **OR:** Odds ratio

GRADE Working Group grades of evidence

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

Summary of findings 2.

HIV counseling and testing integrated with FP for PMTCT: HIV+ compared with HIV- women

Patient or population: women with need for family planning (FP)

Settings: clinic

Intervention: integrated services, HIV+ women

Comparison: integrated services, HIV- women

Outcomes	Reported relative effect (95% CI)	Participants (study)	Quality of the evidence (GRADE)	Intervention
Pregnancy incidence, undesired	1.07 (0.41 to 1.73) vs 2.39 (1.25 to 3.53); P = 0.023	939 (Brou 2009)	Moderate	HIV counseling and testing integrated with FP services (program of PMTCT)

CI: Confidence interval; **FP:** family planning; **PMTCT:** prevention of mother-to-child transmission of HIV

GRADE Working Group grades of evidence

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

BACKGROUND

Description of the condition

Contraception services can help meet the family planning goals of women living with HIV as well as prevent mother-to-child transmission (MTCT). Due to the use of antiretroviral therapy (ART), survival has improved and more HIV-positive women may want to have a child in the future. Unintended pregnancies are still common, as they are for HIV-negative women ([Kancheva Landolt 2012](#); [Wanyenze 2015](#)). Behavioral interventions, involving counseling or education, can help women choose an appropriate contraceptive method and continue to use their preferred type.

Worldwide, women account for about 50% of the estimated 37 million people living with HIV, and many are of reproductive age ([UNAIDS 2015](#)). In 2015, about 34% of new adult infections occurred among young people, aged 15 to 24 years ([UNAIDS 2016](#)). Young women are 11% of the adult population and experienced 20% of new adult infections in 2015. In sub-Saharan Africa, the HIV infection rate for young women aged 15 to 24 years was twice that for young men ([UNAIDS 2016](#)). For people aged 15 to 49 years, the highest HIV prevalence rates in 2014 were in Botswana (25%), Lesotho (23%), Namibia (16%), South Africa (19%), Swaziland (28%), and Zimbabwe (17%) ([UNAIDS 2015](#)). Demographic and Health Surveys have shown HIV prevalence rates among women 15 to 49 years old of 31% in Swaziland in 2007 and 27% in Lesotho in 2009 ([MacQuarrie 2015](#)).

Global efforts have focused on the prevention of MTCT ([WHO 2015a](#)), a concern for HIV-positive women of reproductive age ([Myer 2010](#); [Créde 2012](#); [Wanyenze 2015](#)). In a multi-country HIV care program, pregnancies were significantly higher among women receiving ART compared with those not on ART ([Myer 2010](#)). Factors associated with pregnancy included less education and failure to use non-barrier contraception. In more developed countries, access to health services has reduced the incidence of vertical transmission to infants, but the risks of pregnancy are still a concern ([Finger 2012](#)). For women of childbearing age, maternal mortality is the second leading cause of death, following HIV ([WHO 2015a](#)). Maternal mortality can be reduced by addressing unmet needs for family planning. Young women with HIV may experience higher rates of adverse pregnancy outcomes ([Agwu 2011](#)). Delaying first births and increasing birth intervals can reduce high-risk pregnancies and improve the health of mothers ([Wilcher 2010](#); [Cleland 2012](#)).

Description of the intervention

Behavioral interventions to improve contraceptive use generally involve counseling, but may include other educational or communication components. The intervention may use oral or written communication or may utilize mobile phones or other technology. A program could be targeted to individuals, couples, or groups; conducted through single or multiple sessions; and provided in a clinic or the community.

Family planning (FP) services can help address the contraceptive needs of women with HIV. Unmet need generally refers to women of reproductive age who are sexually active, not using any contraception, and report that they do not want to have a child at that time ([UN 2015](#)). The non-use of contraception may result from limited access to services, inadequate contraceptive counseling,

general lack of information, or partner and community influences. An analysis of Demographic and Health Survey data examined the met and unmet needs for family planning in 12 countries with HIV prevalence greater than 3% for women aged 15 to 49 years ([MacQuarrie 2015](#)). All the countries meeting those criteria were in Africa. Among HIV-positive women, from 31% to 61% did not need family planning, i.e. they either wanted a child in the next two years, were not sexually active, or were not fertile. The unmet need among HIV-positive women ranged from 11% in Zimbabwe to 23% in Togo, similar to that for HIV-negative women in the same countries. For use of a modern method of contraception among women with HIV, the lowest rates were 12% in Togo and 14% in Cameroon; the highest rates were 44% in Swaziland and Zimbabwe and 59% in Namibia ([MacQuarrie 2015](#)). In France, the need for FP was also high among women living with HIV. An analysis of ANRS VESPA2 data included a representative sample of HIV-positive people ([Maraux 2015](#)). Of women at risk for unplanned pregnancy, only 21% used highly effective contraception, while 59% used condoms and 21% used traditional or no methods. Use did not differ significantly by geographic origin, i.e. sub-Saharan Africa or France or migration from another country.

Studies at specific HIV clinics have illustrated the need for improving FP services. At two Ugandan HIV clinics, 40% of the women with HIV had been pregnant since their HIV diagnosis, and 58% of those pregnancies were desired ([Wanyenze 2015](#)). Significantly more of the male partners had desired the last pregnancy compared with the women. Nearly half of the respondents did not want any more children at all. Unmet need for family planning was 31% and 45% by clinic. In Cape Town, South Africa, 62% of postpartum women with HIV reported their recent pregnancy was unplanned even though 90% reportedly used modern contraception ([Créde 2012](#)). The three-month injectable was most commonly used, i.e. by 70% of HIV-positive women; many may have missed their last injection. Of 200 individuals on ART in Thailand, 44% had a child after HIV diagnosis; most of those pregnancies were unintended ([Kancheva Landolt 2012](#)). About 20% of those women wanted a child or another child. Among 230 women receiving ART at a Ugandan HIV clinic, 28% had an unmet need for FP ([Laryea 2014](#)). Of those using contraception, two-thirds used the male condom.

How the intervention might work

Family planning services may include contraceptive counseling and improved access to contraceptive methods. For this review, behavioral interventions include contraceptive counseling, education, or information dissemination. Such interventions may increase contraceptive uptake and improve use and continuation of the chosen method. Contraceptive counseling can help women living with HIV meet their fertility goals of delaying childbearing or spacing children. Counseling should be appropriate for the woman's fertility intentions, lifestyle, preferences, and socioeconomic situation.

Family planning services must address the fertility intentions of HIV-positive women. In many cultures, a large family is still common and preferred, e.g. in sub-Saharan Africa where the total fertility for many countries approaches or exceeds 5 births per woman ([World Bank 2014](#)). The reasons people living with HIV may want to have children could vary, e.g. wishing to fulfill a social norm, avoiding stigma, or expanding a family after the death of a child. Studies of people living with HIV have shown trends in

characteristics of people desiring to have children. In Cameroon, more than 1400 women receiving ART were surveyed about their fertility intentions (Marcellin 2010). Women who wanted to have a child were more likely to be married or in a stable relationship, have fewer children, and have had a CD4 less than 200 at ART initiation and a better score for health-related quality of life. A Tanzanian study of 410 people living with HIV found those who wanted a child were more likely to live with a partner, have one child or none, have no children with their current partner, perceive their health status to be good, and have a CD4 count above 200 (Mmbaga 2013). In Ethiopia, among more than 1800 women with HIV, those wanting to have children were more likely to be in their early thirties, have completed eight years of schooling, have one child, and be receiving ART (Asfaw 2014).

Why it is important to do this review

Our review examined behavioral interventions to improve contraceptive choices and use among women who are HIV-positive. Some reviews of family planning interventions exclude studies of women with chronic health conditions like HIV, which was our focus here. Interventions focused on condom use are generally intended to prevent the transmission or acquisition of sexually transmitted infections (STIs) and HIV and have been reviewed elsewhere (Carvalho 2011). Cochrane reviews of educational interventions to improve contraceptive use have examined adherence to hormonal contraceptive methods (Halpern 2013), the effectiveness of postpartum education (Lopez 2015), and strategies to improve contraceptive use or prevent pregnancies among young people (Lopez 2016a; Oranganje 2016). Because evidence of what works to improve contraceptive use may be limited from randomized controlled trials, this review also includes non-randomized studies.

OBJECTIVES

We systematically reviewed studies of behavioral interventions for HIV-positive women intended to inform contraceptive choice, encourage contraceptive use, or promote adherence to a contraceptive regimen.

METHODS

Criteria for considering studies for this review

Types of studies

Studies evaluated a behavioral intervention for improving contraceptive use for family planning. The evidence from randomized controlled trials (RCTs) is limited about what women need to make informed choices about contraceptives. The design and conduct of behavioral interventions may be influenced by funding limitations, clinic logistics, and ethics regarding who receives the new program. To broaden the base from which we could draw evidence, we examined non-randomized studies (NRS) as well as randomized trials. NRS had to be comparative. RCTs could have been individually randomized or cluster randomized.

Types of participants

Our review focuses on women who are HIV-positive (HIV+) and of reproductive age, as defined by the study investigators. Data had to be presented separately for HIV-positive women if HIV-negative (HIV-) women were also in the study.

Types of interventions

The behavioral intervention had to address the use of one or more contraceptive methods intended to prevent pregnancy. For this review, interventions had to address modern family planning methods (WHO 2015b), i.e. oral contraceptives, implants, intrauterine contraceptive devices, injectables, female sterilization, or condoms. However, we excluded interventions that focused entirely on condom promotion for preventing transmission of HIV or sexually transmitted infections.

The strategy could have many formats, for example oral communication or written material, group motivation or individual counseling, as well as various types of technology such as video presentations or cell phone reminders. The intervention could have been provided in the clinic or community, conducted through single or multiple sessions, and targeted to women or to heterosexual couples.

The comparison could have been another behavioral intervention, usual care, or no intervention. Since behavioral interventions may be provided to all people in a specific clinic, we also considered studies that compared HIV-positive women versus HIV-negative women.

Types of outcome measures

Primary outcomes

- Pregnancy
- Contraception use, e.g. uptake of a new method or improved use or continuation of current method

Trials had to have one of these outcomes to be included.

Secondary outcomes

- Knowledge of contraceptive effectiveness
- Attitude about contraception in general or about a specific contraceptive method

Search methods for identification of studies

Electronic searches

Until 2 August 2016, we conducted searches of MEDLINE via PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science, and POPLINE. In addition, we searched ClinicalTrials.gov and ICTRP for ongoing trials and for trials with relevant reports or data. We show the search strategies and specific dates in Appendix 1. The earlier search strategies are in Appendix 2.

Searching other resources

We also did the following:

- Examined reference lists of pertinent papers for additional citations;
- Searched the library catalogue of FHI 360 for relevant project reports;
- Contacted investigators in the field for other relevant published or unpublished studies.

Data collection and analysis

Selection of studies

We assessed for inclusion all titles and abstracts identified during the literature search. Two authors independently examined the search results for potentially eligible studies. We resolved any discrepancies by discussion. For studies that appeared to meet the criteria for this review, we obtained and examined the full-text articles.

Data extraction and management

Two authors extracted the data. One author entered the data into RevMan, and a second author verified accuracy. These data included the study characteristics, risk of bias (quality assessment), and outcome data. We resolved any discrepancies by discussion.

Intervention fidelity

We used an existing framework to assess the quality of the behavioral interventions ([Borrelli 2011](#)). Domains of treatment fidelity are study design, training of providers, delivery of treatment (intervention), receipt of treatment, and enactment of treatment skills. The framework was intended for assessing current trials. We examined five criteria of interest for our review.

- Study design: had a curriculum or intervention plan
- Prior training of providers: specified providers' credentials
- Project-specific training: provided standardized training for the intervention
- Delivery: assessed providers' adherence to the protocol
- Receipt: assessed clients' understanding and skills regarding the intervention

Assessment of risk of bias in included studies

We evaluated the included RCTs for methodological quality in accordance with recommended principles ([Higgins 2011](#)), and entered the information into the 'Risk of bias' tables. We considered the randomization method, allocation concealment, blinding, and losses to follow-up and early discontinuation.

For the NRS considered for inclusion, we used the Newcastle-Ottawa Quality Assessment Scale (NOS) ([Higgins 2011](#); [Wells 2014](#)). Of the two NOS versions, i.e. for case-control and cohort studies, the latter was more pertinent here ([Appendix 2](#)). The developers are examining the criterion validity and construct validity of this scale, as well as the inter-rater reliability and intra-rater reliability. The scale does not yet have an overall scoring or threshold for a 'good' or 'poor' quality study. The NOS has eight items within three domains: selection (representativeness), comparability (due to design or analysis), and outcomes (assessment and follow-up). A study can receive one star (*) for meeting each criterion. The exception is comparability (design or analysis), for which a study can receive two stars (for design and analysis). We adapted the NOS items as suggested by the developers ([Wells 2014](#)).

For the initial review, all studies were non-randomized, and we created 'Additional tables' for the NOS criteria. For this update, we revised the 'Risk of bias' tables to incorporate the NOS criteria as well as those for RCTs. We transferred the information in the 'Additional tables' to the 'Risk of bias' tables.

Measures of treatment effect

With non-randomized studies, investigators need to control for confounding factors. When available, we used adjusted measures that the investigators considered as the primary effect measures. Odds ratio (OR) is an appropriate effect measure for both cohort and case-control studies and is commonly provided when adjusted analyses are obtained using logistic regression models. We considered other effect measures if an appropriate adjusted OR was not available from the report. The effect measure may have been an odds ratio, risk ratio, hazard ratio or incidence difference. We based the comparisons on post-intervention assessments or changes from pre- to post-intervention between groups.

Investigators used a variety of adjustment strategies. We specified whether confounding was considered in the design (e.g. matching or stratification). We provide the confounding factors considered in the design and analysis when presenting results. When investigators used multivariate models to adjust for potential confounding, we did not analyze the treatment effect as that would usually require individual participant data. Rather we show the results from adjusted models as reported by the investigators. If no adjusted measures were given as part of the primary analysis, we used unadjusted measures. For unadjusted dichotomous outcomes, we calculated the Mantel-Haenszel odds ratio (OR) with 95% confidence interval (CI), using a fixed-effect model. An example is the proportion of women who initiated use of a particular contraceptive method. Fixed and random effects give the same result if no heterogeneity exists, as when a comparison includes only one study.

Unit of analysis issues

If clustering was part of the design, we assessed whether the study investigators properly adjusted the estimates to account for clustering effects. Cluster RCTs may use various methods of accounting for the clustering, such as multilevel modeling. We noted the specific methods used in the results for each included study and presented the results as reported by the investigators.

Dealing with missing data

We wrote to investigators to request missing data, such as sample sizes for analysis and actual numbers for outcomes presented in figures. However, we limited our requests to studies less than 10 years old, as well as studies that had a report within the past five years. Investigators are unlikely to have access to data from older studies.

Assessment of heterogeneity

Given the diversity of design features with non-randomized studies, we did not conduct meta-analysis for pooled estimates. We assessed sources of heterogeneity without pooling the data. We addressed heterogeneity due to differences in populations, study design, interventions, outcome measures, and analysis. The location and setting may influence the design and results. The type of outcome measure may affect results, and we have addressed this below. In addition, we synthesized results by the type of intervention, e.g. counseling or counseling plus improved access to services.

Data synthesis

To assess the quality of evidence and address confidence in the effect estimates, we applied principles from GRADE (Grades of Recommendation, Assessment, Development and Evaluation) (Higgins 2011; GRADE 2013). As meta-analysis was not viable due to varied interventions and outcome measures, a typical 'Summary of findings' table was not feasible. Also, the criteria for NRS and RCTs differ. We did provide a 'Summary of findings' table for the main results, although we did not conduct a formal GRADE assessment for all outcomes (GRADE 2013).

We based our assessment of the body of evidence on the quality of evidence from the included studies, and entered the information into the 'Risk of bias' tables. For the NRS, we used the Newcastle-Ottawa Quality Assessment Scale (NOS) as noted earlier (Appendix 2). After revising the 'Risk of bias' tables to incorporate the NOS criteria, we developed specific criteria for downgrading the evidence from the studies.

- Inadequate randomization sequence generation or allocation concealment, no information for either, or the study was non-randomized
- NRS: not meeting at least one NOS criterion for selection
- NRS: not controlling for relevant confounding
- Follow-up less than 6 months for contraceptive use or less than 12 months for pregnancy

- Loss to follow-up greater than 20% or retrospective chart review of selected cases

RESULTS

Description of studies

Results of the search

The original search in 2012 resulted in 2867 citations due to the broad nature of the search for educational interventions (Figure 1). This includes 2760 items from the database searches. Another 107 came from other sources: 40 from ClinicalTrials.gov and ICTRP and 67 from reference lists and unpublished project reports. After removing duplicates, the final total was 2138 references. We discarded 2053 citations based on examination of the titles and abstracts and reserved 44 for possible use as background literature. Many reports were not from intervention studies, while others were primarily prevention studies and did not focus on women who were HIV-positive. Still others did not have appropriate study designs or did not examine our outcomes. From the clinical trials databases, we found two trials that seemed to meet our criteria and had not been published. Both are completed and the manuscripts are being prepared for publication. The investigators could not yet share outcome data. Descriptions can be found in Characteristics of studies awaiting classification. We examined the full text of 39 reports for possible inclusion as original studies or related articles providing additional information.

Figure 1. Study flow diagram, 2012

For the 2016 version, database searches produced 1035 citations. Another 11 references came from other sources: 9 unduplicated listings from ClinicalTrials.gov and ICTRP plus 2 supplemental items for a potentially eligible study. The new total was 1046 items. After removing 313 duplicates, we had 733 references ([Figure 2](#)). We discarded 721 citations based on title or abstract. We added one

trial to [Ongoing studies](#); another led to a completed study that we eventually excluded. We obtained the full text for 12 reports, which included 6 primary and 6 secondary articles. Three studies met the eligibility criteria with three primary articles and four secondary reports or supplemental items. We excluded three primary articles and two related secondary reports.

Figure 2. Study flow diagram, 2016

Included studies

Ten studies met our eligibility criteria with the three added in this update.

- Of eight NRS, seven were prospective and one was a retrospective review of medical records. The NRS included a total of 8980 participants; the median was 721 (range 98 to 4031).

- Two studies were cluster RCTs with 18 sites each. One trial had 3552 participants and the other had 3584 participants, although the effective sample sizes would be smaller due to the assignment of sites rather than individuals.

Comparisons

Six studies compared a special FP intervention versus standard FP or HIV services. Four studies provided the different interventions by site (Ngure 2009; McCarraher 2011; Grossman 2013; Bachanas 2016), one had different clinical teams (Kosgei 2011), and one used different time frames (Sarnquist 2014).

For four studies, we examined the outcomes for women who were HIV-positive versus those who were HIV-negative. In two studies, all the women received the family planning intervention (King 1995; Brou 2009). In the other two, both groups had HIV post-test counseling but only the HIV-positive women received family planning counseling (Temmerman 1990; Allen 1993).

Outcomes

All included studies reported on use or uptake of contraception, and focused on more effective or modern contraceptives. Studies varied in the types of contraceptives examined (Characteristics of included studies). Six provided data on condom use (Temmerman 1990; Allen 1993; Brou 2009; Kosgei 2011; Grossman 2013; Bachanas 2016). Nine provided data on pregnancy (Temmerman 1990; Allen 1993; King 1995; Brou 2009; Ngure 2009; Kosgei 2011; Grossman 2013). One study addressed our secondary outcome of knowledge but only regarding IUC (Sarnquist 2014).

Intervention fidelity information

We extracted information on intervention fidelity (Table 1). Only three studies provided information for four or more criteria. Eight studies were published since 2009, so we do not attribute lack of information solely to limited reporting during an earlier era. Some may have been more focused on HIV counseling and testing or integrating services than on contraceptive education. The areas missing information most frequently were training for the intervention (5 studies, mostly older ones), assessing adherence to the intervention protocol (6 studies), and assessing participants' receipt of the intervention (7 studies). These results were comparable to those from a small review of NRS on postpartum education (Lopez 2014) rather than what we have found in other recent work on behavioral strategies (Lopez 2015; Lopez 2016a; Lopez 2016b).

Excluded studies

We excluded 21 studies for which we examined the full text plus 7 secondary papers from those studies. Some did not provide a behavioral intervention focused on contraception. Others were not comparative or did not have the relevant outcome data. Characteristics of excluded studies contains the specific reasons.

Risk of bias in included studies

Figure 3 summarizes our assessments of risk of bias for the overall review. Table 2 shows how we rated each study and Figure 4 illustrates our assessment for each study. Because we adapted the 'Risk of bias' tables to accommodate criteria for NRS, some categories are not relevant to an RCT or to an NRS. In those cases, we left the category blank so that an empty cell in Figure 4 indicates the criterion was 'not applicable' rather than 'unclear.'

Figure 3. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

Figure 4. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	NOS selection (NRS)	NOS comparability	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Outcome assessment: method used	Incomplete outcome data (attrition bias)
Allen 1993	⊖		⊕	⊖	⊖	?	⊖	⊕
Bachanas 2016	⊕	⊕			⊖	?	⊖	⊕
Brou 2009	⊖		⊕	⊕	⊖	?	?	?
Grossman 2013	⊕	⊕			⊖	⊖	⊖	⊖
King 1995	⊖		⊕	⊖	⊕	⊕	?	⊕
Kosgei 2011	⊖		⊕	⊕	⊖	?	⊕	⊖
McCarraher 2011	⊖		⊕	⊕	⊖	?	?	⊕
Ngure 2009	⊖		?	⊖	⊖	?	?	?
Sarnquist 2014	⊖		⊕	⊖	⊖	?	⊖	⊕
Temmerman 1990	⊖		⊕	⊖	⊖	?	⊖	⊖

Allocation

The two cluster RCTs provided information on the random sequence generation. For NOS selection criteria in the NRS, we considered seven studies to have low risk of bias and two to have high risk. One with high risk was a substudy within an RCT; participants selected into that trial (Ngure 2009).

For NOS comparability criteria, five NRS did not adjust for potential confounding factors (Temmerman 1990; King 1995; Ngure 2009; Kosgei 2011; Sarnquist 2014). Ngure 2009 stated that adjustment for age and number of children did not produce meaningful results and presented unadjusted rates. Kosgei 2011 matched on some baseline characteristics but noted the study groups differed in other characteristics.

Blinding

For most studies, blinding was not feasible due to the type of intervention. Two of the newer reports stated the study was open or that the providers and participants were aware of the allocation (Bachanas 2016; Grossman 2013).

Incomplete outcome data

Several studies had high risk of bias for various reasons. One study clearly had high loss to follow-up (Temmerman 1990). However, Kosgei 2011 was a retrospective study using medical records, and the investigators excluded cases with incomplete data. While Grossman 2013 was a prospective trial, investigators gathered outcome data from medical records of clinic encounters that had contraceptive data at "end line" (one year after intervention training).

Other potential sources of bias

For the outcome measures, all assessments of contraceptive use were based on self report. Of seven studies with pregnancy data, three had an objective measure.

Effects of interventions

See: [Summary of findings for the main comparison; Summary of findings 2](#)

Enhanced family planning services versus standard care

Six studies compared a special FP intervention versus standard care such as basic FP or referral to a separate FP clinic. Of four NRS, two provided the different interventions by site, one had different clinical teams, and one used different time frames. Ngure 2009 was a NRS conducted within an RCT of acyclovir to prevent HIV transmission. The study had one intervention site and two control sites in Kenya, and included 1429 HIV serodiscordant couples. The investigators compared a multifaceted intervention to increase dual contraceptive uptake versus usual care. Follow-up lasted 24 months until study end. We present the results for HIV+ women.

- The investigators analyzed the reported use of non-condom contraceptives per visit rather than per woman. The visits were after the intervention began. For HIV+ women, use of non-condom contraceptives was more likely at the intervention site than at the comparison sites (OR 6.40, 95% CI 5.37 to 7.62) (Analysis 1.1). The investigators had reported the results as OR 6.4 (95% CI 4.6 to 8.9). Condom use (per sex act) was reportedly

high during follow-up for both HIV-positive (88%) and HIV-negative (91%) women from all sites.

- For the HIV+ women, the reported pregnancy incidence declined at the intervention site from 13.5 to 8.7 per 100 women-years, for a change of -4.8 (Analysis 1.2). At the comparison sites, pregnancy incidence increased from 16.8 to 21.9, for a change of 5.1 (Analysis 1.2). Adjusted pregnancy incidence rates were lower in the intervention site than in the comparison sites after the intervention, but the report only provided the results for HIV + and HIV- women combined.

McCarraher 2011, an NRS, had five sites in Nigeria (N = 335). All sites had already integrated FP with HIV services. The comparison was enhanced FP versus basic FP services among HIV-positive participants. Sites with enhanced services had, e.g. providers trained in FP and counseling and volunteers to educate community members, as well as basic services. The sites with basic services only had facility assessment for the capacity to provide services and training, along with other administrative tools. Use of modern contraceptives was assessed at follow-up (12 to 14 months). Women at the sites with enhanced integrated services were more likely to use modern contraceptives at follow-up compared with women at sites with basic integrated services (OR 2.48, 95% CI 1.31 to 4.72) (Analysis 5.1), based on unadjusted comparisons. The report provided differences from baseline to follow-up for each group. The reported adjusted differences in use of modern contraceptives were 11.0% and 11.6% for the enhanced and basic groups, respectively (Analysis 5.2), a non-significant difference.

The retrospective study of Kosgei 2011 used medical records for women with HIV in Kenya (N = 4031). One clinical team provided the FP intervention integrated with HIV services and two provided routine FP. Investigators excluded cases with incomplete data. Mean follow-up time was approximately 11.4 months for the group receiving integrated family planning and 12 months for the group with routine care.

- The analysis focused on new use of modern contraceptives (excluding condoms) for pregnancy prevention. Reported incident rates per 100 women-years were low: integrated services, 4.8 (95% CI 3.7 to 6.0); routine care, 7.8 (95% CI 6.8 to 8.9). Women in the integrated services group were less likely to report using a modern contraceptive compared with the routine care group. The reported attributable risk was -3.0 (95% CI -4.6 to -1.4) (Analysis 4.1),
- New use of condoms was more likely for the integrated services group compared with the routine services group. The reported attributable risk was 16.4 (95% CI 11.9 to 21.0) (Analysis 4.1).
- For pregnancy incidence, the study arms did not differ significantly (Analysis 4.2).

In an NRS in Zimbabwe (N = 98), Sarnquist 2014 integrated family planning with services for PMTCT. The study tested a peer education program about reproductive health plus standard FP. The comparison group only received the standard FP. At three months, the special intervention was not associated with using LARC overall or the specific methods of IUD and implant (Analysis 2.1). The subgroup analysis showed substantial heterogeneity ($I^2 = 78\%$). Proportionately more women in the standard care group used the IUD while the reverse was the case for implant use. However, only four women overall used the IUD. The study arms did not differ significantly in use of other modern contraception

(Analysis 2.2). The sample size calculation was based on the ability to detect a difference in a belief outcome rather than a contraceptive use outcome. For the knowledge outcome, women in the intervention group were more likely than those in the comparison group to know that an IUD was effective in preventing pregnancy (OR 4.58, 95% CI 1.71 to 12.29) (Analysis 2.3).

The two cluster RCTs provided the different interventions by site. Grossman 2013 had 18 sites in Kenya and a total of 3584 participants; 12 sites provided integrated FP and HIV services and 6 provided standard referral to a separate FP clinic in the same facility. The women were receiving care at the HIV clinics. At the end of the project, women at the intervention sites were more likely than those at the control sites to use a more effective contraceptive (adjusted OR 1.81, 95% CI 1.24 to 2.63) (Analysis 6.1). More effective methods included sterilization, IUD, implant, injectable, or OCs. The study groups did not differ significantly for dual method use (condoms plus a more effective method), using condoms (alone or with another method), or using any family planning (Analysis 6.1). For pregnancy, the reported incidence rate ratio did not differ significantly between the two arms (Analysis 6.2).

Bachanas 2016 provided an HIV and FP intervention versus usual care in this cluster RCT. The trial had 18 sites, with 6 sites in each of three countries (Kenya, Namibia, and Tanzania) and 3522 participants. The investigators pooled the 6- and 12-month outcomes, controlling for correlation between 6 and 12 months. The HIV and FP intervention was provided at the site level for all clients not just study participants.

- Among contraceptive use outcomes, the intervention groups did not differ significantly for dual method use (Analysis 3.1). For use of a highly effective contraceptive, women at the Tanzania intervention sites were more likely than those at the usual care sites to use such a method (adjusted OR 2.25, 95% CI 1.24 to 4.10) (Analysis 3.1). In Kenya and Namibia, the study arms did not show an intervention effect.
- For unprotected sex at last vaginal sex, only the Tanzania sites showed an intervention effect. The Tanzania intervention sites were less likely than the usual care sites to report unprotected sex at last vaginal sex (adjusted OR 0.23, 95% CI 0.14 to 0.40) (Analysis 3.2). The effect was not evident for the Kenya and Namibia sites. Overall, the intervention sites were less likely to report any unprotected sex in past 2 weeks compared with the usual care sites (adjusted OR 0.56, 95% CI 0.32 to 0.99) (Analysis 3.2).

Family planning counseling (HIV+ versus HIV- women)

For four NRS, we compared outcomes for HIV+ women with those for HIV- women. Some studies had used a before-and-after design to examine intervention associations with the outcomes. In two studies, the women who tested positive for HIV received FP counseling. Those who tested negative for HIV only had counseling on their results.

- Temmerman 1990 was conducted in Kenya (N = 188). The intervention involved a postpartum counseling session on preventing HIV transmission and using contraception. Investigators recruited participants from a study of HIV infection and pregnancy. At one year, the HIV-positive and HIV-negative groups were not significantly different for use of oral contraceptives (Analysis 7.1) or condoms (Analysis 7.3). The HIV-

positive and HIV-negative groups were not significantly different for pregnancy (Analysis 7.4).

- The larger study of Allen 1993 took place in Rwanda (N = 1458). Like Temmerman 1990, the intervention involved one counseling session after HIV testing. The women were attending pediatric and prenatal clinics. The study groups were not significantly different for use of hormonal contraceptives at one year (Analysis 7.1). The HIV-positive women were more likely to have discontinued their chosen method of contraception (OR 2.52, 95% CI 1.53 to 4.14) (Analysis 7.2). They were more likely to be using condoms (OR 2.82, 95% CI 2.18 to 3.65) and spermicide (OR 2.36, 95% CI 1.69 to 3.30) at one year (Analysis 7.3). At two years, the HIV-positive women were less likely to have been pregnant than the HIV-negative women (OR 0.55, 95% CI 0.43 to 0.69) (Analysis 7.4). From logistic regression, the investigators reported that HIV-negative serostatus predicted pregnancy after adjusting for age, marital status, sexual episodes per month, and number of living children. They did not show those data but rather the results of multivariate analysis stratified by HIV status.

In the other two studies, both HIV+ and HIV- women received the same FP services and counseling. Many of the women in King 1995 (N = 502) had also been part of Allen 1993. The intervention was a 15-minute video on contraceptives plus discussion and provision of contraceptives. The mean follow-up time for use of hormonal contraceptives was 5.4 months; the average for pregnancy was one year. The HIV+ and HIV- groups did not differ significantly for use of oral contraceptive pills, injectables, or implants (Analysis 8.1). The investigators examined new users, but not by HIV status. For incident pregnancy, the risk was lower for HIV+ women compared with HIV- women (OR 0.39; 95% CI 0.23 to 0.68) (Analysis 8.2). Mean follow-up time was approximately 12 months. The investigators also reported incident pregnancy for an earlier cohort in which 77% of women in this study participated (Allen 1993). Incident pregnancy had been 22% in the earlier group of HIV+ women versus 9% after the intervention here. Among HIV- women, pregnancy had been 30% versus 20% post intervention.

- In Brou 2009, which took place in Côte d'Ivoire, participants were HIV+ and HIV- pregnant women (N = 939). The intervention included HIV testing and counseling, family planning information, and free provision of modern contraceptives. The goal was PMTCT.
 - The hazard ratio for new pregnancy from adjusted analysis indicated the HIV+ and HIV- groups did not differ significantly (Analysis 9.1). However, HIV+ women had a lower incidence of undesired pregnancy per 100 women-years (1.07, 95% CI 0.41 to 1.73) compared with HIV- women (2.39, 95% CI 1.25 to 3.53) (reported P = 0.023) (Analysis 9.2).
- For modern contraceptive use, the reported hazard ratio showed no significant difference between the HIV+ and HIV- women (Analysis 9.1). For unadjusted use, HIV+ women were less likely than those who were HIV- to report using modern contraceptives at month 12 (OR 0.62, 95% CI 0.46 to 0.84) and month 24 (OR 0.53, 95% CI 0.40 to 0.72) (Analysis 9.3). The subgroup analysis showed heterogeneity ($I^2 = 72.5\%$). The HIV+ group lost 20% of women versus 13% for the HIV- group. The HIV- group had proportionately more IUD users at the later times. Project staff members were not recommending the IUD for HIV+ women due to the risk of infection.

- HIV+ and HIV- groups did not differ significantly for consistent condom use at months 3, 12, or 18 ([Analysis 9.4](#)).

DISCUSSION

Summary of main results

We summarized the results for each study in [Table 3](#), along with the quality of evidence. In this section, we focus on four studies that provided evidence of high or moderate quality and showed an association of the intervention with pregnancy or contraceptive use. Two were non-randomized studies and two were cluster RCTs.

Three studies compared enhanced family planning services versus usual care ([Summary of findings for the main comparison](#)). The NRS of [McCarraher 2011](#) was conducted in Nigeria; all sites had integrated HIV and FP services. At one year, women with enhanced integrated services were more likely to report using a modern method of contraception compared with women who received basic integrated services. Two studies were cluster randomized trials that compared FP integrated with HIV services versus usual HIV care. The interventions included the utilization of peer educators or lay counselors.

- In Kenya, [Grossman 2013](#) compared FP services integrated with HIV care versus standard referral to a separate clinic. Assessment occurred one year after the intervention training. Women at the sites with integrated services were more likely to report using a more effective method of contraception compared with women at the standard referral sites. The study arms did not differ significantly in self-reported pregnancy, dual method use (condoms plus a more effective contraceptive method), any family planning, or condom use.
- At sites in Kenya, Namibia, and Tanzania, [Bachanas 2016](#) compared an HIV prevention and FP intervention versus usual HIV care. The investigators pooled the 6- and 12-month data. Women at the special intervention sites in Tanzania were more likely to report using a highly effective contraceptive compared with women at the usual care sites. Women at the special intervention sites in Tanzania were also less likely to report having had unprotected sex (no condom use) at last intercourse. Across the three countries, women at the special intervention sites were less likely to report having had any unprotected sex in the past two weeks. The study arms did not differ significantly in dual method use (condoms plus a highly effective contraceptive).

A non-randomized study integrated HIV testing and counseling with FP services in Côte d'Ivoire ([Brou 2009](#)). Investigators compared the outcomes for HIV+ and HIV- women who received essentially the same intervention ([Summary of findings 2](#)). By 24 months, the HIV + women had a lower incidence of undesired pregnancy compared with the HIV- women. The two groups did not differ significantly for overall pregnancy, use of a modern contraceptive method, or consistent condom use.

Of the remaining six studies, four with low quality evidence showed significant differences between groups in contraceptive use or pregnancy ([Table 3](#)). Two studies with low quality evidence did not.

Overall completeness and applicability of evidence

The studies were heterogeneous in design. Two were cluster RCTs, seven were prospective NRS, and one was a retrospective review of medical records. The six more recent studies were more informative regarding effective FP education for women who are HIV+. These studies compared a special FP intervention with usual care. Comparisons in the other four studies were between HIV+ and HIV- women. Of these earlier studies, two provided the intervention to all women, and two provided FP counseling to the HIV+ women only.

Differing time frames likely influenced the design, intervention content, and outcome measures. Newer studies had stronger designs and more consistent measures of condom use and of contraceptive use, i.e. use of modern methods or more effective methods of contraception. Three studies were conducted in the 1990s, early in the HIV epidemic, and a fourth began in 2001. They reported on the most commonly used contraceptive methods at the time and in those locations.

For the behavioral interventions, the services and methods of delivery varied more among the later studies, e.g. utilizing peer educators and providing group as well as individual education ([Table 1](#)). Some reports provided more information on service delivery, i.e. integrating FP with HIV services, than on the educational content. More focus on providing counseling specific to the concerns of women living with HIV, may further improve the use of modern contraceptives for contraception. Five studies provided training on FP methods as well as the educational content or process; four showed significant differences between the intervention and control groups. Two studies observed staff during counseling sessions, one held discussions about counseling, and one supervised LARC insertion. Across all studies, the behavioral interventions appeared to provide at least standard information on contraceptive methods.

Most studies in this review limited participants to age 18 or older. Two studies included adolescents as young as 15 or 16 years with an upper limit of 35 or 49 years. Some reviews of reproductive health interventions have focused on young people. One addressed reaching youth through providing services outside of traditional health facilities ([Denno 2012](#)). Therefore, the outcomes included use of services or related commodities and not necessarily behavioral change. Another review addressed reproductive health and rights, such as treatment adherence and mental health as well as family planning ([Pretorius 2015](#)). The included studies did not meet our design criteria or have our contraceptive outcomes.

The studies included in this review were conducted in Africa: four in Kenya; two in Rwanda; one each in Côte d'Ivoire, Nigeria, and Zimbabwe; and one in Kenya, Namibia, and Tanzania. Most of the HIV programming and research efforts have been focused on Africa ([Petruney 2012](#)) where the highest prevalence rates are found ([UNAIDS 2015](#); [WHO 2015a](#)). For other geographic areas, FP interventions for women with HIV may need to differ in counseling format and service implementation. For example, the at-risk populations differ in Asia, where variations are evident in health systems, culture, and socioeconomic factors ([Petruney 2012](#)).

Quality of the evidence

Reports prior to 2010 provided lower quality of evidence while those published later had moderate quality on average. The quality was high for one cluster RCT, moderate in three studies, low in four, and very low in two studies. Therefore, we considered the overall quality of evidence to be low (Table 2).

The main reason for downgrading was for being non-randomized. Most of the earlier NRS did not use matching in the design or adjust the analysis for potential confounding. One was a retrospective chart review. Two studies provided the intervention by site or clinical team but did not adjust for clustering (Ngure 2009; McCarragher 2011). However, with the few units in those studies, adjustment for clustering would not have been meaningful.

Self report of outcomes was common. Contraceptive use is routinely assessed by self report, except for clinical trials of specific methods. Of seven studies with pregnancy, three had an objective assessment. Pregnancy data were generally for incidence, while contraceptive data usually reflected current use rather than change or continuation.

Potential biases in the review process

For the initial review, we included two types of comparison: (1) special intervention versus usual care; (2) HIV+ versus HIV- women. This broadened the base from which we could draw evidence, but increased the difficulty of drawing conclusions across studies. Four of the older studies were in the latter category. In this update, 6 of 10 studies compared a special FP intervention with usual care or services, and those included the newly added studies.

Some of the earlier reports were from analyses of data from larger studies. For King 1995, 77% of the participants came from an earlier cohort study (Allen 1993). The participants in Brou 2009 were involved in either a cohort study providing peripartum and postnatal intervention to prevent MTCT (HIV+ women) or HIV counseling and reproductive health care (HIV- women). Counseling provided in the earlier interventions may have influenced the outcomes in the studies we reviewed. For Temmerman 1990, data were collected within a research project on HIV infection and pregnancy outcome. Bias in the intervention was unlikely as the primary study provided the intervention at 7 to 14 days postpartum, and the substudy assessed the outcomes at one year postpartum.

Agreements and disagreements with other studies or reviews

Access to contraceptives may be improved by integrating family planning with HIV services programs. In Ethiopia, family planning was integrated into voluntary testing and counseling services (Bonnenfant 2012). With improved access to contraceptive counseling, 11% of the men and 8% of the women changed their fertility intentions after post-test counseling, i.e. they no longer wanted children. A case study in Swaziland found that women at more integrated sites had more FP counseling but they received condoms less often, and unmet FP need did not differ significantly by model of care (Church 2015). An uncontrolled study in Malawi integrated FP services into HIV care (Phiri 2016). The investigators tailored FP counseling to the needs of people with HIV and focused on the use of LARC. Outcomes included provision of FP services and messages as well as uptake of contraceptive methods. Of

the women who initiated use of a modern contraceptive, more than half chose DMPA, 19% selected IUC, 14% chose OCs, and 12% received an implant. However, the report did not provide any pre-integration data for comparison. In Uganda, an RCT examined integrating HIV testing and counseling into community-based FP services (Brunie 2016). A formative assessment focused on the uptake of HIV testing and counseling and attitudes regarding testing rather than the contraceptive outcomes of interest in our review.

Several reviews have addressed the feasibility and utility of integrating HIV and FP services. One indicated some positive results of integrated services on condom use, while results were mixed for use of other contraceptives (Kennedy 2010). A related review examined service integration models (Lindegren 2012), two of which are in our review. The investigators reported integration of FP and HIV services was associated with improvements in contraceptive use in some studies, but most focused on provision or use of services. Another review of integrated interventions included FP counseling and services, counseling for adherence to HIV medications, STI assessment and treatment, and other topics (Medley 2015). We considered the same FP studies, some of which met our inclusion criteria. The investigators concluded that the FP interventions were associated with improved contraceptive use but not with pregnancy. They did not assess the quality of evidence.

Hormonal contraception and HIV risk

Important considerations in FP for women with HIV include the potential associations of hormonal contraception with HIV acquisition, transmission, and disease progression. Two major health organizations reviewed the relevant evidence for their Medical Eligibility Criteria (WHO 2016; CDC 2012). After technical consultation in 2012, the World Health Organization recommended that women at high risk for HIV and women living with HIV continue using all existing hormonal contraceptives with no restriction (WHO 2016). The evidence was inconclusive regarding the use of progestin-only injectables and a woman's risk of acquiring HIV. Therefore, the WHO added a clarification, strongly urging that women choosing progestin-only injectables also use condoms. In the USA, the Centers for Disease Control and Prevention came to the same conclusions (CDC 2012).

An open-label RCT that started in late 2015 will examine whether contraceptive use is associated with increased risk for HIV infection (ECHO 2016). The investigators will compare two hormonal methods of contraception, i.e. the injectable DMPA and the levonorgestrel implant, as well as the non-hormonal copper IUD. The trial plans to enroll about 7800 women in four countries (Kenya, South Africa, Swaziland, and Zambia). Expected study completion is June 2019.

AUTHORS' CONCLUSIONS

Implications for practice

More recent studies of FP counseling for HIV+ women focused on the use of modern or more effective methods of contraception. Several studies integrated FP with HIV services to improve access. In three studies with good quality evidence, the special intervention was associated with greater use of modern or more effective contraception. One also showed that unprotected sex was less frequent for the intervention sites, especially in one country for that project. All three studies provided training on FP and counseling

for the health care providers or peer educators. Two observed counseling sessions and one supervised LARC insertions. The services that made a difference were enhanced versus basic FP services (all integrated), FP services integrated with HIV care versus standard referral, and an HIV prevention and FP intervention versus usual care. The latter two studies involved peer or lay counselors in providing FP education.

Implications for research

Improvements in HIV treatment have influenced the fertility intentions of people living with HIV. Women with HIV may have special concerns regarding family planning. Yet comparative research on contraceptive counseling for HIV+ women is still limited; we added three new studies to the original seven in this review. Study designs and interventions varied over time. The

quality of evidence was moderate from more recent studies and low for the earlier ones. Reporting was more thorough and consistent for the later work. In our initial review, we called for research to focus on assessing women's needs and training providers to address those needs rather than deliver standardized information. In this update, we found training on FP methods and counseling was more common, which may strengthen the intervention and improve contraceptive use. More effective counseling methods are especially needed for limited resource settings, which include clinics focusing on people living with HIV.

ACKNOWLEDGEMENTS

2013: From FHI 360, Carol Manion helped develop the search strategies and Sarah Mullins helped review search results.

REFERENCES

References to studies included in this review

Allen 1993 {published data only}

Allen S, Serufulira A, Bogaerts J, Van de Perre P, Nsengumuremyi F, Lindan C, et al. Confidential HIV testing and condom promotion in Africa. Impact on HIV and gonorrhea rates. *JAMA*. 1992/12/16 1992; Vol. 268, issue 23:3338-43.

* Allen S, Serufulira A, Gruber V, Kegeles S, Van de Perre P, Carael M, et al. Pregnancy and contraception use among urban Rwandan women after HIV testing and counseling. *American Journal of Public Health*. 1993/05/01 1993; Vol. 83, issue 5:705-10.

Bachanas 2016 {published data only}

* Bachanas P, Kidder D, Medley A, Pals SL, Carpenter D, Howard A, et al. Delivering Prevention Interventions to People Living with HIV in Clinical Care Settings: Results of a Cluster Randomized Trial in Kenya, Namibia, and Tanzania. *AIDS and Behavior* 2016 Mar 19 [Epub ahead of print]. [DOI: [10.1007/s10461-016-1349-2](https://doi.org/10.1007/s10461-016-1349-2)]

Zhang J, Pals SL, Medley A, Nichols C, Bachanas P, van Zyl D, et al. Parameters for sample size estimation from a group-randomized HIV prevention trial in HIV clinics in sub-Saharan Africa. *AIDS and Behavior* 2014;**18**(12):2359-65.

Brou 2009 {published and unpublished data}

Brou H, Djohan G, Becquet R, Allou G, Ekouevi DK, Zanou B, et al. Sexual prevention of HIV within the couple after prenatal HIV-testing in West Africa. *AIDS Care*. 2008/05/02 2008; Vol. 20, issue 4:413-8.

* Brou H, Viho I, Djohan G, Ekouevi D K, Zanou B, Leroy V, et al. [Contraceptive use and incidence of pregnancy among women after HIV testing in Abidjan, Ivory Coast]. *Revue d'epidemiologie et de sante publique* 2009;**57**(2):77-86.

Grossman 2013 {published data only}

Cohen C. Study Protocol Family Planning and HIV Integration. http://integrationforimpact.org/wp-content/uploads/2012/05/Study-Protocol_FP_HIV-Integration_03Dec10.pdf (accessed 12 April 2016).

* Grossman D, Onono M, Newmann SJ, Blat C, Bukusi EA, Shade SB, et al. Integration of family planning services into HIV care and treatment in Kenya: a cluster-randomized trial. *AIDS* 2013;**27** Suppl 1:S77-85.

Integration for Impact. Training Manual Fully Integrated Family Planning and HIV/AIDS Care and Treatment Clinics, Nyanza Province. http://integrationforimpact.org/wp-content/uploads/2012/05/Supplemental-training-for-clinicians_Integration-of-FP-and-HIV-Services.pdf (accessed 12 April 2016).

Onono M, Guze MA, Grossman D, Steinfeld R, Bukusi EA, Shade S, et al. Integrating family planning and HIV services in western Kenya: the impact on HIV-infected patients' knowledge of family planning and male attitudes toward family planning. *AIDS Care* 2015;**27**(6):743-52.

King 1995 {published data only}

King R, Estey J, Allen S, Kegeles S. A family planning intervention to reduce vertical transmission of HIV in Rwanda. *AIDS*. US: Lippincott Williams & Wilkins, 1995; Vol. 9, issue Suppl 1:S45-51.

Kosgei 2011 {published and unpublished data}

Kosgei RJ, Lubano KM, Shen C, Wools-Kaloustian KK, Musick BS, Siika AM, et al. Impact of integrated family planning and HIV care services on contraceptive use and pregnancy outcomes: a retrospective cohort study. *Journal of Acquired Immune Deficiency Syndrome*. 2011/10/04 2011; Vol. 58, issue 5:e121-6.

McCarraher 2011 {published data only}

Chabikuli NO, Awi DD, Chukwujekwu O, Abubakar Z, Gwarzo U, Ibrahim M, et al. The use of routine monitoring and evaluation systems to assess a referral model of family planning and HIV service integration in Nigeria. *AIDS*. 2010/02/02 2009; Vol. 23 Suppl 1:S97-S103.

* McCarraher DR, Vance G, Gwarzo U, Taylor D, Chabikuli ON. Changes in contraceptive use following integration of family planning into ART Services in Cross River State, Nigeria. *Studies in Family Planning* 2011; Vol. 42, issue 4:283-90.

Ngunjiri 2009 {published and unpublished data}

Lingappa JR, Kahle E, Mugo N, Mujugira A, Margaret A, Baeten J, et al. Characteristics of HIV-1 discordant couples enrolled in a trial of HSV-2 suppression to reduce HIV-1 transmission: the partners study. *PLoS One*. 2009/05/01 2009; Vol. 4, issue 4:e5272.

* Ngunjiri K, Heffron R, Mugo N, Irungu E, Celum C, Baeten JM. Successful increase in contraceptive uptake among Kenyan HIV-1-serodiscordant couples enrolled in an HIV-1 prevention trial. *AIDS*. 2010/02/02 2009; Vol. 23 Suppl 1:S89-95. [NCT00194519]

Sarnquist 2014 {published data only}

Sarnquist CC, Moyo P, Stranix-Chibanda L, Chipato T, Kang JL, Maldonado YA. Integrating family planning and prevention of mother to child HIV transmission in Zimbabwe. *Contraception* 2014;**89**(3):209-14.

Temmerman 1990 {published data only}

* Temmerman M, Moses S, Kiragu D, Fusallah S. Impact of single session post-partum counselling of HIV infected women on their subsequent reproductive behaviour. *AIDS Care*. United Kingdom: Taylor & Francis, 1990; Vol. 2, issue 3:247-52.

Temmerman M, Plummer FA, Mirza NB, Ndinya-Achola JO, Wamola IA, Nagelkerke N, et al. Infection with HIV as a risk factor for adverse obstetrical outcome. *AIDS*. 1990/11/01 1990; Vol. 4, issue 11:1087-93.

References to studies excluded from this review

Adamchak 2007 {published data only}

Adamchak SE, Grey TE, Otterness C, Katz K, Janowitz B. Introducing Family Planning Services into Antiretroviral Programs in Ghana: An Evaluation of a Pilot Intervention. Accra (Ghana): Family Health International; 2007 Sep.

Aglah 2005 {published data only}

Aglah O, Bonku E, Wohlfahrt D. Integrating Family Planning Counselling and Services into HIV Care and Treatment Services in Ghana. A Performance Needs Assessment. New York, NY (USA): EngenderHealth, ACQUIRE Project; 2005 Dec.

Bradley 2009 {published data only}

Bradley H, Gillespie D, Kidanu A, Bonnenfant Y T, Karklins S. Providing family planning in Ethiopian voluntary HIV counseling and testing facilities: client, counselor and facility-level considerations. *AIDS* 2009;**23 Suppl 1**:S105-14.

Dhont 2009 {published data only}

Dhont N, Ndayisaba GF, Peltier CA, Nzabonimpa A, Temmerman M, van de Wijgert J. Improved access increases postpartum uptake of contraceptive implants among HIV-positive women in Rwanda. *European Journal of Contraception and Reproductive Health Care*. 2009/11/26 2009; Vol. 14, issue 6:420-5.

FHI 2010 {published data only}

Family Health International. Integrating Family Planning into HIV Care and Treatment Services in Kenya. Research Triangle Park, NC (USA): Family Health International; 2010.

Fogarty 2001 {published data only}

* Fogarty LA, Heilig CM, Armstrong K, Cabral R, Galavotti C, Gielen AC, et al. Long-term effectiveness of a peer-based intervention to promote condom and contraceptive use among HIV-positive and at-risk women. *Public Health Reports*. 2002/03/13 2001; Vol. 116 Suppl 1:103-19.

Gielen A C, Fogarty L A, Armstrong K, Green B M, Cabral R, Milstein B, et al. Promoting condom use with main partners: A behavioral intervention trial for women. *AIDS & Behavior* 2001;**5**(3):193-204.

Grabbe 2009 {published data only}

Grabbe K, Stephenson R, Vwalika B, Ahmed Y, Vwalika C, Chomba E, et al. Knowledge, use, and concerns about contraceptive methods among sero-discordant couples in Rwanda and Zambia. *Journal of Women's Health*. 2009/08/28 2009; Vol. 18, issue 9:1449-56.

Jewkes 2008 {published data only}

Jewkes R, Nduna M, Levin J, Jama N, Dunkle K, Khuzwayo N, et al. A cluster randomized-controlled trial to determine the effectiveness of Stepping Stones in preventing HIV infections and promoting safer sexual behaviour amongst youth in the rural Eastern Cape, South Africa: trial design, methods and baseline findings. *Tropical Medicine & International hHealth*. 2006/01/10 2006; Vol. 11, issue 1:3-16.

* Jewkes R, Nduna M, Levin J, Jama N, Dunkle K, Puren A, et al. Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial. *BMJ*. 2008/08/09 2008; Vol. 337:a506.

Jones 2006 {published data only}

Jones DL, Weiss SM, Bhat GJ, Bwalya V. Influencing sexual practices among HIV-positive Zambian women. *AIDS Care*. 2006/07/13 2006; Vol. 18, issue 6:629-34.

Kamali 2003 {published data only}

Kamali A, Quigley M, Nakiyingi J, Kinsman J, Kengeya-Kayondo J, Gopal R, et al. Syndromic management of sexually-transmitted infections and behaviour change interventions on transmission of HIV-1 in rural Uganda: a community randomised trial. *Lancet*. 2003/02/28 2003; Vol. 361, issue 9358:645-52.

Kimani 2015 {published data only}

* Kimani J, Warren CE, Abuya T, Ndwiga C, Mayhew S, Vassall A, et al. Use of HIV counseling and testing and family planning services among postpartum women in Kenya: a multicentre, non-randomised trial. *BMC Women's Health* 2015;**15**:104.

Warren CE, Mayhew SH, Vassall A, Kimani JK, Church K, Obure CD, et al. Study protocol for the Integra Initiative to assess the benefits and costs of integrating sexual and reproductive health and HIV services in Kenya and Swaziland. *BMC Public Health* 2012;**12**:973.

Lightfoot 2007 {published data only}

Lightfoot MA, Kasirye R, Comulada WS, Rotheram-Borus MJ. Efficacy of a culturally adapted intervention for youth living with HIV in Uganda. *Prevention Science*. 2007/09/12 2007; Vol. 8, issue 4:271-3.

Mark 2007 {published data only}

Mark KE, Meinzen-Derr J, Stephenson R, Haworth A, Ahmed Y, Duncan D, et al. Contraception among HIV concordant and discordant couples in Zambia: a randomized controlled trial. *Journal of Womens Health (Larchmt)*. 2007/10/17 2007; Vol. 16, issue 8:1200-10.

Ngubane 2008 {published data only}

Ngubane N, Patel D, Newell ML, Coovadia HM, Rollins N. Messages about dual contraception in areas of high HIV prevalence are not heeded. *South African Medical Journal* 2008; Vol. 98, issue 3:209-12.

Ngure 2012 {published data only}

Heffron R, Were E, Celum C, Mugo N, Ngure K, Kiarie J, et al. A prospective study of contraceptive use among African women in HIV-1 serodiscordant partnerships. *Sex Transm Dis*. 2010/07/06 2010; Vol. 37, issue 10:621-8.

* Ngure K, Heffron R, Mugo N R, Celum C, Cohen C R, Odoyo J, et al. Contraceptive method and pregnancy incidence among women in HIV-1-serodiscordant partnerships. *AIDS* 2012;**26**(4):513-8.

Peltzer 2009 {published data only}

Peltzer K, Chao L W, Dana P. Family planning among HIV positive and negative prevention of mother to child transmission

(PMTCT) clients in a resource poor setting in South Africa. *AIDS Behavior* 2009;**13**(5):973-9.

Piya-Anant 1995 {published data only}

Piya-Anant M, Atisook R, Ratananikom P. Birth control counseling for HIV seropositive pregnant women. *International Journal of Gynecology and Obstetrics* 1995;**50** Suppl 2:S131-4.

Rutenberg 2005 {published data only}

Rutenberg N. Family Planning and PMTCT Services: Examining Interrelationships, Strengthening Linkages. Washington, DC (USA): Population Council, Horizons Research Summary; 2003 Dec.

* Rutenberg N, Baek C. Field experiences integrating family planning into programs to prevent mother-to-child transmission of HIV. *Studies in Family Planning* 2005;**36**(3):235-45.

Siverégi 2015 {published data only}

Siverégi A, Dudley L, Makumucha C, Dlamini P, Moyo S, Bhembé S. Does counselling improve uptake of long-term and permanent contraceptive methods in a high HIV-prevalence setting?. *African J Prim Health Care Fam Med* 2015;**7**(1):E1-9.

Wall 2013 {published data only}

Haddad L, Wall K M, Vwalika B, Khu N H, Brill I, Kilembe W, et al. Contraceptive discontinuation and switching among couples receiving integrated HIV and family planning services in Lusaka, Zambia. *AIDS* 2013;**27** Suppl 1:S93-103.

Stephenson R, Vwalika B, Greenberg L, Ahmed Y, Vwalika C, Chomba E, et al. A randomized controlled trial to promote long-term contraceptive use among HIV-serodiscordant and concordant positive couples in Zambia. *Journal of Womens Health*. 2011/03/18 2011; Vol. 20, issue 4:567-74.

* Wall KM, Haddad L, Vwalika B, Htee Khu N, Brill I, Kilembe W, et al. Unintended pregnancy among HIV positive couples receiving integrated HIV counseling, testing, and family planning services in Zambia. *PLoS One* 2013;**8**(9):e75353.

Warren 2008 {published data only}

Warren C, Phafoli S, Majara B, Tsukulu T. Extending prevention of mother-to-child transmission through postpartum family planning in Lesotho. Maseru (Lesotho): Population Council, Frontiers in Reproductive Health; 2008 Sep.

References to ongoing studies

Farquhar 2015 {published data only}

Farquhar C. Home-based partner education and testing (HOPE) study (HOPE). <https://clinicaltrials.gov/ct2/show/NCT01784783> (accessed 28 March 2016).

Additional references

Agwu 2011

Agwu AL, Jang SS, Korthuis PT, Araneta MR, Gebo KA. Pregnancy incidence and outcomes in vertically and behaviorally HIV-infected youth. *JAMA* 2011;**305**(5):468-70.

Asfaw 2014

Asfaw HM, Gashe FE. Fertility intentions among HIV positive women aged 18-49 years in Addis Ababa Ethiopia: a cross sectional study. *Reproductive Health* 2014;**11**(1):1-8.

Bonnenfant 2012

Bonnenfant YT, Hindin MJ, Gillespie D. HIV diagnosis and fertility intentions among couple VCT clients in Ethiopia. *AIDS Care* 2012;**24**(11):1407-15.

Borrelli 2011

Borrelli B. The assessment, monitoring, and enhancement of treatment fidelity in public health clinical trials. *Journal of Public Health Dentistry*. 2011/04/19 2011; Vol. 71, issue 51:S52-63.

Brunie 2016

Brunie A, Wamala-Mucheri P, Akol A, Mercer S, Chen M. Expanding HIV testing and counselling into communities: feasibility, acceptability, and effects of an integrated family planning/HTC service delivery model by Village Health Teams in Uganda. *Health Policy and Planning* 2016 Apr 4 [Epub ahead of print].

Carvalho 2011

Carvalho FT, Goncalves TR, Faria ER, Shoveller JA, Piccinini CA, Ramos MC, et al. Behavioral interventions to promote condom use among women living with HIV. *Cochrane Database of Systematic Reviews* 2011, Issue 9. [DOI: [10.1002/14651858.CD007844.pub2](https://doi.org/10.1002/14651858.CD007844.pub2)]

CDC 2012

Centers for Disease Control and Prevention. Update to CDC's U.S. Medical Eligibility Criteria for Contraceptive Use, 2010: Revised recommendations for the use of hormonal contraception among women at high risk for HIV infection or infected with HIV. *Morbidity and Mortality Weekly Report* 2012;**61**(24):449-52.

Church 2015

Church K, Wringe A, Lewin S, Ploubidis GB, Fakudze P, Mayhew SH. Exploring the feasibility of service integration in a low-income setting: a mixed methods investigation into different models of reproductive health and HIV care in Swaziland. *PLoS One* 2015;**10**:e0126144.

Cleland 2012

Cleland J, Conde-Agudelo A, Peterson H, Ross J, Tsui A. Contraception and health. *Lancet* 2012;**380**(9837):149-56.

Créde 2012

Créde S, Hoke T, Constant D, Green MS, Moodley J, Harries J. Factors impacting knowledge and use of long acting and permanent contraceptive methods by postpartum HIV positive and negative women in Cape Town, South Africa: a cross-sectional study. *BMC Public Health*. 2012/03/20 2012; Vol. 12, issue 197:1-9.

Denno 2012

Denno DM, Chandra-Mouli V, Osman M. Reaching youth with out-of-facility HIV and reproductive health services:

a systematic review. *Journal of Adolescent Health* 2012;**51**(2):106-21.

ECHO 2016

FHI 360. The Evidence for Contraceptive Options and HIV Outcomes Trial (ECHO). <https://clinicaltrials.gov/ct2/show/NCT02550067> (accessed 13 June 2016). [NCT02550067]

Finger 2012

Finger JL, Clum GA, Trent ME, Ellen JM. Desire for pregnancy and risk behavior in young HIV-positive women. *AIDS Patient Care STDS*. 2012/04/07 2012; Vol. 26, issue 3:173-80.

GRADE 2013

Schünemann H, Brożek J, Guyatt G, Oxman A. GRADE Handbook [updated October 2013]. http://gdt.guidelinedevelopment.org/central_prod/_design/client/handbook/handbook.html (accessed 29 December 2015).

Halpern 2013

Halpern V, Lopez LM, Grimes DA, Stockton MF, Gallo MF. Strategies to improve adherence and acceptability of hormonal methods of contraception. *Cochrane Database of Systematic Reviews* 2013, Issue 10. [DOI: [10.1002/14651858.CD004317.pub4](https://doi.org/10.1002/14651858.CD004317.pub4)]

Higgins 2011

Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions* 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org. John Wiley & Sons, Ltd, (accessed 26 Mar 2012).

Kancheva Landolt 2012

Kancheva Landolt N, Phanuphak N, Pinyakorn S, Lakhonphon S, Khongpetch C, Chaithongwongwatthana S, et al. Sexual life, options for contraception and intention for conception in HIV-positive people on successful antiretroviral therapy in Thailand. *AIDS Care*. 2012/02/02 2012; Vol. 24, issue 7:897-904.

Kennedy 2010

Kennedy CE, Spaulding AB, Brickley DB, Almers L, Mirjahangir J, Packer L, et al. Linking sexual and reproductive health and HIV interventions: a systematic review. *Journal of the International AIDS Society*. 2010/07/21 2010; Vol. 13, issue 26:1-10.

Laryea 2014

Laryea DO, Amoako YA, Spangenberg K, Frimpong E, Kyei-Ansong J. Contraceptive use and unmet need for family planning among HIV positive women on antiretroviral therapy in Kumasi, Ghana. *BMC Women's Health* 2014;**14**:126.

Lindegren 2012

Lindegren ML, Kennedy CE, Bain-Brickley D, Azman H, Creanga AA, Butler LM, et al. Integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family planning services. *Cochrane Database of Systematic Reviews* 2012, Issue 9. [DOI: [10.1002/14651858.CD010119](https://doi.org/10.1002/14651858.CD010119)]

Lopez 2014

Lopez LM, Grey TW, Chen M, Hiller JE. Strategies for improving postpartum contraceptive use: evidence from non-randomized studies. *Cochrane Database of Systematic Reviews* 2014, Issue 11. [DOI: [10.1002/14651858.CD011298.pub2](https://doi.org/10.1002/14651858.CD011298.pub2)]

Lopez 2015

Lopez LM, Grey TW, Hiller JE, Chen M. Education for contraceptive use by women after childbirth. *Cochrane Database of Systematic Reviews* 2015, Issue 7. [DOI: [10.1002/14651858.CD001863.pub4](https://doi.org/10.1002/14651858.CD001863.pub4)]

Lopez 2016a

Lopez LM, Bernholc A, Chen M, Tolley EE. School-based interventions for improving contraceptive use in adolescents. *Cochrane Database of Systematic Reviews* 2016, Issue 6. [DOI: [10.1002/14651858.CD012249](https://doi.org/10.1002/14651858.CD012249)]

Lopez 2016b

Lopez LM, Grey TW, Tolley EE, Chen M. Brief educational strategies for improving contraception use in young people. *Cochrane Database of Systematic Reviews* 2016, Issue 3. [DOI: [10.1002/14651858.CD012025.pub2](https://doi.org/10.1002/14651858.CD012025.pub2)]

MacQuarrie 2015

MacQuarrie KLD. HIV/AIDS and Unmet Need for Family Planning. Rockville MD: ICF International; 2015. DHS Working Papers No. 122.

Maraux 2015

Maraux B, Hamelin C, Bajos N, Dray-Spira R, Spire B, Lert F. Women living with HIV still lack highly effective contraception: results from the ANRS VESPA2 study, France, 2011. *Contraception* 2015;**92**(2):160-9.

Marcellin 2010

Marcellin F, Protopopescu C, Abe C, Boyer S, Blanche J, Ongolo-Zogo P, et al. Desire for a child among HIV-infected women receiving antiretroviral therapy in Cameroon: results from the national survey EVAL (ANRS 12-116). *AIDS Care*. 2010/02/09 2010; Vol. 22, issue 4:441-51.

Medley 2015

Medley A, Bachanas P, Grillo M, Hasen N, Amanyaiwe U. Integrating prevention interventions for people living with HIV into care and treatment programs: a systematic review of the evidence. *Journal of Acquired Immune Deficiency Syndrrome* 2015;**68** Suppl 3:S286-96.

Mmbaga 2013

Mmbaga EJ, Leyna GH, Ezekiel MJ, Kakoko DC. Fertility desire and intention of people living with HIV/AIDS in Tanzania: a call for restructuring care and treatment services. *BMC Public Health* 2013;**13**(1):1-8.

Myer 2010

Myer L, Carter RJ, Katyal M, Toro P, El-Sadr WM, Abrams EJ. Impact of antiretroviral therapy on incidence of pregnancy among HIV-infected women in Sub-Saharan Africa: a cohort study. *PLoS Medicine*. 2010/02/18 2010; Vol. 7, issue 2:e1000229.

Oringanje 2016

Oringanje C, Meremikwu MM, Eko H, Esu E, Meremikwu A, Ehiri JE. Interventions for preventing unintended pregnancies among adolescents. *Cochrane Database of Systematic Reviews* 2016, Issue 2. [DOI: [10.1002/14651858.CD005215.pub3](https://doi.org/10.1002/14651858.CD005215.pub3)]

Petrunej 2012

Petrunej T, Minichiello SN, McDowell M, Wilcher R. Meeting the Contraceptive Needs of Key Populations Affected by HIV in Asia: An Unfinished Agenda. *AIDS Research and Treatment* 2012;**2012**:792649. [DOI: [10.1155/2012/792649](https://doi.org/10.1155/2012/792649)]

Phiri 2016

Phiri S, Feldacker C, Chaweza T, Mlundira L, Tweya H, Speight C, et al. Integrating reproductive health services into HIV care: strategies for successful implementation in a low-resource HIV clinic in Lilongwe, Malawi. *Journal of Family Planning and Reproductive Health Care* 2016;**42**(1):17-23.

Pretorius 2015

Pretorius L, Gibbs A, Crankshaw T, Willan S. Interventions targeting sexual and reproductive health and rights outcomes of young people living with HIV: a comprehensive review of current interventions from sub-Saharan Africa. *Glob Health Action* 2015;**8**:28454.

UN 2015

United Nations, Department of Economic and Social Affairs, Population Division. Trends in Contraceptive Use Worldwide 2015. www.who.int/reproductivehealth/topics/family_planning/unmet_need_fp/en/ (accessed 23 May 2016).

UNAIDS 2015

UNAIDS. AIDSinfo. <http://aidsinfo.unaids.org> (accessed 11 May 2016).

UNAIDS 2016

UNAIDS. Global AIDS Update 2016. www.unaids.org/en/resources/documents/2016/Global-AIDS-update-2016 (accessed 31 May 2016).

Wanyenze 2015

Wanyenze RK, Matovu JKB, Kamya MR, Tumwesigye NM, Nannyonga M, Wagner GJ. Fertility desires and unmet need for family planning among HIV infected individuals in two HIV clinics with differing models of family planning service delivery. *BMC Women's Health* 2015;**15**:5.

Wells 2014

GA Wells, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp (accessed 6 October 2015).

WHO 2015a

World Health Organization. Health in 2015: from MDGs to SDGs. <http://www.who.int/gho/publications/mdgs-sdgs/en/> (accessed 23 May 2016).

WHO 2015b

World Health Organization. Family planning / contraception. Fact sheet No. 351. www.who.int/mediacentre/factsheets/fs351/en/ (accessed 05 June 2015).

WHO 2016

World Health Organization. Hormonal contraception and HIV. www.who.int/reproductivehealth/topics/family_planning/hc_hiv/en/ (accessed 20 May 2016).

Wilcher 2010

Wilcher R, Cates W. Reaching the underserved: family planning for women with HIV. *Studies in Family Planning* 2010;**41**(2):125-8.

World Bank 2014

World Bank. Fertility rate, total (births per woman). <http://data.worldbank.org/indicator/SP.DYN.TFRT.IN/countries/C9?display=default> (accessed 26 May 2016).

* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Allen 1993

Methods	Design: prospective study Location: Kigali, Rwanda Time frame: recruitment 1986 and 1987 Sample size calculation: no mention
Participants	1458 women from initial sample of 3702 women; aged 16 to 35 years; from central hospital pediatric and prenatal clinics
Interventions	HIV testing with pretest and post-test counseling

Allen 1993 (Continued)

Pretest counseling included AIDS education video, followed by group discussion led by social worker and physician; opportunity to ask questions; demonstration of condoms and spermicides

HIV post-test counseling

1. HIV+ women:
 - Childbearing discouraged; presumably high risk of bearing infected child and increased risk to woman's health
 - Advised to use condoms to avoid transmission
 - Informed of condoms and spermicide as contraceptives and more effective methods available through another service
2. HIV- women: information on HIV risk reduction

HIV counseling and testing after enrollment every 6 months (Allen 1992); offered condoms and spermicides at contacts

Outcomes	<p>Hormonal contraceptive use and pregnancy</p> <ul style="list-style-type: none"> • use of injectable or oral contraceptives noted during yearly exam; low use of other modern contraceptives (2% IUD users; < 1% female sterilization) • for condoms or spermicides, calendars to record sexual contacts and chosen contraceptive; adherence evaluation every 3 months; condoms and spermicide provided as needed (Allen 1992) • pregnancy incidence from questionnaire in clinic (85%) or at home (if woman could not go to clinic) <p>Follow-up: 2 years</p>
Notes	Assessed contraceptive use after HIV counseling and testing. Counseling focused on condom and spermicide use to prevent transmission. Informed women more effective contraceptive methods available through another program.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS
NOS selection (NRS)	Low risk	<p>Exposed: recruited from pediatric and prenatal outpatient clinics at only community hospital in city; reportedly representative of childbearing women in Kigali</p> <p>Non-exposed: same source as exposed cohort; HIV status determined after enrollment</p> <p>Exposure: study records; intervention provided on site</p>
NOS comparability	High risk	<p>Design: NA</p> <p>Analysis: multivariate, stratified by HIV status; did not present logistic regression for pregnancy (age, sexual activity, number of children, HIV status)</p>
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; blinding not feasible due to type of intervention (differed depending on HIV status)
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention

Allen 1993 (Continued)

Outcome assessment: method used	High risk	Pregnancy incidence from questionnaire in clinic (85%) or at home (if could not go to clinic) Contraceptives: use of injectable or OCs noted during yearly exams; use of condoms or spermicide from participants' calendars with sexual contacts and use of methods
Incomplete outcome data (attrition bias) All outcomes	Low risk	Hormonal contraceptive use at 12 months: HIV+ 373/460 (81%); HIV- 881/998 (88%) Pregnancy by 2 years: HIV+ 88% (407/460); HIV- 95% (945/998) Losses by group: 1 year, HIV+ 19% and HIV- 12%; 2 years, HIV+ 12% and HIV- 5%

Bachanas 2016

Methods	Design: cluster RCT; clinics matched (provider to patient ratio, number of patients enrolled, clinical services provided) Location: Kenya, Namibia, and Tanzania Time frame: October 2009 to December 2011 Sample size calculation: unprotected sex in past 3 months assumed 50% for comparison; 80% power to detect 25% difference between intervention and comparison (12.5% absolute difference), intraclass correlation coefficient 0.02, 9 clinics in each condition with 200 participants each
Participants	18 district-level hospitals (6 per country); 3522 participants Inclusion criteria <ul style="list-style-type: none"> Sites: HIV outpatient facilities Women: > 18 years old; received HIV care at site at least twice; sexually active in past 3 months; planned to attend clinic for at least a year Exclusion criteria: woman with known pregnancy; male partner of pregnant woman
Interventions	HIV prevention and FP intervention for HIV+ people in HIV care and treatment clinics (not just study participants) <ul style="list-style-type: none"> Health care providers: basic prevention recommendations (disclosure, partner testing, safer sex, alcohol reduction); adherence assessment and support; family planning and brief safer pregnancy counseling; condom distribution Lay counselors: group education (HIV/AIDS); individual counseling (topics as above); HIV counseling and testing, where permitted Comparison: usual HIV care (clinics on wait-list; after final study data collection, providers were trained in HIV prevention services)
Outcomes	Use of highly effective contraceptive (pills, injectable, IUD, implant, male or female sterilization); unprotected sex (no condom); dual method use (condoms + highly effective contraceptive); provision of family planning services Follow-up: 6 and 12 months post intervention Analysis: generalized linear mixed models with fixed effect for country, time, trial arm and all possible interactions; random effects for clinic and participant (to control for correlation within clinic and within person over time); 6- and 12-month data pooled

Bachanas 2016 (Continued)

If significant interaction, OR estimated within country or time; otherwise, interaction dropped from model

Notes
Contraceptives: provided OCs and injectables within clinics; referred to family planning clinics for IUC and implants

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomized by coin flip (Kidder 2013); 1 clinic in each of 3 matched pairs (per country) to intervention and 1 clinic to wait-list comparison
Allocation concealment (selection bias)	Low risk	Sites chosen and randomized; approached every third clinic patient in waiting area; interested women eligible if met basic criteria above
Blinding of participants and personnel (performance bias) All outcomes	High risk	Open label
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention; unlikely given clinic assignment to groups
Outcome assessment: method used	High risk	Self-reported use of contraceptives and condoms
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up: at 12 months, 16.5% intervention and 11.2% comparison

Brou 2009

Methods	<p>Design: non-randomized intervention study</p> <p>Location: Abidjan, Côte d'Ivoire</p> <p>Time frame: HIV testing March 2001 to June 2003</p> <p>Sample size calculation: no mention</p>
Participants	<p>939 women</p> <p>Inclusion criteria: pregnant; ≥18 years old; attending selected prenatal clinics in 2 suburbs; tested for HIV during prenatal visit and delivered (546 HIV+; 393 HIV-)</p> <p>Involvement with other studies</p> <ul style="list-style-type: none"> HIV+: cohort study with peripartum and postnatal intervention to prevent MTCT HIV-: cohort study with HIV counseling and reproductive health care
Interventions	<p>All participants</p> <ul style="list-style-type: none"> Prenatal HIV testing and post-test counseling Information on family planning, STIs and HIV and condom use Free provision of modern contraceptives (injectable, pills, condoms) IUD recommended for HIV- women, not HIV+ women (risk of infection)

Behavioral interventions for improving contraceptive use among women living with HIV (Review)

Brou 2009 (Continued)

- Lactational amenorrhea recommended for women not wanting to use modern contraceptives in first months

Outcomes	Postpartum use of modern contraceptives (IUD, injectable, pills, condoms); pregnancy incidence per 100 women-years; unwanted pregnancy incidence; consistent condom use (Brou 2008; months 3, 12, 18) Follow-up: 3, 6, 12, 18, 24 months
Notes	Investigator communicated all women had counseling on various modern methods; did not have material on counseling content. Analysis conducted with data from larger study. Other reports did not provide detail on content.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS
NOS selection (NRS)	Low risk	Exposed: HIV+ attending selected prenatal clinics in 2 suburbs Non-exposed: HIV-; same source as HIV+ Exposure: clinic records; intervention provided on site
NOS comparability	Low risk	Design: NA Analysis: Cox multivariate models of factors predicting use of modern contraception and of new pregnancy; included HIV status, age, living with partner, use of modern contraceptive, number of living children; unadjusted use of modern contraceptive and unadjusted incidence of pregnancy and undesired pregnancy
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; not feasible due to type of intervention
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention
Outcome assessment: method used	Unclear risk	Pregnancy by sonogram, urine test or uterine measure (low risk); use of modern contraceptives and consistent use of condoms by questionnaire (high risk)
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up: 2.3% (23/980) lost before delivery Loss for contraceptive use: month 12, HIV+ 11% (59/546) and HIV- 7% (29/393) (low risk); month 24, HIV+ 23% (127/546) and HIV- 16% (61/393) (high risk) Excluded 2% (18/980) for no partner during follow-up; no information on HIV status of these women

Grossman 2013

Methods	<p>Design: cluster RCT</p> <p>Location: 18 public HIV clinics in Nyanza Province, Kenya</p> <p>Time frame: baseline December 2009 to February 2010; "end line" July 2011 to September 2011 (1 year after intervention training)</p> <p>Sample size calculation: based on 22% prevalence for use of modern contraceptive (survey) and clinically significant increase as 8%; detect 8% difference in contraceptive prevalence (30% intervention vs 22% control); needed 140 per site (2520 total); assumed intracluster correlation coefficient 0.01; 2-sided alpha, 80% power</p>
Participants	<p>General with N: 18 clinic sites; 3584 women; 12 sites with integrated FP and HIV services (1684 women); 6 control sites (1900 women)</p> <p>Inclusion criteria</p> <ol style="list-style-type: none"> 1. Sites: public sector HIV clinics at dispensaries, health centers, and sub-district and district hospitals in Kisumu East, Nyatike, Rongo and Suba districts 2. Women: had visit at HIV clinic site during study period; 18 to 45 years old <p>Exclusion criteria: site had already integrated FP services into HIV care or did not offer antiretroviral therapy on site</p>
Interventions	<p>Integrated FP: peer educators trained to conduct group education about FP for clients waiting to be seen at HIV clinics, reviewed available contraceptive methods and effectiveness and side effects; clinic staff provide FP methods and counseling</p> <p>Comparison: standard referral of clients to separate FP clinic in same facility</p>
Outcomes	<p>Primary: use of more effective contraception (sterilization, IUD, implant, injectable, OCs)</p> <p>Secondary: use of any FP method; use of condoms alone; dual method use (condoms + more effective contraceptive); incidence of pregnancy</p> <p>Follow-up: last 3 project months (end line), i.e. July 2011 to September 2011</p> <p>Analysis: generalized estimated equation models with robust standard errors to account for clustering within sites; analysis based on encounters rather than participants</p>
Notes	<p>Obtained supplemental information from online files (see references)</p> <p>"Knowledge" outcome referred to awareness of contraceptive methods, not understanding; therefore not included in this review</p>

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	<p>Computer-generated randomization scheme (study protocol)</p> <p>Facilities stratified based on whether large (> 700 in HIV care) or small (< 700 in HIV care); randomly allocated within strata at 2:1 (intervention to control)</p>
Allocation concealment (selection bias)	Low risk	Sites identified and randomized; all women within age group eligible who had visit during study period
Blinding of participants and personnel (performance bias) All outcomes	High risk	Clinics, healthcare providers, patients and researchers not blinded to allocation; investigators did not view data by study arm until after database locked

Grossman 2013 (Continued)

Blinking of outcome assessment (detection bias) All outcomes	High risk	Contraceptive use and pregnancy status abstracted from electronic medical records at clinic sites; not possible to blind all staff
Outcome assessment: method used	High risk	Self report for contraceptive use; pregnancy by self report and confirmed clinically
Incomplete outcome data (attrition bias) All outcomes	High risk	Loss to follow-up: outcome data from records of clinic encounters at end line that had contraceptive information; cluster size larger and number of encounters greater at end line vs baseline

King 1995

Methods	Design: non-randomized intervention study Location: Kigali, Rwanda Time frame: 1992 to 1993 Sample size calculation: no mention
Participants	502 women (94 contraceptive users and 408 potential new users); 77% from cohort followed since 1988 (Allen 1993) and 23% newly enrolled; original cohort from random selection within consecutive sample at only community hospital in city Inclusion criteria: HIV+ (N = 330) or HIV- (N = 172); 77 male partners received educational intervention
Interventions	Family planning service added 1992 15-minute video on contraceptives plus discussion and provision of contraceptives <ul style="list-style-type: none"> Free of charge: oral contraceptives, injectable progestins, and implants Intrauterine devices available (but not popular) Tubal ligation and vasectomy discussed; access limited due to surgeon shortage Condoms available but not in report; reportedly ineffective in reducing pregnancy in this population
Outcomes	Use of hormonal contraceptives (pill, injectable, implant); incident pregnancy; having gynecological exam every 6 months For missed appointments, nurse administered questionnaire in home. Follow-up: every 3 months; contraceptive use average 5.4 months; pregnancy average 1 year
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS
NOS selection (NRS)	Low risk	Exposed: recruited HIV+ from pediatric and prenatal clinics at study hospital Non-exposed: recruited HIV- from same source as HIV+ Exposure: study records; intervention provided on site

King 1995 (Continued)

NOS comparability	High risk	Design: NA Analysis: no adjustment for potential confounding; contraceptive use stratified by age, marital status, number of children, HIV status
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Nurse who facilitated discussion unaware of participants' HIV serostatus; same intervention provided regardless of HIV status
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Staff members who collected data unaware of participants' HIV serostatus
Outcome assessment: method used	Unclear risk	Contraceptive use and pregnancy data by self report (in-home questionnaire if missed visit)
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up: contraceptive use data, none; pregnancy data, HIV+ 6% (19/330) and HIV- 8% (13/172)

Kosgei 2011

Methods	Design: retrospective study from medical records Location: Eldoret, Kenya Time frame: 1 October 2005 to 28 February 2009 Sample size calculation: no mention
Participants	4031 HIV-infected women receiving care at hospital HIV clinic Inclusion criteria (for analysis): 15 to 49 years old; enrolled on or after 1 October 2005; attended clinic on or after 1 October 2007 Exclusion criteria: no follow-up visit after initial exposure or only 1 visit on or after 1 October 2007; missing covariate information (schooling, sexual activity, pregnancies, children, status of HIV disclosure)
Interventions	3 clinical teams functioned as separate practices Family planning integrated (IFP) with HIV care services (N = 1453): clinical team I started October 2007 (FP relocated to HIV clinic); included central check-in, consistent and structured counseling; contraceptive methods (except sterilization) through HIV clinic Routine care (N = 2578): teams II and III, original model; provided condoms and referral to independent service for FP; client responsible for making FP appointment and for co-pay
Outcomes	Pregnancy and modern contraceptive use (including or excluding condoms): incidence; incidence rate per 100 person-years; attributable risk Use of modern contraceptive (WHO definition) for pregnancy prevention (female sterilization, oral contraceptives, IUDs, implants, injectable, or condoms) Follow-up (mean days $\pm$ SD): integrated FP 342 $\pm$ 155; routine care 361 $\pm$ 147

Kosgei 2011 (Continued)

Notes Researcher communicated that outcome data obtained from clinic records; study did not involve interviews. Contraceptive counseling was reportedly standard information.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS; medical record review
NOS selection (NRS)	Low risk	Exposed: HIV-infected women; 15 to 49 years old; receiving care at HIV clinic Non-exposed: same source as exposed Exposure: clinic records; intervention provided on site
NOS comparability	Low risk	Design: matched on baseline characteristics (education, sexual activity, pregnancies, live births, children in household, HIV disclosure) Analysis: report mentions adjustment for potential confounding but provides no further information
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; medical record review of care provided; blinding not feasible for providers due to types of intervention
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention
Outcome assessment: method used	Low risk	Pregnancy and contraceptive use gathered retrospectively from clinic records; unclear whether records based on services provided or patient report during visit
Incomplete outcome data (attrition bias) All outcomes	High risk	No follow-up visit: 5.5% (301/5433); no information by group (clinical team) Excluded cases with incomplete data

McCarraher 2011

Methods	Design: non-randomized comparative study Location: 5 local government areas in Nigeria Time frame: intervention March 2008 to June 2009 Sample size calculation: anticipated 260 clients would enroll and complete follow-up; unbalanced distribution between groups (1.75 enhanced:1 basic); 50% clients over 4-weeks would be eligible and enroll with 75% retention; expected number sufficient for 80% power to detect 10% change in modern contraceptive prevalence using one-sided alpha 0.05, accounting for repeated measures among same individuals
Participants	335 female ART clients Inclusion criteria: 18 to 45 years old; CD4 > 100 or WHO clinical stage I, II, or III; not planning to relocate during study; willing to return for follow-up interview

McCarraher 2011 (Continued)

Interventions	Family planning (FP) integrated into antiretroviral services	
	Enhanced integrated: training of FP providers on FP and counseling; additional facility support, e.g. observing FP sessions and facilitating meetings between providers; community mobilization, volunteers escorting ART clients to FP services (2 sites); basic components (below)	
	Basic integrated: advocacy meetings; assessment of facility capacity to deliver services; FP training for 2 ART providers; introduction of monitoring and evaluation tools	
Outcomes	Use of modern contraceptive method (OCs, IUDs, injectables, implants, male or female sterilization, consistent condom use)	
	Follow-up: 12 to 14 months	
Notes		
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS: 2 sites purposely assigned due to large caseloads (1 enhanced and 1 basic model); 3 sites randomly assigned (1 basic; 2 enhanced)
NOS selection (NRS)	Low risk	Exposed: receiving antiretroviral therapy at clinic; for overall study, 90% response (of baseline interview) Non-exposed: same as exposed cohort except at different sites Exposure: site records; services provided by site
NOS comparability	Low risk	Design: NA Analysis: adjusted differences in contraceptive use (baseline to follow-up, not between groups) from linear mixed models; adjusted for age, parity at baseline, desire for children in next 2 years, living with partner, and partner approved of contraceptive use
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; not feasible for providers due to type of intervention
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention
Outcome assessment: method used	Unclear risk	Self-reported use of modern contraceptive method
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up: 14% (47/335); overall loss for follow-up interviews 18% (61/335) Contraceptive data at follow-up: 86% (252/292); by group, enhanced 85% (167/197) and basic 89% (85/95)

Ngure 2009

Methods	Design: non-randomized comparative study (within RCT of acyclovir to prevent HIV transmission)
---------	--

Behavioral interventions for improving contraceptive use among women living with HIV (Review)

Ngure 2009 (Continued)

Location: Thika, Eldoret, Kisumu, Nairobi; Kenya

Time frame: Thika site June 2007 to October 2008; comparison sites enrolled December 2004 to May 2007

Sample size calculation: no mention for this NRS within an RCT

Participants	<p>1429 couples, HIV serodiscordant; from urban, peri-urban, and rural areas</p> <p>Intervention site N = 213 couples (75% women HIV+); comparison sites N = 1216 couples (68% women HIV+)</p> <p>Inclusion criteria: reported at least 3 episodes of vaginal intercourse in past 3 months; HIV+ partner $\geq$ 18 years old; seropositive for HSV-2; CD4 count $\geq$ 250 cells/μl; no history of AIDS-defining condition; not on ART; HIV- partner $\geq$ 18 years old</p> <p>Exclusion criteria: HIV+ women who were pregnant at screening</p>
Interventions	<p>Intervention (Thika): multifaceted intervention to increase dual contraceptive uptake; included staff training on contraception, free provision of hormonal contraceptives on site, appointment cards, couples contraceptive counseling, involvement of male partners</p> <p>Comparison sites</p> <ul style="list-style-type: none"> Kisumu and Eldoret: offered condoms only; referred to nearby medical facilities for other methods Nairobi: offered injectable depo and OCs free at research clinic
Outcomes	<p>Pregnancy (test); self-reported contraceptive use (IUD, surgical method, injectable, implant, or OCs); condom use by HIV status (for all sites combined)</p> <p>Follow-up: 24 months until trial closure (monthly for HIV+; quarterly for HIV-)</p>
Notes	<p>Investigator communicated pregnancy assessed by clinical test. Not eligible for RCT if pregnant; participants in RCT would be off study medication if pregnant.</p> <p>Unable to obtain sample sizes that contributed to outcomes, only numbers enrolled</p>

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS
NOS selection (NRS)	Unclear risk	<p>Exposed: recruited for RCT of acyclovir; 20% not enrolled in RCT for reasons other than ineligibility</p> <p>Non-exposed: same as exposed except enrolled in RCT at different sites</p> <p>Exposure: study records; site provided HIV and family planning services</p>
NOS comparability	High risk	<p>Design: NA</p> <p>Analysis: for pregnancy, reportedly adjustment by age and number of children resulted in no meaningful change; showed unadjusted rates for all outcomes</p>
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; not feasible due to type of intervention

Ngure 2009 (Continued)

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention
Outcome assessment: method used	Unclear risk	Pregnancy by urine test (low risk); contraceptive use by self report (high risk)
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unable to determine losses Pregnancy data per 100 woman-years; contraceptive use data per visit rather than per person or couple

Sarnquist 2014

Methods	Design: quasi-experimental prospective study; standard care if recruited between 27 May and 24 June 2011 and intervention group if recruited between 27 June and 24 August 2011 Location: 4 public clinics in Chitungwiza, Zimbabwe Time frame: recruited 27 May 2011 to 24 August 2011 Sample size calculation: based on belief about control over condom use with anticipated change from 25% to 55%; with alpha = 0.05 and beta = 0.80, needed 33 standard-of-care and 65 intervention participants
Participants	General with N: 98 pregnant women (intervention 65; standard care 33) Inclusion criteria: HIV+; seeking antenatal care between 26 and 38 weeks of gestation; 18 to 40 years of age; spoke English or Shona Exclusion criteria: chose not to participate or were ineligible
Interventions	Intervention: Peers Undertaking Reproductive and Sexual Health Education (PURSE); 3 group sessions at 90-minutes each; sexual negotiation skills and empowerment; information about HIV, PMTCT, and FP; communication skills related to sex and FP; learning techniques in discussions, behavior modeling, songs and dramatizations, role-playing; care from nurses with enhanced FP training Control: standard care from nurses with enhanced FP training
Outcomes	Primary: uptake of LARC; using other FP methods; knowledge of IUC as effective FP method; women's control over condom use; increased sexual negotiation power and ability to advocate for FP Secondary: uptake of PMTCT services and HIV disclosure Follow-up: 3 months (well-child visit)
Notes	Small reimbursement for visit attendance per local IRB guidelines 2 focus groups among convenience sample from intervention group in January 2012

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS
NOS selection (NRS)	Low risk	Exposed: women seeking antenatal care at 4 public clinics

Sarnquist 2014 (Continued)

		Non-exposed: same source as exposed except different months for recruitment
		Exposure: study records; intervention provided at sites
NOS comparability	High risk	Design: NA Analysis: no adjustment for potential confounding
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; not feasible for providers due to type of intervention
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention; highly unlikely due to differences in recruitment times
Outcome assessment: method used	High risk	Self-reported contraceptive use
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up: intervention group 4.6% (3/65); control 3% (1/33)

Temmerman 1990

Methods	Design: non-randomized study (within study of HIV infection and pregnancy) Location: Nairobi, Kenya Time frame: 1988 Sample size calculation: no mention
Participants	188 postpartum women within main study of HIV infection and pregnancy outcome 1 year after postpartum HIV testing, asked women to return who tested HIV+ and same number who tested HIV- Inclusion criteria for main study (N = 1507): adverse pregnancy outcome (< 2500 g or stillbirth) or control with normal birth infant (> 2500 g) Inclusion for substudy: 1 year after postpartum HIV testing, asked women to return who tested HIV+ and same number who tested HIV- (matched on pregnancy outcome)
Interventions	Postpartum HIV testing after enrollment; results 7 to 14 days postpartum HIV+ women: single-session postpartum counseling on preventing HIV transmission, health effects of future pregnancies, risks of perinatal transmission, and high mortality for infected children; encouraged use of condoms and other contraceptive methods; provided free condoms HIV- women: HIV test results and counseling; referred to pediatric clinic for follow-up
Outcomes	Pregnancy; oral contraceptive use; condom use Follow-up: 1 year postpartum
Notes	

Temmerman 1990 (Continued)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	NRS
NOS selection (NRS)	Low risk	Exposed: from case-control study of postpartum women at maternity hospital; HIV+ based on postpartum HIV test Non-exposed: same source as exposed; HIV- based on postpartum HIV test Exposure: study records; counseling or referral in clinic
NOS comparability	High risk	Design: matched on birth outcome; HIV-status groups differed by age, marital status, and other factors Analysis: no adjustment for potential confounding
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention; not feasible due to type of intervention
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention
Outcome assessment: method used	High risk	Pregnancy and contraceptive use: self report
Incomplete outcome data (attrition bias) All outcomes	High risk	Losses: HIV+ 74% (70/94); HIV- 65% (61/94) Addresses not located for 40%; about 25% with addresses did not attend 1-year follow-up

ART: antiretroviral therapy

FP: family planning

IUC: intrauterine contraception

IUD: intrauterine device

MOH: Ministry of Health

NA: not applicable

NRS: non-randomized study

OC: oral contraceptives

PMTCT: prevention of maternal-to-child HIV transmission

VCT: voluntary counseling and testing

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Adamchak 2007	Cross-sectional assessment of contraceptive use and unmet needs.
Aglah 2005	No relevant outcome; demand for family planning services.
Bradley 2009	No relevant outcome of contraceptive use or pregnancy.

Study	Reason for exclusion
Dhont 2009	Improving access; did not necessarily include behavioral intervention such as counseling.
FHI 2010	Not comparative; pre-post assessment of one group.
Fogarty 2001	No relevant outcome data; study focused on stages of changes. Contraceptive use reported as part of 'progress', 'relapse', etc. Progress included movement up one or more stages (such as pre-contemplation to contemplation) as well as 'maintenance' and 'action', both of which addressed consistent use.
Grabbe 2009	Analyzed knowledge and use of contraception by gender and country (Rwanda and Zambia), not by HIV status or any intervention group. Participants from Zambia also examined in Wall 2013 .
Jewkes 2008	Individuals who were HIV+ at baseline were excluded from analysis.
Jones 2006	Promotion of condom use for risk reduction; intervention did not include contraceptive use to prevent pregnancy. Reproductive choice was addressed in terms of not using protection when seeking pregnancy.
Kamali 2003	No relevant outcome; focused on HIV/STI transmission.
Kimani 2015	Women receiving postnatal care and not identified as HIV+ or HIV-; family planning integrated with HIV services, which included HIV counseling and testing
Lightfoot 2007	Intervention did not address contraception or pregnancy prevention.
Mark 2007	Study focused on couples (serodiscordant and concordant). Results presented by study arm and not by HIV status within intervention groups. Some analysis done within HIV status but not by HIV status. Unable to obtain additional data from investigators.
Ngubane 2008	Report provides contraceptive use (by type) for total cohort; in figure without absolute numbers and not by HIV status. HIV testing and counseling was provided, as was family planning counseling. One of the investigators communicated that they did not analyze by HIV status. She also noted that the counseling was standard of care at each visit (condoms with each sex act plus an additional contraceptive to avoid pregnancy).
Ngure 2012	Ngure 2012 analyzed pregnancy at 14 sites by HIV status and by type of contraceptive used. No mention of contraceptive counseling. Heffron 2010 analysis included 14 sites and focused on contraceptive use by HIV status, not by any intervention. Related to Ngure 2009 , but Ngure 2009 compared participants at one site that had an intervention with participants at 3 sites that did not have that intervention.
Peltzer 2009	Assessed postnatal family planning counseling for HIV+ and HIV- women. No specific intervention tested. Data on contraceptive use combines women who had counseling and some who did not.
Piya-Anant 1995	Not comparative study; data for HIV+ women only.
Rutenberg 2005	Review of services provided and received. Some contraceptive use data for those who had care. Also includes data on missed opportunities for providing family planning counseling.
Siveregi 2015	Contraceptive use after intervention appears to reflect preference rather than use; use of long-term or permanent method assessment immediately after counseling session

Study	Reason for exclusion
Wall 2013	Focused on couples (serodiscordant and concordant). Results by study arm and in some cases by HIV status, not by HIV status within study arm
Warren 2008	Pre-post assessment; women not necessarily HIV+

Characteristics of ongoing studies [ordered by study ID]

Farqufar 2015

Trial name or title	Home-based Partner Education and Testing (HOPE) Study
Methods	Design: RCT; open label Location: Kisumu, Nyanza, Kenya
Participants	600 couples; women enrolled at antenatal clinic Inclusion criteria: <ul style="list-style-type: none"> Females > 8 weeks gestation; ≥ 14 years old (pregnant females 14 to 17 years old are emancipated minors per Kenyan law); stable partnership (married or cohabiting); planning on living in vicinity (≤ 40 km from clinic) 9 months postpartum; willing to participate in couple HIV testing and counseling; no recent history of intimate partner violence (within last month with current partner); male partner not present during screening visit Males ≥ 18 years old; willing to participate in couple HIV testing and counseling Exclusion criteria: not meeting any of the inclusion criteria
Interventions	Intervention: home-based partner education and HIV testing (HOPE) including counseling and HIV testing; education regarding HIV prevention, facility delivery, exclusive breastfeeding, and postpartum family planning Comparison: standard antenatal care; women invited to bring male partner for voluntary HIV testing and counseling
Outcomes	Condom use during past 6 months and last sex (self report from men and women); women's self report of contraceptive use, type, and frequency; various outcomes unrelated to this review Follow-up: 6 and 14 weeks postpartum (women); 6 months postpartum (women with male partner)
Starting date	September 2013; expected completion August 2015
Contact information	Carey Farquhar, MD MPH; principal investigator; University of Washington
Notes	

DATA AND ANALYSES

Comparison 1. Family planning intervention versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Use of contraceptives (non-condom) per visit	1	3463	Odds Ratio (M-H, Fixed, 95% CI)	6.40 [5.37, 7.62]
2 Reported pregnancy incidence per 100 women-years			Other data	No numeric data

Analysis 1.1. Comparison 1 Family planning intervention versus usual care, Outcome 1 Use of contraceptives (non-condom) per visit.

Study or subgroup	Intervention n/N	Comparison n/N	Odds Ratio M-H, Fixed, 95% CI	Weight	Odds Ratio M-H, Fixed, 95% CI
Ngure 2009	486/751	604/2712		100%	6.4[5.37,7.62]
Total (95% CI)	751	2712		100%	6.4[5.37,7.62]
Total events: 486 (Intervention), 604 (Comparison)					
Heterogeneity: Not applicable					
Test for overall effect: Z=20.81(P<0.0001)					

Analysis 1.2. Comparison 1 Family planning intervention versus usual care, Outcome 2 Reported pregnancy incidence per 100 women-years.

Study	Sites	Reported pregnancy incidence per 100 women-years		Change
		June 2006 to May 2007	June 2007 to September 2008	
Ngure 2009	Intervention site	13.5	8.7	-4.8
Ngure 2009	Comparison sites	16.8	21.9	5.1

Comparison 2. Peer education versus standard care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Using LARC	1	196	Odds Ratio (M-H, Fixed, 95% CI)	1.31 [0.54, 3.20]
1.1 IUD	1	98	Odds Ratio (M-H, Fixed, 95% CI)	0.16 [0.02, 1.57]
1.2 Implant	1	98	Odds Ratio (M-H, Fixed, 95% CI)	2.33 [0.82, 6.60]
2 Using other modern contraception	1	98	Odds Ratio (M-H, Fixed, 95% CI)	0.57 [0.16, 2.03]
3 Knew IUD effective in preventing pregnancy	1	98	Odds Ratio (M-H, Fixed, 95% CI)	4.58 [1.71, 12.29]

Analysis 2.1. Comparison 2 Peer education versus standard care, Outcome 1 Using LARC.

Analysis 2.2. Comparison 2 Peer education versus standard care, Outcome 2 Using other modern contraception.

Analysis 2.3. Comparison 2 Peer education versus standard care, Outcome 3 Knew IUD effective in preventing pregnancy.

Comparison 3. HIV prevention and family planning versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Contraceptive use (6 and 12 months pooled)			Other data	No numeric data
2 Unprotected sex (6 and 12 months pooled)			Other data	No numeric data

Analysis 3.1. Comparison 3 HIV prevention and family planning versus usual care, Outcome 1 Contraceptive use (6 and 12 months pooled).

Contraceptive use (6 and 12 months pooled)		
Study	Outcome	Reported adjusted OR (95% CI)
Bachanas 2016	Dual method use	1.16 (0.64 to 2.11)
Bachanas 2016	Use of highly effective method	—
Bachanas 2016	Kenya	1.02 (0.57 to 1.83)
Bachanas 2016	Namibia	0.68 (0.38 to 1.23)
Bachanas 2016	Tanzania	2.25 (1.24 to 4.10)

Analysis 3.2. Comparison 3 HIV prevention and family planning versus usual care, Outcome 2 Unprotected sex (6 and 12 months pooled).

Unprotected sex (6 and 12 months pooled)		
Study	Outcome	Reported adjusted OR (95% CI)
Bachanas 2016	Unprotected sex at last vaginal sex (if had sex in past 3 months)	—
Bachanas 2016	Kenya	0.92 (0.53 to 1.59)
Bachanas 2016	Namibia	0.81 (0.45 to 1.45)
Bachanas 2016	Tanzania	0.23 (0.14 to 0.40)
Bachanas 2016	Any unprotected sex in past 2 weeks	0.56 (0.32 to 0.99)

Comparison 4. Integrated family planning versus routine care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Reported new use of contraceptives per 100 women-years			Other data	No numeric data
2 Reported pregnancies per 100 women-years			Other data	No numeric data

Analysis 4.1. Comparison 4 Integrated family planning versus routine care, Outcome 1 Reported new use of contraceptives per 100 women-years.

Study	Method	Reported new use of contraceptives per 100 women-years		Attributable risk (95% CI)
		Integrated Incident rate (95% CI)	Routine Incident rate (95% CI)	
Kosgei 2011	New use of condoms	53.4 (50.7 to 56.0)	36.9 (35.0 to 38.8)	16.4 (11.9 to 21.0)
Kosgei 2011	New use of modern contraceptive methods (excluding condoms)	4.8 (3.7 to 6.0)	7.8 (6.8 to 8.9)	-3.0 (CI -4.6 to -1.4)

Analysis 4.2. Comparison 4 Integrated family planning versus routine care, Outcome 2 Reported pregnancies per 100 women-years.

Study	Reported pregnancies per 100 women-years		Attributable risk (95% CI)
	Integrated Incident rate (95% CI)	Routine Incident rate (95% CI)	
Kosgei 2011	8.2 (6.8 to 9.8)	7.0 (6.1 to 8.1)	1.2 (-0.6 to 3.0)

Comparison 5. Integrated family planning: enhanced versus basic

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Use of modern contraceptive method at 12 to 14 months	1	252	Odds Ratio (M-H, Fixed, 95% CI)	2.48 [1.31, 4.72]
2 Reported differences in use of modern contraceptives (baseline to follow-up)			Other data	No numeric data

Analysis 5.1. Comparison 5 Integrated family planning: enhanced versus basic, Outcome 1 Use of modern contraceptive method at 12 to 14 months.

Study or subgroup	Enhanced n/N	Basic n/N	Odds Ratio M-H, Fixed, 95% CI	Weight	Odds Ratio M-H, Fixed, 95% CI
McCarraher 2011	58/167	15/85		100%	2.48[1.31,4.72]
Total (95% CI)	167	85		100%	2.48[1.31,4.72]
Total events: 58 (Enhanced), 15 (Basic)					
Heterogeneity: Not applicable					
Test for overall effect: Z=2.78(P=0.01)					
			Favors basic 0.01 0.1 1 10 100 Favors enhanced		

Analysis 5.2. Comparison 5 Integrated family planning: enhanced versus basic, Outcome 2 Reported differences in use of modern contraceptives (baseline to follow-up).

Study	Reported differences in use of modern contraceptives (baseline to follow-up)			Difference between groups
	Use of modern contraceptives	Enhanced integration of services	Basic integration of services	
McCarraher 2011	Unadjusted difference	12.9%	12.3%	—

Study	Reported differences in use of modern contraceptives (baseline to follow-up)			Difference between groups
	Use of modern contraceptives	Enhanced integration of services	Basic integration of services	
McCarraher 2011	Adjusted difference	11.0%	11.6%	0.6% (P = 0.937)

Comparison 6. Integrated family planning services versus routine care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Reported family planning use (end of project)			Other data	No numeric data
2 Reported pregnancy (final project year)			Other data	No numeric data

Analysis 6.1. Comparison 6 Integrated family planning services versus routine care, Outcome 1 Reported family planning use (end of project).

Study	Outcome	Reported family planning use (end of project)		Adjusted OR (95% CI)
		Integrated	Control	
Grossman 2013	Using more effective contraceptive	36.6%	29.8%	1.81 (1.24 to 2.63)
Grossman 2013	Dual method use (condoms + more effective method)	20.9%	19.1%	1.30 (0.77 to 2.17)
Grossman 2013	Using condoms (alone or with another method)	57.7%	59.1%	0.64 (0.35 to 1.19)
Grossman 2013	Using any family planning	73.4%	69.7%	0.90 (0.50 to 1.60)

Analysis 6.2. Comparison 6 Integrated family planning services versus routine care, Outcome 2 Reported pregnancy (final project year).

Study	Reported pregnancy (final project year)		Adjusted incidence rate ratio
	Integrated Pregnancy rate/100 visits	Control Pregnancy rate/100 visits	
Grossman 2013	1.5	1.7	0.90 (95% CI 0.68 to 1.20)

Comparison 7. Family planning counseling (HIV+) versus control (HIV-)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Use of hormonal contraceptives at 1 year	2		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Oral contraceptives	1	57	Odds Ratio (M-H, Fixed, 95% CI)	1.04 [0.31, 3.53]
1.2 Injectable or oral contraceptives	1	1254	Odds Ratio (M-H, Fixed, 95% CI)	0.87 [0.63, 1.21]
2 Discontinued chosen hormonal contraceptive by 1 year	1	276	Odds Ratio (M-H, Fixed, 95% CI)	2.52 [1.53, 4.14]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3 Use of condoms or spermicide at 1 year	2		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Condom use reported	1	57	Odds Ratio (M-H, Fixed, 95% CI)	1.41 [0.18, 10.78]
3.2 Condom use recorded	1	1442	Odds Ratio (M-H, Fixed, 95% CI)	2.82 [2.18, 3.65]
3.3 Spermicide use recorded	1	1442	Odds Ratio (M-H, Fixed, 95% CI)	2.36 [1.69, 3.30]
4 Pregnancy	2		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 At 1 year	1	57	Odds Ratio (M-H, Fixed, 95% CI)	0.9 [0.22, 3.62]
4.2 At 2 years	1	1352	Odds Ratio (M-H, Fixed, 95% CI)	0.55 [0.43, 0.69]

Analysis 7.1. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 1 Use of hormonal contraceptives at 1 year.

Analysis 7.2. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 2 Discontinued chosen hormonal contraceptive by 1 year.

Analysis 7.3. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 3 Use of condoms or spermicide at 1 year.

Analysis 7.4. Comparison 7 Family planning counseling (HIV+) versus control (HIV-), Outcome 4 Pregnancy.

Comparison 8. Informational video + discussion: HIV+ versus HIV-

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Use of hormonal contraceptives after intervention	1		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Oral contraceptives	1	502	Odds Ratio (M-H, Fixed, 95% CI)	0.98 [0.52, 1.84]
1.2 Injectable	1	502	Odds Ratio (M-H, Fixed, 95% CI)	0.86 [0.49, 1.51]
1.3 Implant	1	502	Odds Ratio (M-H, Fixed, 95% CI)	3.49 [0.78, 15.63]
2 Incident pregnancy after intervention	1	470	Odds Ratio (M-H, Fixed, 95% CI)	0.39 [0.23, 0.68]

Analysis 8.1. Comparison 8 Informational video + discussion: HIV+ versus HIV-, Outcome 1 Use of hormonal contraceptives after intervention.

Analysis 8.2. Comparison 8 Informational video + discussion: HIV + versus HIV-, Outcome 2 Incident pregnancy after intervention.

Comparison 9. Family planning counseling and free contraceptives: HIV+ versus HIV-

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Reported hazard ratios from multi-variate Cox models			Other data	No numeric data
2 Reported pregnancy incidence per 100 women-years			Other data	No numeric data
3 Use of modern contraceptive (injectable, IUD, pills, condoms)	1		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Use at month 6	1	899	Odds Ratio (M-H, Fixed, 95% CI)	0.91 [0.69, 1.20]
3.2 Use at month 12	1	851	Odds Ratio (M-H, Fixed, 95% CI)	0.62 [0.46, 0.84]
3.3 Use at month 24	1	751	Odds Ratio (M-H, Fixed, 95% CI)	0.53 [0.40, 0.72]
4 Reported consistent condom use			Other data	No numeric data

Analysis 9.1. Comparison 9 Family planning counseling and free contraceptives: HIV + versus HIV-, Outcome 1 Reported hazard ratios from multivariate Cox models.

Study	Reported hazard ratios from multivariate Cox models	
	Outcome	Hazard ratio (95% CI)
Brou 2009	Use of modern contraceptives	0.90 (0.72 to 1.14)
Brou 2009	Pregnancy	1.63 (0.95 to 2.80)

Analysis 9.2. Comparison 9 Family planning counseling and free contraceptives: HIV+ versus HIV-, Outcome 2 Reported pregnancy incidence per 100 women-years.

Study	Outcome	Reported pregnancy incidence per 100 women-years		
		HIV+ women	HIV- women	P
Brou 2009	Overall incidence	5.70 (95% CI 4.17 to 7.23)	4.37 (95% CI 2.83 to 5.91)	0.167
Brou 2009	Undesired incidence	1.07 (95% CI 0.41 to 1.73)	2.39 (95% CI 1.25 to 3.53)	0.023

Analysis 9.3. Comparison 9 Family planning counseling and free contraceptives: HIV + versus HIV-, Outcome 3 Use of modern contraceptive (injectable, IUD, pills, condoms).

Analysis 9.4. Comparison 9 Family planning counseling and free contraceptives: HIV+ versus HIV-, Outcome 4 Reported consistent condom use.

Study	Follow-up time	Reported consistent condom use		P
		HIV+ women	HIV- women	
Brou 2009	3 months	26.2%	19.8%	0.193
Brou 2009	12 months	12.1%	15.9%	0.139

Study	Follow-up time	Reported consistent condom use		P
		HIV+ women	HIV- women	
Brou 2009	18 months	8.4%	10.6%	0.302

ADDITIONAL TABLES

Table 1. Intervention fidelity information

Study	Curriculum or plan	Provider credentials	Training for intervention	Assessed adherence to protocol	Assessed intervention receipt ^a	Fidelity criteria ^b
Temmerman 1990	Contraceptive counseling apparently standard for study	Trained HIV counselor may have provided family planning (FP) information	–	–	–	2
Allen 1993	Contraceptive information apparently standard for study	–	–	–	–	2
King 1995	Video on contraceptive methods plus discussion	Nurse led discussion	–	Standard video; no information on discussion	Nurse asked questions during discussion to determine understanding	3
Brou 2009	Contraceptive counseling apparently standard method information	–	–	–	–	1
Ngure 2009	Multifaceted intervention described	Clinical and counseling staff	FP methods and counseling	Checklists to remind staff; weekly staff meeting to share experiences	Discuss challenges to contraceptive uptake with individual couples and in support groups.	5
Kosgei 2011	Contraceptive counseling in 'consistent and structured manner'	Nurses experienced in FP	–	–	–	2
McCarragher 2011	–	Nurse coordinator with FP background; providers of FP and antiretroviral therapy	FP and counseling	Observing FP sessions	–	3

Table 1. Intervention fidelity information (Continued)

Grossman 2013	—	Peer educators for FP group education; clinical staff provide HIV treatment, FP methods and counseling	Both groups, 7 days: all FP methods (action, efficacy, safety) in context of HIV; FP counseling and provision; refresher training every 3 months Integration sites: integration logistics; activity registers	No information on counseling; supervised providers for IUC and implant insertions	—	2
Sarnquist 2014	Curriculum with 3 sessions, 90-minutes each	Trainers (peers) with group facilitation experience; clinic nurses	Training in curriculum; provider training (5 days) on modern FP methods, including LARC insertion and removal	—	Outcomes: knew IUD effective method; belief of control over condom use; sexual relationship scale	4
Bachanas 2016	—	Health care providers (HCP); lay counselors	HCP, 1 week on prevention messages, risk reduction, FP; lay counselors, 2 weeks on HIV prevention via group education + individual counseling	Study staff observed encounters with HCP and lay counselors using standard form	Assessed receipt of prevention messages, including FP and consistent condom use	4

^aParticipants' understanding and skills regarding the intervention

FP: family planning

HCP: health care provider

IUC: intrauterine contraception

LARC: long-acting reversible contraception

Table 2. Summary of evidence quality

Study	Randomization methods or NRS	NRS: NOS selection criterion	NRS: NOS comparability	Follow-up period	Loss or chart review	Evidence quality ^a
Temmerman 1990	-1	—	-1	—	-1	Very low
Allen 1993	-1	—	-1	—	—	Low
King 1995	-1	—	-1	—	—	Low
Brou 2009	-1	—	—	—	—	Moderate
Ngure 2009	-1	—	-1	—	—	Low
Kosgei 2011	-1	—	—	—	-1	Low
McCarraher 2011	-1	—	—	—	—	Moderate
Grossman 2013	—	—	—	—	-1	Moderate

Table 2. Summary of evidence quality (Continued)

Sarnquist 2014	-1	—	-1	-1	—	Very low
Bachanas 2016	—	—	—	—	—	High

^aDowngrading: (1) inadequate randomization sequence generation or allocation concealment, no information on either, or study not randomized; (2) NRS, no NOS selection criterion met; (3) NRS, not controlling for relevant confounding; (4) follow-up < 6 months for contraceptive use or < 12 months for pregnancy; (5) loss to follow-up > 20% or retrospective chart review of selected cases

NRS: non-randomized study

NOS: Newcastle - Ottawa Quality Assessment Scale

Table 3. Outcome summary and evidence quality

Study	Outcome measure	Result (95% CI)	Evidence quality ^a
Enhanced family planning services vs standard care			
Ngunjiri 2009	Pregnancy incidence (per 100 woman-years)	Intervention site 8.7 vs comparison 21.9 (change -4.8 vs 5.1)	Low
	Contraceptive use (per visit), non-condom	OR 6.40 (5.37 to 7.62)	
Kosgei 2011	Pregnancy	NS	Low
	Contraceptive use (modern method)	Reported attributable risk -3.0 (-4.6 to -1.4)	
	Condom use (new use)	Reported attributable risk 16.4 (11.9 to 21.0)	
McCarraher 2011	Contraceptive use (modern method)	OR 2.48 (1.31 to 4.72)	Moderate
Grossman 2013	Pregnancy	NS	Moderate
	Contraceptive use:	Adjusted OR 1.81 (1.24 to 2.63);	
	more effective method;	NS	
	dual method; any family planning		
	Condom use (alone or with another method)	NS	
Sarnquist 2014	Contraceptive use:	NS	Very low
	LARC; other modern method		
Bachanas 2016	Contraceptive use:	NS;	High
	dual method;	Tanzania sites, adjusted OR 2.25 (1.24 to 4.10)	
	highly effective method		
	Condom use:	Tanzania sites, adjusted OR 0.23 (0.14 to 0.40);	
	unprotected last sex;		
	any unprotected sex in past 2 weeks	all sites, adjusted OR 0.56 (0.32 to 0.99)	

Table 3. Outcome summary and evidence quality (Continued)

Family planning counseling: HIV+ vs HIV-

Temmerman 1990	Pregnancy	NS	Very low
	Contraceptive use (OC)	NS	
	Condom use	NS	
Allen 1993	Pregnancy	OR 0.55 (0.43 to 0.69)	Low
	Contraceptive use:	NS;	
	hormonal;	OR 2.52 (1.53 to 4.14)	
	discontinued chosen method		
	Condom use;	OR 2.82 (2.18 to 3.65);	
	spermicide	OR 2.36 (1.69 to 3.30)	
King 1995	Pregnancy	OR 0.39 (0.23 to 0.68)	Low
	Contraceptive use:	NS	
	OC; injectable; implant		
Brou 2009	Pregnancy	NS	Moderate
	Pregnancy, undesired	Reported incidence: HIV+ 1.07 (0.41 to 1.73) vs HIV- 2.39 (1.25 to 3.53); P = 0.023	
	Contraceptive use (modern method)	NS	
	Condom use (consistent)	NS	

^aFrom Table 2

CI: confidence interval

LARC: long-acting reversible contraception

NS: no significant difference between comparison groups

OC: oral contraceptives

APPENDICES

Appendix 1. Search 2016

MEDLINE via PubMed (1 December 2012 to 2 August 2016)

((("Contraception"[Mesh] OR "Contraception Behavior"[Mesh] OR "Contraceptive Agents"[Mesh] OR "Contraceptive Devices"[Mesh] OR contraceptive OR contraception OR "family planning" OR reproductive[ti]) AND HIV[ti] AND (educat*[tiab] OR counsel*[tiab] OR communicat*[tiab] OR behavioral[tiab] OR behavioural[tiab] OR intervention[tiab] OR use[tiab] OR uptake[tiab] OR continuation[tiab])) NOT ("HIV prevention"[ti] OR "HIV/AIDS prevention"[ti] OR "risk reduction"[ti] OR "men who have sex with men"[ti] OR MSM[ti]))

CENTRAL (5 April 2016 (Cochrane Library Issue 3, 2016))

Contracept* OR "family planning" in Title, Abstract or Keywords

AND educat* OR counsel* OR communicat* OR behavioral OR behavioural OR intervention OR use OR uptake OR continuation in Title,
Abstract or Keywords
AND HIV in Record Title
NOT "HIV prevention" OR "HIV/AIDS prevention" OR VCT OR testing OR "risk reduction" OR "men who have sex with men" OR MSM in
Record Title
Search limits: Trials
Publication year: 2012 to 2016

Web of Science (5 April 2016)

Topic: contracept*
AND Topic: HIV
AND Topic: educat* OR counsel* OR communicat* OR behavioral OR behavioural
NOT Title "HIV prevention" OR "HIV/AIDS prevention" OR VCT OR testing OR "risk reduction" OR "men who have sex with men" OR MSM
Timespan: 2012 to 2016

POPLINE (5 April 2016)

Keyword: Contraception AND
HIV AND
Education
Years: from 2012 to 2016

ClinicalTrials.gov (28 March 2016)

Search terms: contraceptive OR contraception OR family planning OR reproductive health
Conditions: HIV
Interventions: educat* OR counsel* OR communication OR behavioral OR behavioural OR intervention
Outcome measures: pregnancy OR use OR uptake OR continuation
Gender: Studies with female participants
First received: 1 March 2012 to 28 March 2016

ICTRP (28 March 2016)

Title: contraceptive OR contraception OR family planning OR reproductive health
Condition: HIV
Intervention: educat* OR counsel* OR communicat* OR behavioral OR behavioural OR intervention OR use OR uptake OR continuation
Date of registration: 1 March 2012 to 28 March 2016

Appendix 2. Search 2012**MEDLINE via PubMed (01 Oct 2012)**

((("Contraception"[Mesh] OR "Contraception Behavior"[Mesh] OR "Contraceptive Agents"[Mesh] OR "Contraceptive Devices"[Mesh] OR
contraceptive OR contraception OR "family planning" OR reproductive[ti])
AND HIV[ti] AND (educat*[tiab] OR counsel*[tiab] OR communicat*[tiab] OR behavioral[tiab] OR behavioural[tiab] OR intervention[tiab]
OR use[tiab] OR uptake[tiab] OR continuation[tiab]))
NOT ("HIV prevention"[ti] OR "HIV/AIDS prevention"[ti] OR "risk reduction"[ti] OR "men who have sex with men"[ti] OR MSM[ti]))

CENTRAL (02 Oct 2012)

Contracept* OR "family planning" in Title, Abstract or Keywords
AND educat* OR counsel* OR communicat* OR behavioral OR behavioural OR intervention OR use OR uptake OR continuation in Title,
Abstract or Keywords
AND HIV in Record Title
NOT "HIV prevention" OR "HIV/AIDS prevention" OR VCT OR testing OR "risk reduction" OR "men who have sex with men" OR MSM in
Record Title

CINAHL and PsycINFO (via EBSCO) (06 Jun 2012)

contraceptive OR contraception OR "family planning" in all text
AND HIV in title
AND (educat* OR counsel* OR communicat* OR behavioral OR behavioural OR intervention OR use OR uptake OR continuation) in abstract
NOT ("HIV prevention" OR "HIV/AIDS prevention" OR VCT OR testing OR "risk reduction" OR "men who have sex with men" OR MSM) in title

POPLINE (11 Jul 2012)

Keywords: ((contraceptive/contraception/family planning/reproductive health) & HIV) & (educat*/counsel*/communicat*/behavioral/behavioural) & (random*/clinical trial/research report)

Title NOT: HIV prevention/AIDS prevention/risk reduction/men who have sex with men/MSM

EMBASE (31 Jul 2012)

('contraception'/exp/mj OR 'contraception behavior'/exp/mj OR 'contraceptive agents'/exp/mj OR 'contraceptive devices'/exp/mj OR 'family planning'/exp/mj) AND (educat* OR counsel*:ab OR communicat*:ab OR behavioral:ab) AND (use:ab OR continuation:ab) AND ('hiv-positive':ab OR 'hiv-1':ab OR 'living with hiv':ab OR (hiv:ab OR 'human immunodeficiency virus':ab AND (transmission:ab OR concordant:ab OR serodiscordant:ab))) NOT ('hiv prevention':ti OR testing:ti OR 'risk reduction':ti OR 'men who have sex with men':ti OR msm:ti) AND [humans]/lim AND ([embase]/lim OR [embase classic]/lim)

ClinicalTrials.gov (11 Jul 2012)

Search terms: contraceptive OR contraception OR family planning OR reproductive health

Study type: Interventional studies

Conditions: HIV

Interventions: educat* OR counsel* OR communication OR behavioral OR behavioural OR intervention

Outcome measures: pregnancy OR use OR uptake OR continuation

Gender: Studies with female participants

ICTRP (11 Jul 2012)

Title: contraceptive OR contraception OR family planning OR reproductive health

Condition: HIV

Intervention: educat% OR counsel% OR communicat% OR behavioral OR behavioural OR intervention OR use OR uptake OR continuation

Appendix 3. Newcastle - Ottawa Quality Assessment Scale for cohort studies

Cohort studies

Note: A study can be awarded a maximum of one star (#) for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for Comparability.

Selection

1) Representativeness of the exposed cohort

- a) truly representative of the average _____ (describe) in the community #
- b) somewhat representative of the average _____ in the community #
- c) selected group of users eg nurses, volunteers
- d) no description of the derivation of the cohort

2) Selection of the non exposed cohort

- a) drawn from the same community as the exposed cohort #
- b) drawn from a different source
- c) no description of the derivation of the non exposed cohort

3) Ascertainment of exposure

- a) secure record (eg surgical records) #
- b) structured interview #
- c) written self report
- d) no description

4) Demonstration that outcome of interest was not present at start of study

- a) yes #

b) no

Comparability

1) Comparability of cohorts on the basis of the design or analysis

a) study controls for _____ (select the most important factor) #

b) study controls for any additional factor # (This criteria could be modified to indicate specific control for a second important factor.)

Outcome

1) Assessment of outcome

a) independent blind assessment #

b) record linkage #

c) self report

d) no description

2) Was follow-up long enough for outcomes to occur

a) yes (select an adequate follow up period for outcome of interest) #

b) no

3) Adequacy of follow up of cohorts

a) complete follow up - all subjects accounted for #

b) subjects lost to follow up unlikely to introduce bias - small number lost - > ____ % (select an adequate %) follow up, or description provided of those lost) #

c) follow up rate < ____ % (select an adequate %) and no description of those lost

d) no statement

WHAT'S NEW

Date	Event	Description
2 August 2016	New search has been performed	Search updated
21 June 2016	New citation required but conclusions have not changed	Two recent trials showed intervention effects. Later reports indicated more training of providers on contraceptive methods and counseling.

HISTORY

Protocol first published: Issue 11, 2012

Review first published: Issue 1, 2013

Date	Event	Description
18 April 2016	Amended	Revised 'Risk of bias' tables to incorporate criteria for non-randomized studies; added 'Summary of findings'

Date	Event	Description
4 April 2016	Amended	Included 3 new studies (Bachanas 2016 ; Grossman 2013 ; Sarnquist 2014)
7 January 2013	Amended	text change

CONTRIBUTIONS OF AUTHORS

2016: L Lopez and T Grey reviewed search results. L Lopez conducted the primary data extraction and revised the text. T Grey did the secondary extraction for the study characteristics and outcome data. M Chen did the secondary data extraction for the Risk of bias tables. All authors reviewed and commented on the manuscript.

2013: L Lopez developed the concept, reviewed search results, conducted the primary data extraction, and drafted the review. Deborah Hilgenberg, formerly of FHI 360, reviewed search results and conducted the secondary data extraction. M Chen reviewed studies for potential inclusion and the quality assessment data, contributed to the methods section and the interpretation of results. J Denison helped with initial inclusion criteria and reviewed studies for potential inclusion. GS Stuart helped with the Background section and reviewed the clinical content. All authors reviewed and commented on the protocol and the review.

DECLARATIONS OF INTEREST

[McCarragher 2011](#) was conducted at FHI 360, where review authors are employed (LML, MC) or were employed during the initial review (DH, JD). None were involved in the study design or implementation. M Chen was involved in secondary analysis of data from the study.

SOURCES OF SUPPORT

Internal sources

- No sources of support supplied

External sources

- National Institute of Child Health and Human Development, USA.

2012 to 2016: Funding for conducting the review at FHI 360

- United States Agency for International Development, USA.

2012: Funding for conducting the review at FHI 360

INDEX TERMS

Medical Subject Headings (MeSH)

*Contraception Behavior; *HIV Seronegativity; *HIV Seropositivity; Condoms [statistics & numerical data]; Contraceptive Agents, Female [*administration & dosage]; Family Planning Services; Pregnancy Rate

MeSH check words

Female; Humans; Pregnancy