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Mary Lou Lindegren Date

Integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family planning services

By

Mary Lou Lindegren
Master of Public Health degree

Healthcare outcomes track
Career MPH Program
Rollins School of Public Health

_____ [Chair's signature]
Ayanna Buckner, MD, MPH
Committee Chair

_____ [Member's signature]
Caitlin Kennedy, PhD, MPH
Committee Member

_____ [Member's signature]
Melissa Alperin, MPH
Chair, CMPH Program
Committee Member

Integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family planning services

By

Mary Lou Lindegren

B.S., Duke University, 1981
M.D., Duke University, 1986

Thesis Committee Chair: Ayanna Buckner, MD, MPH

An abstract of
A thesis submitted to the Faculty of the
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In partial fulfillment of the requirements for the degree of
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2012

Abstract

Integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family planning services

By Mary Lou Lindegren

Background: The integration of HIV and maternal, neonatal, child health and nutrition services (MNCHN), including family planning (FP) is recognized as a key strategy to reduce maternal and child mortality and control the HIV epidemic. However, limited evidence exists on the effectiveness of service integration.

Objective: To evaluate the impact of integrating MNCHN-FP and HIV services on health, behavioral, and economic outcomes and to identify research gaps.

Methods: Using the Cochrane Collaboration's validated search strategies for identifying reports of HIV interventions, along with appropriate keywords and MeSH terms, a range of electronic databases were searched, including CENTRAL, CINAHL, EMBASE, MEDLINE, and Web of Science, from January 1990 to October 2010. Included studies were published in peer-reviewed journals, and provided intervention evaluation data (pre-post or multi-arm study design). Interventions were organizational strategies or change, process modifications or introductions of technologies aimed at integrating MNCHN-FP and HIV service delivery.

Analysis: A total of 10,619 citations were identified from electronic databases and 101 citations from hand searching, cross-references and interpersonal communication. After screening for relevance, 121 full-text articles were reviewed.

Results: Twenty peer-reviewed articles representing 19 interventions met inclusion criteria. There were no randomized controlled trials. One study utilized a stepped wedge design, while the rest were non-randomized trials, cohort studies, time series, cross-sectional, serial cross-sectional and before-after studies. It was not possible to perform meta-analysis. Risk of bias was generally high. There was high between-study heterogeneity in intervention types, study objectives, settings and designs, and reported outcomes. Most studies integrated FP with HIV testing or HIV treatment. Overall, HIV and MNCHN-FP service integration was feasible across a variety of integration models, settings and target populations. Nearly all studies reported positive post-integration effects on key outcomes including contraceptive use, HIV treatment initiation, HIV testing, and quality of services.

Conclusion: This systematic review found that integrated HIV and MNCHN-FP services were feasible to implement and can improve a variety of health and behavioral outcomes. However, significant evidence gaps remain. Rigorous research comparing outcomes of integrated with non-integrated services, including cost-effectiveness, HIV and STI incidence, morbidity and mortality are needed to inform programs and policy.

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Review information

Authors

Mary Lou Lindegren[1], Caitlin E Kennedy[2], Deborah Bain-Brickley[3], Hana Azman[3], Andreea Creanga[4], Lisa Butler[3], Alicen Spaulding[5], Tara Horvath[3], Gail E Kennedy[3]

[1]Vanderbilt University, Nashville, Tennessee, USA

[2]Department of International Health, Social and Behavioral Interventions Program, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA

[3]Global Health Sciences, University of California, San Francisco, San Francisco, California, USA

[4]US Centers for Disease Control and Prevention, Atlanta, Georgia, USA

[5]Division of Epidemiology and Community Health, University of Minnesota, Minneapolis, Minnesota, USA

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Contact person

Mary Lou Lindegren

Vanderbilt University
Nashville TN USA

E-mail: mllindegren@gmail.com

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Abstract

Background

The integration of HIV/AIDS and maternal, neonatal, child health and nutrition services (MNCHN), including family planning (FP) is recognized as a key strategy to reduce maternal and child mortality and control the HIV/AIDS epidemic. However, limited evidence exists on the effectiveness of service integration.

Objectives

To evaluate the impact of integrating MNCHN-FP and HIV/AIDS services on health, behavioral, and economic outcomes and to identify research gaps.

Search methods

Using the Cochrane Collaboration's validated search strategies for identifying reports of HIV interventions, along with appropriate keywords and MeSH terms, we searched a range of electronic databases, including the Cochrane Central Register of Controlled Trials (CENTRAL), Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, MEDLINE (via PubMed), and Web of Science / Web of Social Science. The date range was from 01 January 1990 to 15 October 2010. There were no limits to language.

Selection criteria

Included studies were published in peer-reviewed journals, and provided intervention evaluation data (pre-post or multi-arm study design).The interventions described were organizational strategies or change, process modifications or introductions of technologies aimed at integrating MNCHN-FP and HIV/AIDS service delivery.

Data collection and analysis

We identified 10,619 citations from the electronic database searches and 101 citations from hand searching, cross-reference searching and interpersonal communication. After initial screenings for relevance by pairs of authors working independently, a total of 121 full-text articles were obtained for closer examination.

Results

Twenty peer-reviewed articles representing 19 interventions met inclusion criteria. There were no randomized controlled trials. One study utilized a stepped wedge design, while the rest were non-randomized trials, cohort studies, time series studies, cross-sectional studies, serial cross-sectional studies, and before-after studies. It was not possible to perform meta-analysis. Risk of bias was generally high. We found high between-study heterogeneity in terms of intervention types, study objectives, settings and designs, and reported outcomes. Most studies integrated FP with HIV testing (n=7) or HIV care and treatment (n=4). Overall, HIV and MNCHN-FP service integration was found to be feasible across a variety of integration models, settings and target populations. Nearly all studies reported positive post-integration effects on key outcomes including contraceptive use, antiretroviral therapy initiation in pregnancy, HIV testing, and quality of services.

Authors' conclusions

This systematic review's findings show that integrated HIV/AIDS and MNCHN-FP services are feasible to implement and can improve a variety of health and behavioral outcomes. However, significant evidence gaps remain. Rigorous research comparing outcomes of integrated with non-integrated services, including cost, cost-effectiveness, and health outcomes such as HIV and STI incidence, morbidity and mortality are greatly needed to inform programs and policy.

Plain language summary

Integrating HIV/AIDS services with services focused on the health of mothers, infants and children, as well as on nutrition and family planning

Integrating HIV/AIDS prevention and treatment services with services focused on the health of mothers, infants and children, as well as on nutrition and family planning (MNCHN-FP) may improve the health of mothers and children affected by HIV/AIDS or a risk of HIV infection.We identified 20 articles representing 19 strategies for integrating these kinds of services. Overall, we found that integrating HIV/AIDS and MNCHN-FP services was was feasible across a variety of integration models, locations, and populations. Most studies reported that integration had a positive impact on health outcomes. Many studies, however, also reported that some outcomes had improved, while others had not improved; or that there was no effect at all.

There are still significant gaps in the evidence. There is a need for rigorous research comparing the outcomes of integrated services with those of non-integrated services. Such studies should look at the impact of integrated programs on cost, cost-effectiveness, the rate at which new HIV and other sexually transmitted infections occur in the population, and the impact on the rate of serious illness and death in women and children. These rigorous studies will help researchers and doctors to develop effective integrated programs, and will help policy-makers to develop evidence-based health policy.

Background

Worldwide, it is estimated that approximately 34 million people are living with HIV, of who 16.8 million are women and 3.4 million are children under 15. Over 90% of whom are living in sub-Saharan Africa (UNAIDS 2011). Approximately 390,000 (340,000–450,000) children are newly infected with HIV each year and more than 42,000-60,000 HIV associated deaths among pregnant women occur each year. (UNAIDS 2011). Increased attention and resources have been focused on scaling up interventions for the prevention of mother-to-child transmission of HIV (PMTCT) and antiretroviral treatment for eligible pregnant women and children. Despite massive investment, however, in HIV programs globally and the proven cost-effectiveness of HIV interventions, the coverage of HIV prevention, care and treatment programs for women and children remains unacceptably low.(UNAIDS 2011a). Nearly two-thirds of pregnant women in low- and middle-income countries are not being tested for HIV. Additionally, there is wide variability in coverage between countries. Of the 22 countries that account for 90% of pregnant women with HIV, only four countries tested over 90% of pregnant women (Botswana, South Africa, Zambia and Zimbabwe) and three countries tested less than 20% (Nigeria, Chad, and the Democratic Republic of Congo) (UNAIDS 2011). Although coverage is improving, only 48% of HIV-positive pregnant women received the most effective PMTCT regimens in 2010. The coverage of HIV interventions for infants and children is even lower. Only 28% of children born to mothers living with HIV received an HIV test with the first two months of life and only 23% received lifesaving co-trimoxazole prophylaxis. (UNAIDS 2011) Of the estimated 2 million children in need of antiretroviral therapy, only 23% are receiving it, much lower than (51%) coverage among adults (UNAIDS 2011).

The Global Plan to eliminate new HIV infections among children and improve the health of mothers has set ambitious targets for 2015, including reducing the number of children newly infected with HIV by 90%, reducing the number of women dying from HIV-associated causes during pregnancy, delivery and postpartum by 50%, reducing the mother-to-child transmission of HIV to less than 5%, and reducing unmet family planning needs to zero. (UNAIDS 2011a) A comprehensive approach to reducing HIV transmission and improving HIV-free survival among both the mother and infants is recommended by WHO and includes four pillars (1) primary prevention of HIV infection among women, (2) prevention of unintended pregnancies among HIV-infected women, (3) prevention of vertical transmission from an HIV-infected mother to her infant, and (4) care and support for HIV-infected women, their infants, partners, and families (WHO 2002). However, many challenges exist across the PMTCT cascade to achieving high coverage of effective interventions to prevent mother-to-child transmission in low and middle income countries and scale-up care and treatment for infants and children. It is essential to find better ways to deliver essential evidence-based health interventions to women and children. Integrating the delivery of health services may be an efficient and effective way to improve health and reduce healthcare costs.

The PEPFAR Re-authorization Act of 2008 and the Global Health Initiative of 2010 both place a strong emphasis on integration and linkages of programs to address broad development challenges, and also providing a comprehensive package of services for the populations served (Global Health Initiative). At the international level, the importance of integrating maternal, neonatal, child health and nutrition (MNCHN) services, including family planning (FP) services, with HIV/AIDS services, is well recognized as a key strategy to meeting the 2015 Millennium Development Goals (MDGs), particularly to reduce maternal and child mortality, while also contributing to the prevention and control of HIV (MDG 2010).

However, coverage of effective child survival interventions in some countries remains inadequate to meet the MDG of reducing maternal and child mortality. Nearly 8 million children died in 2010 before the age of 5, with pneumonia and diarrheal diseases as the leading causes of death, particularly for those infected with HIV. Diarrheal disease accounts for an estimated 19% of all deaths in children under the age 5 years, approximately 1.5 million deaths per year (Boschi-Pinto 2008) and pneumonia accounts for nearly one in five deaths (Rudan 2008). Over 70% of these deaths occur in the African and South-East Asian regions, which are also disproportionately affected by HIV in children (Boschi-Pinto 2008, UNAIDS 2011a). While diarrheal control strategies have reduced the number of child deaths from diarrhea, coverage with these effective interventions is surprisingly low, with oral rehydration solution (ORS) being used for only 40% of children with diarrhea (Bhutta 2010). Additionally, coverage of antibiotics for treatment of pneumonia is only 27%. Under-nutrition is another underlying cause of child mortality, contributing to over one third of under-five deaths worldwide.

Though global under-five mortality has decreased 28% since 1990, progress in reduction of neonatal mortality is more slow, now accounting for 41% of all deaths under the age of 5 years. (Bhutta 2010) There has been no reduction in neonatal mortality noted in the African region. Reduction in neonatal mortality is linked to reduction in maternal mortality. Over 350,000 women died in pregnancy or childbirth in 2008, most of whom reside in sub-Saharan Africa and Asia (UNICEF 2012) . Many deaths could be averted if pregnant women received care from skilled professionals and had access to emergency obstetric care. However, coverage of maternal health interventions, including skilled birth attendants, antenatal care, unmet need for contraception is not adequate to achieve the millennium development goals.

The global plan for elimination of pediatric HIV infection emphasizes leveraging synergies, linkages and integration for improved sustainability.(UNAIDS 2011a). The goal of the WHO and UNAIDS 2010 Treatment 2.0 initiative is to optimize and innovate treatment in key areas, including integrated and decentralized delivery of HIV services (WHO 2011) Despite these clear mandates, there is limited information and evidence to guide policy action and program efforts on integration. There is a need to examine the efficacy and outcomes of MNCHN-FP-HIV integration, and to identify how to effectively design and implement integrated programs.

Promoting the integration of HIV/AIDS prevention, treatment and care services with maternal, neonatal, child health and nutrition services, including family planning services (MNCHN-FP-HIV) is a recommended strategy for reducing maternal and child mortality and to control the HIV/AIDS epidemic. Strategic integration of these programs hopes to reduce costs, avoid duplication, increase efficiency and improve women and children's access to and uptake of needed services as well as to improve the quality of services. Such synergies are critical, particularly in countries where HIV accounts for a significant amount of mortality among women and children. However, it is not yet clear whether such strategies are effective.

In 2008-2009, we conducted a systematic review of linkages between sexual and reproductive health (SRH) and HIV interventions. (SRH-HIV Linkages). While this review included MNCHN as one category of SRH interventions, it did not focus on MNCHN interventions in particular, nor did it conduct as thorough a search as possible on all aspects of MNCHN that could be linked with HIV/AIDS interventions. Searches for the SRH-HIV Linkages review identified articles and program reports published or presented before December 31, 2007.

This review builds upon the previous SRH-HIV Linkages research by expanding and updating one component of the SRH, MNCHN and FP services, integrated with HIV services. This review examines the effectiveness of MNCHN-FP-HIV service integration, reviews factors that promote and inhibit program effectiveness, and identifies primary research gaps.

Description of the intervention

In the literature on integration of services there is growing agreement that there is no clear and agreed-upon definition of linkages or integration, and the dichotomy between integrated and non-integrated services is actually more of a continuum, with most health services falling somewhere in between (Atun 2009, Shigayeva 2010).

Linkages can occur at multiple levels. Linkages can be defined as “policy, programmatic, services and advocacy of bi-directional synergies between MNCHN and HIV/AIDS” (SRH-HIV Linkages). In contrast to linkages, which exist at multiple levels, integration at the service delivery level only can be defined as “different kinds of MNCHN and HIV services or operational programs joined together to ensure and perhaps maximize collective outcomes” (SRH-HIV Linkages).

Others have defined integration as “a variety of managerial or operational changes to health systems to bring together inputs, delivery, management and organization of particular service functions. Integration aims to improve the service in relation to efficiency and quality, thereby maximizing use of resources and opportunities” (Briggs 2009) For the purposes of this review, we used this definition of integration. Linkages or integration can be bi-directional or offered simultaneously. For example, programs can combine HIV-related topics with ongoing MNCHN-FP issues, and, conversely, MNCHN-FP related topics with ongoing HIV issues; or they can initiate both types of services at the same time. Additionally, this review focuses on interventions, rather than observational research. We define an intervention as a combination “of technologies (e.g. vaccines, drugs), organizational changes, process modifications and other inputs related to decision-making, planning and service delivery” (Atun 2009).

How the intervention might work

Integration of MNCHN-FP and HIV services potentially has a number of advantages, including improving the efficiency, coverage, and cost-effectiveness of services, compared to offering these services separately. Additionally, offering services in the same facility or by same providers may improve acceptability and uptake of services in areas where vertical programs may not be feasible, strengthen existing health care systems overall by improving clinical training, laboratory services and supply management, and improve the quality of care, increase patient satisfaction, and reduce stigma among HIV-infected individuals.

Why it is important to do this review

Both the global plan for elimination of new HIV infections in children and the goal for universal access to HIV care and treatment call for innovative approaches to drastically improve the efficiency gains in HIV programs, in greater effectiveness, intervention coverage and impact on HIV-specific and broader health outcomes. Despite gains in the global response to the HIV epidemic, there are many challenges to achieving universal access to HIV and MCH services in many low and middle income countries whose health systems are under-resourced and where ART and PMTCT programs are not well integrated with other health services.

Integration is a key component of the UNAIDS global plan and the Treatment 2.0 strategy (WHO 2011, UNAIDS 2011a). To date, there has been no systematic review of the impact on health, behavioral, uptake, and cost outcomes of interventions to integrate of MNCHN-FP and HIV services in low- and middle-income countries. Given the importance of identifying effective models and lack of evidence to date, it is imperative to systematically evaluate the impact of integrating MNCHN-FP and HIV programs. This systematic review will inform new initiatives and country programs, and will help to focus efforts on the most effective modalities for improving access to key interventions.

Objectives

To systematically review the literature on effectiveness of integration of MNCHN-FP and HIV services on health, behavior, and cost outcomes. Several key questions were identified as important topics to understand the state of the evidence of integrated MNCHN-FP-HIV service delivery and what additional gaps remain in the literature; these included:

- What are the study characteristics and integration models in the literature?
- What is the methodological quality of these evaluations?
- What are the primary outcomes from the identified studies?
- What integration models are effective?
- What are the research gaps?

Methods

Criteria for considering studies for this review

Types of studies

Any intervention study involving a pre-post or multi-arm comparison of individuals or groups who received the intervention versus those who did not was included. To include a broad range of evidence, studies were included if they met the following inclusion criteria:

1. Published in a peer-reviewed journal between January 1, 1990 and October 15, 2010.
2. Presented post-intervention evaluation data of an organizational or management strategy, organizational changes, process modifications, or the introduction of technologies aimed at integrating MNCHN-FP and HIV service delivery, or of different models of linking or integrating MNCHN-FP and HIV service delivery. Both on-site delivery of services and referral were considered integration for the purposes of this review, although these are different levels of integrating services. Studies had to evaluate the format of delivery of interventions that are assumed to be already needed or efficacious, rather than the efficacy of an intervention.
3. Used a pre-post or multi-arm comparison of individuals who received the intervention versus those who did not (according to study design categories described below) to assess quantitative outcomes of interest (as

described below).

This included the following study designs:

1. **Randomized trial** – **Individual:** Minimum two study arms; random assignment of individuals to study arm.
2. **Randomized trial** – **Group:** Minimum two study arms; random assignment of groups (couples, classrooms, towns, etc.) to study arm.
3. **Non-randomized "trial"** – **Individual*:** Minimum two study arms; assignment of individuals to study arm, but not done randomly.
4. **Non-randomized "trial"** – **Group*:** Minimum two study arms; assignment of groups to study arm, but not done randomly.
5. **Before-after study:** Pre- and post-intervention assessment among the same individuals. One study arm and one follow-up assessment period.
6. **Time series study:** Pre-intervention and several post-intervention assessments among the same individuals. One study arm and multiple follow-up assessment periods.
7. **Case-control study:** Two groups defined by outcome measures, one consisting of cases and one consisting of controls. To be included, the study must compare outcomes between those who got the intervention and those who did not.
8. **Prospective cohort:** Two or more groups defined by exposure measures and followed over time.
9. **Retrospective cohort:** Two or more groups defined by exposure measures, but uses previously collected or historical data.
10. **Cross-sectional:** Exposure and outcome determined in the same population at the same time. To be included, the study had to compare outcomes between those who got the intervention and those who did not.
11. **Serial cross-sectional:** A cross-sectional survey conducted in a population at multiple points in time with different people in that population. To be included, the study had to compare outcomes between those who got the intervention and those who did not

*If study design was #3 or #4, a non-randomized allocation method had to be specified

Studies must have included a quantitative comparison of individuals or groups who received the intervention versus those who did not, or a comparison of individuals or groups before and after receiving the intervention. Studies could have either a control or a comparison group. A control group is a study arm that does not receive any type of intervention. A comparison group is a study arm that receives an intervention, which may be the standard of care, a less-intensive form of the intervention, or a separate intervention unrelated to the integration of MNCHN-FP and HIV/AIDS.

When both or all comparison groups in a study received a linked intervention, we used the following criteria to determine if the study would be included:

We ***included*** studies in which the comparison group(s) received a different level or intensity of linkage. For example, we included studies in which one group received onsite integrated services and the other group received a referral. These studies allow us to learn more about integration interventions by evaluating the advantages and disadvantages of more intensive vs. less intensive integration.

We ***excluded*** studies in which both groups received integrated services, but the difference in the services only consisted of different clinical interventions, since this would be considered the same level of integration. For example, we excluded studies in which both comparison groups received different FP commodities (e.g., a group of HIV-infected women in clinical care received a hormonal contraception whereas another similar group received an intrauterine device (IUD)). These studies do not shed light on the advantages and disadvantages of linkage interventions.

Types of participants

This review includes interventions delivered to all populations, including youth and adults, both general populations and specific high-risk populations, such as injecting drug users (IDUs) and commercial sex workers (CSWs). This review includes interventions in all countries, including high-, middle-, and low-income countries as defined by the World Bank (World Bank 2007).

Types of interventions

Broadly defined, any intervention which implements an organizational or management strategy which aimed at linking or integrating MNCHN-FP and HIV/AIDS services, or different models of service delivery, was considered eligible for review. These linkages work in both directions, by integrating HIV/AIDS issues into ongoing MNCHN policies and programs, and conversely, MNCHN-FP issues into HIV/AIDS policies and programs.

HIV/AIDS interventions encompass HIV counselling and testing, care, and treatment services, and services for people living with HIV (PLHIV). Primary HIV prevention activities were not included in this review because of the diversity of these interventions and the fact that they have been reviewed elsewhere.

HIV interventions were divided into four components:

1. HIV counselling and testing. This category includes any form of testing to diagnose HIV, including voluntary counselling and testing (VCT)/client-initiated counselling and testing (CITC); provider-initiated testing and counselling (PITC); early infant diagnosis (EID); and family and partner testing
2. Prevention of secondary HIV transmission. This category includes interventions with PLHIV designed to reduce the risk of secondary HIV transmission, including condom promotion and provision; safe sex and risk reduction counselling, including discordant couples risk reduction; and interventions to reduce alcohol-related risk.
3. HIV care and treatment. This category includes biomedical or traditional/alternative treatment for PLHIV, including CD4 testing to assess ART eligibility; ART or highly active ART (HAART); interventions to improve HIV medication adherence; opportunistic infection (OI), prevention, diagnosis, and management, including co-trimoxazole (CTX); detection and management of sexually transmitted infections (STIs); clinical monitoring; pain and symptom management; and palliative care.
4. Psychosocial and other services for PLHIV. This category includes psychosocial support for people living with HIV/AIDS; non-health-related programs for PLHIV (such as food, transportation, and housing); stigma reduction; and general positive living interventions for PLHIV. All interventions given to PLHIV are included in this category of HIV intervention if they do not fit into any of the other categories.

MNCHN-FP interventions were divided into seven components:

1. Family planning. This category includes any kind of contraceptive service provision, family planning counselling, or education. This includes modern contraceptive methods, natural family planning methods and the lactational amenorrhea method (LAM).
2. Antenatal services. This category includes routine antenatal services for pregnant women including screening for anemia, syphilis, pre-eclampsia; tuberculosis (TB) screening, diagnosis and treatment; tetanus toxoid, iron/folate; malaria intermittent preventive therapy (IPT) and insecticide treated nets (ITNs); nutritional assessment, counselling and support (including Vitamin A supplementation for pregnant women); deworming; safe water and hygiene interventions; infant feeding counselling; community outreach to promote antenatal care (ANC) and facility delivery; and interventions to promote a delivery plan.
3. Post-abortion care: Care and medical treatment for women after any type of abortion, including incomplete, induced and spontaneous abortion. Post-abortion care includes three components: (1) emergency treatment

for complications of spontaneous or induced abortion; (2) family planning counselling and services and, depending on disease prevalence and available resources, sexually transmitted infection evaluation and treatment, and HIV counselling and/or referral for testing; and (3) community empowerment through community awareness and mobilization.

4. Intrapartum/childbirth services: This category includes interventions for mothers and infants during the intrapartum/childbirth period, including interventions to prevent maternal hemorrhage; skilled attendant at delivery; emergency obstetric care; and active management of third stage labor
5. Postnatal/postpartum services: This category includes essential newborn care interventions (thermal, cord care); resuscitation; infant feeding support-early and exclusive breastfeeding; newborn immunizations; the identification and treatment of newborn infections; and postpartum services for women
6. Infant/child services: This category includes interventions for infants and children up to the age of 5, including immunizations; growth monitoring; case management of pneumonia, diarrhoea, fever, and sepsis; nutritional assessment; developmental assessment; malaria prevention and treatment; Vitamin A and other micronutrient supplementation; deworming; and safe water, sanitation and hygiene.
7. Nutrition services**:** This category includes interventions that focus on nutritional care for either adults or children, including nutritional assessment, counselling, support, treatment, and supplementation, regardless of location or population. For this reason, nutrition services may overlap substantially with other MNCHN services; in this case, studies were included in both categories.

For the purposes of this review, if only condoms were provided only for contraception, with no additional family planning counseling and no additional contraceptive methods, this was not considered a family planning intervention, as condoms alone can also be used for the purpose of HIV/STI prevention.

PMTCTis a four-pronged strategy that includes (1) primary prevention of HIV infection among women, (2) prevention of unintended pregnancies among HIV-infected women, (3) prevention of vertical transmission from an HIV-infected mother to her infant, and (4) care and support for HIV-infected women, their infants, partners, and families (WHO 2002). For the purposes of this review, prong 1 is excluded, as we are not considering primary HIV prevention activities. Prong 2 would be included as a integration if it is conducted in a setting where other HIV services were also being provided for PLHIV. Prong 3, prevention of vertical transmission, normally takes place within antenatal/intrapartum/postnatal settings. Prong 3 interventions that are linked with MNCHN services *only* by being located in one of these settings – specifically, evaluations of the delivery of PMTCT within an antenatal setting, including HIV testing in ANC and provision of prophylaxis to HIV-infected women and infants – was not included in the review, as this is considered the standard way to deliver this HIV intervention, and these studies have been reviewed in greater detail elsewhere. Similarly, studies that evaluate the efficacy of antiretroviral therapy or safe delivery practices (including cesarean delivery and vaginal cleaning) to prevent vertical transmission were not included in this review, as these are examining the efficacy of an intervention rather than a management or organizational strategy to deliver an intervention that is already assumed to be efficacious. Instead, we refer readers to Cochrane reviews of these topics by Read 2005, Wiysonge 2005, Sturt 2010, Siegfried 2011 and Wiysonge 2011. In addition, evaluations of infant feeding interventions solely for the purposes of preventing vertical HIV transmission to the infant and infant health/survival, and not linked to other aspects of MNCHN, were not included in this review as this is considered an HIV intervention only and these studies have been reviewed in a Cochrane review (Horvath 2009). Finally, PMTCT Prong 4 interventions fall under HIV care and treatment, and psychosocial and other services for PLHIV, for the purposes of this review.

PMTCT interventions that link the prevention of vertical transmission of HIV (Prong 3) with other MNCHN interventions were included in this review. For example, an intervention that trained nurses to provide family planning counselling for HIV-infected pregnant women in a PMTCT program would be included. Similarly, an intervention that promoted antiretroviral drug adherence for HIV-infected women in postnatal services would be

included.

See Appendix 1 for the matrix classifying the different types of MNCHN-FP and HIV integration and linkage interventions for each of the studies included in this review.

Types of outcome measures

Studies were included if one or more of the following outcomes were reported.

Primary outcomes

- Mortality (including maternal mortality, infant mortality, etc.)
- HIV incidence
- STI incidence

Secondary outcomes

- Unintended pregnancy
- Condom use
- Family planning use
- Bed net use
- Uptake of HIV or MNCHN-FP services
- Coverage of HIV or MNCHN-FP services
- Quality of HIV or MNCHN-FP services
- Cost or cost-effectiveness
- Stigma
- Women's empowerment
- Referrals to other services
- Adherence to treatment

Search methods for identification of studies

See search methods used in reviews by the Cochrane Collaborative Review Group on HIV Infection and AIDS.

Electronic searches

We formulated a comprehensive and exhaustive search strategy in an attempt to identify all relevant studies regardless of language or publication status (published, in press and in progress).

Journal and trials databases

We searched the following electronic databases, in the period from 01 January 1990 to 15 October 2010:

- MEDLINE (via PubMed)
- EMBASE
- Cochrane Central Register of Controlled Trials (CENTRAL)
- Cumulative Index to Nursing and Allied Health Literature (CINAHL)
- Web of Science / Web of Social Science

Along with MeSH terms and relevant keywords, we used the Cochrane highly sensitive search strategy for identifying reports of randomised controlled trials in MEDLINE (Higgins 2008); and the Cochrane HIV/AIDS Group's existing strategies for identifying references relevant to HIV/AIDS, augmented by search terms designed to capture reports of non-randomized and observational studies. The search strategy was iterative, in that

references of included studies were searched for additional references. All languages were included. See Appendix 2 for our PubMed search strategy, which was modified as appropriate for use in the other databases.

Using a variety of relevant terms, we also searched the clinical trials registry at the US National Institutes of Health, ClinicalTrials.gov (www.clinicaltrials.gov).

Limits. The searches were performed without limits to language or setting and published from 01 January 1990 to the date of the searches (15 October 2010).

Searching other resources

Conference abstract databases

We searched the Aegis archive of HIV/AIDS conference abstracts (www.aegis.org), which includes the following conferences:

- British HIV/AIDS Association, 2001-2008
- Conference on Retroviruses and Opportunistic Infections (CROI), 1994-2008
- European AIDS Society Conference, 2001 and 2003
- International AIDS Society, Conference on HIV Pathogenesis, Treatment and Prevention (IAS), 2001-2005
- International AIDS Society, International AIDS Conference (IAC), 1985-2004
- US National HIV Prevention Conference, 1999, 2003, and 2005

We also searched the CROI and International AIDS Society web sites for abstracts presented at conferences subsequent to those listed above (CROI, 2009-2010; IAC, 2006-2010; IAS, 2007-2009), the PEPFAR implementers meetings, and the Addis Ababa Conference, “Linking Family Planning and HIV/AIDS in Africa” posted on the conference web site.

Researchers and relevant organizations. We contacted individual researchers working in the field, and policymakers based in inter-governmental organizations including the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) to identify studies either completed or ongoing.

Reference lists. We checked the reference lists of all studies identified by the above methods and examined the bibliographies of any systematic reviews, meta-analyses, or current guidelines we identified during the search process.

Handsearching was conducted on the following key journals:

- AIDS
- AIDS and Behavior
- AIDS Care
- AIDS Education and Prevention
- Contraception
- Family Planning Perspectives / Perspectives on Sexual and Reproductive Health
- Health Policy
- Health Policy and Planning
- International Family Planning Perspectives / International Perspectives on Sexual and Reproductive Health
- International Journal of Gynecology and Obstetrics
- International Journal of STD & AIDS
- JAIDS
- Lancet

- Lancet Infectious Diseases
- Pediatric Infectious Diseases
- Pediatrics
- Reproductive Health Matters
- Sexually Transmitted Diseases
- Sexually Transmitted Infections
- Social Science and Medicine

The tables of contents of these journals were searched from January 1, 1990 through October 15, 2010 with the exception of the International Journal of STD and AIDS, which was only available starting from January1996.Articles that looked potentially relevant were compared with the full list of articles generated by electronic database searching to determine if they had already been identified. If they had not been identified, the title and abstract were screened to determine if the inclusion criteria were met.

Data collection and analysis

The methodology for data collection and analysis was based on the guidance of Cochrane Handbook of Systematic Reviews of Interventions (Higgins 2008). Search results were imported into a bibliographic citation management software (EndNote X4). Duplicate references were then excluded. Reviewing only article titles, one author (TH) excluded all references that were clearly irrelevant. Abstracts of all remaining studies, and studies identified by other means, were examined by pairs of authors, each author working independently. Where necessary, the full text was obtained to determine the eligibility of studies for inclusion.

The search for studies was performed with the assistance of the Cochrane HIV/AIDS Group. The authors performed the selection of potentially eligible studies. The titles, abstracts and descriptor terms of all downloaded material from the electronic searches were read and irrelevant reports discarded to create a pool of potentially eligible studies.

Data extraction and management

Each article identified for inclusion was read and data extracted by pairs of authors, each author working independently. Differences in data extraction or interpretation of studies were resolved by discussion and consensus.

For each study, the following information was extracted using a pre-piloted data abstraction form and presented in the following tables:

Study descriptions: Information on study authors, matrix cells, location, setting, target group, years of program, years of evaluation, name of program, intervention, study design, unit of analysis, sample size, age, gender, and length of follow-up. See Included studies.

Study outcomes: Information on study authors, intervention, study design, reported numerical outcomes and results (health, behavioral, knowledge/attitudes, and process), and text summary of outcomes. See Included studies.

Integration implementation: Information on integration direction, setting, goal of the study, format of integration (on-site, referral, etc.), components of integration, promoting factors, inhibiting factors, recommendations, and any other relevant information reported in the study. See Appendix 4.

Assessment of risk of bias in included studies

We used the Cochrane Collaboration tool for assessing the risk of bias for each individual studies. For trials, the Cochrane tool assesses risk of bias in individual studies across six domains: sequence generation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting and other potential biases.

Sequence generation

- Low risk: investigators described a random component in the sequence generation process, such as the use of random number table, coin tossing, card or envelope shuffling, etc.
- High risk: investigators described a non-random component in the sequence generation process, such as the use of odd or even date of birth, algorithm based on the day or date of birth, hospital, or clinic record number.
- Unclear risk: insufficient information to permit judgment of the sequence generation process.

Allocation concealment

- Low risk: participants and the investigators enrolling participants cannot foresee assignment (e.g., central allocation; or sequentially numbered, opaque, sealed envelopes).
- High risk: participants and investigators enrolling participants can foresee upcoming assignment (e.g., an open random allocation schedule, a list of random numbers); or envelopes were unsealed or non-opaque or not sequentially numbered.
- Unclear risk: insufficient information to permit judgment of the allocation concealment or the method not described.

Blinding

- Low risk: blinding of the participants, key study personnel, and outcome assessor, and unlikely that the blinding could have been broken. No blinding in the situation where non-blinding is not likely to introduce bias.
- High risk: no blinding or incomplete blinding when the outcome is likely to be influenced by lack of blinding.
- Unclear risk: insufficient information to permit judgment of adequacy or otherwise of the blinding.

Incomplete outcome data

- Low risk: no missing outcome data, reasons for missing outcome data unlikely to be related to true outcome, or missing outcome data balanced in number across groups.
- High risk: reason for missing outcome data likely to be related to true outcome, with either imbalance in number across groups or reasons for missing data.
- Unclear risk: insufficient reporting of attrition or exclusions.

Selective reporting

- Low risk: a protocol is available which clearly states the primary outcome as the same as in the final trial report.
- High risk: the primary outcome differs between the protocol and final trial report.
- Unclear risk: no trial protocol is available or there is insufficient reporting to determine if selective reporting is present.

Other forms of bias

- Low risk: there is no evidence of bias from other sources.

- High risk: there is potential bias present from other sources (e.g., early stopping of trial, fraudulent activity, extreme baseline imbalance, or bias related to specific study design).
- Unclear risk: insufficient information to permit judgment of adequacy or otherwise of other forms of bias.

Study Rigor

We further assessed study rigor on a 9-point scale, with minimum score (low rigor) of 1 and maximum score (high rigor) of 9. Studies received one point for meeting each of the following criteria:

1. Study design includes pre/post intervention data

2. Study design includes control or comparison group

3. Study design includes cohort

4. Comparison groups equivalent at baseline on socio-demographics

5. Comparison groups equivalent at baseline on outcome measures

6. Random assignment (group or individual) to the intervention

7. Participants randomly selected for assessment

8. Control for potential confounders

9. Follow-up rate ≧75%.

This scale was based on the 8-point rigor assessment scale for systematic reviews of HIV behavioral interventions by the Johns Hopkins WHO Synthesizing Intervention Effectiveness project (Kennedy 2007; Denison 2008) and by a subsequent systematic review on linking sexual and reproductive health and HIV interventions (Kennedy 2010). See Appendix 3.

Dealing with missing data

Study authors were contacted when missing data were an issue.

Assessment of heterogeneity

There was considerable heterogeneity among studies in terms of study objectives, models of interventions, study designs, locations, and reported outcomes. Therefore, results were not pooled, but narrative findings are presented.

Results

Description of studies

Results of the search

Electronic database searching was completed in October 15, 2010 and yielded 10,619 citations (Figure 1). After 675 duplicates were removed, 9,944 citations were screened by one author (TH) to remove articles that were clearly not relevant to the review based on the titles, abstracts, journals, and keywords of the articles. This screening resulted in 4,855 citations being excluded from the review, with 5,089 abstracts screened by pairs of authors, each author working independently. Ultimately, 121 full-text articles were obtained for closer examination, again by pairs of authors, each author working independently.

Included studies

A total of 20 articles reporting on 19 distinct interventions met the criteria for inclusion. Due to the heterogeneity of study designs, intervention types, and outcomes, we did not conduct a meta-analysis but instead present a summary of the outcomes of interest and program descriptions. Of the 19 studies, the majority were conducted in sub-Saharan Africa (n=15), with one study each reported in Haiti, UK, United States, and Ukraine. Most studies were conducted in clinic or hospital settings (n=17), and two studies were conducted in community settings. There were no randomized-controlled trials. Of the 19 studies, one study used a stepped wedge design (Killam 2010), seven were serial cross sectional studies (Bradley 2009, Coyne 2007, Delvaux 2008, Gamazina 2009, Gillespie 2009, Peck 2003, Potter 2008, van der Merwe 2006) Bradley 2009, Gillespie 2009, Coyne 2007, Delvaux 2008, Gamazina 2009, Peck 2003, Potter 2008, van der Merwe 2006, three were cross sectional studies (Rasch 2006, Creanga 2007, Simba 2010), three were before-after studies (Chabikuli 2009, King 1995, Liambila 2009), one was a non-randomized trial-individual design (Kissinger 1995), one was a non-randomized trial-group design (Ngure 2009), one was a time series study (Brou 2009) and two were prospective cohort studies (one of which also included a retrospective cohort) (Bahwere 2008, Hoffman 2008). Studies ranged in size from 60 to over 13,000 participants.

All studies targeted women, but seven studies also included men or couples. No studies targeted adolescents. The studies were heterogeneous in terms of study objectives, intervention types, settings, study designs, and reported outcomes. Ten studies integrated HIV services into existing MNCHN-FP programs, seven studies integrated MNCHN-FP services into existing HIV programs, one study integrated new MNCHN-FP and HIV services simultaneously and one study integrated both MNCHN-FP into HIV services and HIV into MNCHN-FP services.

The included studies were classified in a matrix was according to the different models of MNCHN-FP and HIV integration interventions (See Appendix 1). Several studies included multiple models of integration and therefore fell into more than one category. We broadly classified these interventions into 6 major models of integration and analyzed outcomes related to these integration models (Appendix 5 - Appendix 10). For this we included studies in only one model of integration. One of the most common models was integration of family planning with HIV services, particularly HIV testing. Descriptions of studies included in Appendix 11.

ANC services adding ART for eligible pregnant women

We found three studies that evaluated a model of adding antiretroviral therapy services for eligible HIV-infected pregnant women to ANC services to increase the proportion of treatment-eligible women initiating ART during pregnancy, including one stepped-wedge cluster randomised group trial design (Killam 2010), and two serial cross sectional studies (van der Merwe 2006, Gamazina 2009). These studies were conducted in Zambia, South Africa and Ukraine.

Killam 2010

Killam 2010. This stepped wedge cluster randomised group trial conducted in Lusaka, Zambia compared 17,619 pregnant women who started ANC in clinics with integrated ART to 13,917 women who were referred for ART and constituted the control group. In the intervention group, ANC staff was trained to initiate ART in the ANC clinic according to the same approach as in general ART clinic. Both the general ART and the ANC-integrated ART clinics were staffed by the same cadres of providers; a clinical officer, a nurse, and a peer educator, received the same Ministry of Health (MOH) ART training, and used the same schedule of visits, lab evaluations, record systems and quality assurance (QA) systems. Women received ART in the ANC clinics until 6 weeks postpartum and then were referred to the general ART clinic. The comparison group was the current standard of care, where women who were eligible for ART were referred urgently to the general ART clinic, located on the

same premises but physically separate and separately staffed. CD4 testing was integrated into ANC at the first ANC visit with results available within 2 weeks to identify treatment eligible HIV-infected pregnant women. The primary outcome was the proportion of treatment eligible HIV-infected pregnant women enrolling into ART within 60 days of CD4 cell count and the proportion initiating ART during pregnancy. Of the 1566 patients found treatment-eligible, providing ART in the ANC clinic doubled the proportion initiating ART during pregnancy compared to active referral to the ART clinic (32.9% vs. 14.4%, AOR 2.01, 95% CI 1.27-3.34). A larger proportion of treatment-eligible women in the integrated ANC clinic enrolled into ART care within 60 days of HIV diagnosis and before delivery compared to controls (44.4% vs. 25.3%, AOR 2.06, 95%CI 1.27-3.34). The integrated strategy did not affect the timeliness of ART initiation (mean gestational age of ART initiation); however both groups received an average of 10 weeks of ART during pregnancy.

van der Merwe 2006

van der Merwe 2006. This serial cross sectional study conducted in South Africa evaluated the effectiveness of integrating key components of ART within ANC and strengthening linkages between clinics on the uptake of ART during pregnancy. The integration intervention brought health workers from the ART clinic to the ANC clinic weekly to conduct treatment preparation, including adherence counselling, for treatment-eligible HIV-infected pregnant women during their second ANC visit with referral to the ART clinic staffed by the same health workers who began treatment preparation at a separate site for ART initiation and follow-up. Integrated CD4 testing in ANC was conducted at first ANC visit with results available within 2 weeks to identify treatment eligible HIV-infected pregnant women. The primary outcome was time to treatment initiation. Integrating aspects of ART within ANC reduced delays between HIV diagnosis and treatment initiation, from median of 56 days to 37 days, p=.041.

Gamazina 2009. This serial cross sectional study conducted in the Ukraine evaluated the impact of provider training on the provision of high quality, comprehensive HIV counselling and testing in ANC and post-natal care, with appropriate referrals for HIV care and psychosocial support on strengthening the quality of counselling and referrals. Additionally, behavior change information, education, and communication (IEC) materials were developed along with a referral system to non-governmental organization (NGO)-based peer support programs. Primary outcomes on the quality of HIV counselling were collected through provider observations (37 in the intervention, 32 in the comparison group) and client exit interviews. Providers who participated in the training intervention delivered counselling of higher quality than those in the comparison group based on a three-indicator summary index, p<.001. Provision of a complete counselling experience was verified significantly more often by clients in the intervention group than the comparison group, p<.001.

Effect of PMTCT integration on ANC services

There were three studies that evaluated the impact of integration of PMTCT services to ANC on the quality of ANC care, including two serial cross sectional studies (Delvaux 2008, Potter 2008) and one cross sectional study (Simba 2010). One study each was conducted in Côte d'Ivoire, Tanzania, and Zambia.

Delvaux 2008. A serial cross sectional study conducted in Côte d'Ivoire evaluated the impact of integration of PMTCT, including HIV testing and short course treatment with nevirapine, in ANC and delivery facilities on the quality of ANC services. Numerous measures were used for quality of services. For both antenatal and delivery care the overall quality summary scores increased significantly following the intervention. Offering and uptake of HIV testing increased after the intervention, 63%, 42% respectively and most HIV positive women were offered nevirapine.

Potter 2008. Another serial cross sectional study conducted as retrospective chart review in 22 ANC clinics in Lusaka, Zambia evaluated the impact of integration of PMTCT services (HIV testing with same day results and

single-dose nevirapine for HIV-infected pregnant women and their infants) or research or both on routine rapid plasma reagin (RPR) screening and syphilis treatment, as a marker of quality of ANC care. Documented RPR screening improved after PMTCT services and research were added to ANC (63% before vs. 81% after, p<.0001); there was no change when PMTCT research alone was added and there was a decrease after PMTCT services alone was added. Documented syphilis treatment among RPR-positive screened women did not change after PMTCT research, service or both were added into ANC.

Simba 2010. A cross sectional study conducted in Tanzania evaluated the average staff workload when PMTCT services were integrated into reproductive and child health (RCH) clinics (n=43 health facilities) compared to those clinics offering RCH services only (n=17 health facilities). The average workload was higher in clinics that provided integrated PMTCT and RCH services compared to those that provided reproductive and child health services alone; however the significance of this difference was not reported and there was a wide range in staff workload across clinics (RCH and PMTCT services: average workload 50.5%, range: 8-147%; RCH services alone: average workload 37.8%, range: 11-82%).

Child malnutrition services adding HIV testing

Bahwere 2008. One study conducted in Malawi used both prospective and retrospective cohorts to evaluate the effect of integrating opt out HIV testing into community-based child malnutrition services on improving the identification of HIV-infection in children. Caregivers and children enrolled or recently graduated from a community-based therapeutic care program for malnutrition were offered HIV testing and counselling. Additionally, basic medical care (vitamin A, de-worming, anemia treatment, antibiotics for bacterial infections, and malaria prophylaxis) and community nutrition rehabilitation were provided to children with severe acute malnutrition (SAM). Primary outcomes included uptake of HIV testing and the percent who recovered from malnutrition. There were high rates of VCT uptake (97%, 92%) among children and caregivers (64%, 58%) in both the prospective (n=735) and retrospective cohorts (n=1283), respectively. In the prospective cohort, 59.1% of HIV-infected children recovered to a discharge weight-for-height greater than 80% of reference median, suggesting that SAM can be managed in the community for many HIV-infected children, though this proportion was significantly lower than the rate among HIV-negative children (83%). HIV-infected children had slower nutritional recovery than HIV-negative children.

Post-abortion care adding HIV testing

Rasch 2006. One cross sectional study conducted in Tanzania evaluated the effectiveness of integrating HIV testing into post-abortion care. In this study, women who were seen in a municipal hospital in Dar es Salaam for an incomplete abortion were approached and interviewed using an empathetic approach. Women who revealed having had an illegal, unsafe abortion were provided with family planning counselling and services (injection Depo-Provera, oral contraceptives, and condoms), HIV/STI counselling, and offered HIV testing. Women were asked to return for re-counselling and contraceptive services at follow-up. Of 706 women who enrolled in the study, 58% accepted VCT when offered. Women who accepted VCT were twice as likely to use a condom (AOR 1.80, 95%CI 1.16-2.81) and three times as likely to use a double method (condoms as well as a hormonal method) (AOR 3.07, 95%CI 2.12-4.43) than women who did not accept VCT. Only 30% of HIV-infected women returned for follow-up.

HIV treatment and secondary HIV prevention services adding FP services

Four studies were identified that integrated HIV treatment and FP services, including two non-randomized trials (Ngure 2009, Kissinger 1995), one before and after study (Chabikuli 2009) and one serial cross-sectional design (Coyne 2007). Interventions took place at health care delivery points (hospitals and HIV clinics) in the UK, US, Kenya, and Nigeria.

Ngure 2009. A non-randomized group trial conducted in Kenya evaluated a multi component intervention designed to promote dual contraceptive use (condoms along with another effective method) by women within HIV-1 heterosexual discordant couples that were participating in a biomedical HIV prevention trial. The intervention included staff training, couples family planning sessions and free provision of family planning on site. Non-barrier contraceptive use substantially increased among both HIV positive seronegative women in HIV discordant partnerships. Condom use was high throughout the study period for both HIV+ and HIV negative women. The number of pregnancies decreased significantly in HIV-serodiscordant couples after the integrated FP-HIV services were introduced.

Kissinger 1995. A non-randomized individual level trial was conducted in the US to evaluate the integration of a MCH program into an existing HIV outpatient program and comprehensive primary care center to improve clinic attendance among women. This integrated program implemented a separate waiting area and examination rooms for mothers and children, combined pediatric and maternal clinics merging visits for mothers and children, increased the number of female health providers, provided free on-site child care services and coordination of transportation, and on-site colposcopy and gynecologic services within the primary care clinic, as well as availability of health care providers for urgent care on a daily basis. After the intervention women were significantly more likely than men to attend at least 75% of their appointments at both 6, $p<.01$, and 12 months of follow-up, $p<.001$.

Chabikuli 2009. A serial cross sectional study conducted in Nigeria evaluated an intervention using a referral-based co-located family planning and HIV services (HIV counselling and testing, antiretroviral therapy and PMTCT services) to improve MCH clinic attendance of HIV-infected women. The intervention sought to strengthen skills of providers by formalizing referral between family planning and HIV clinics. Clients in the HIV clinics routinely received FP counselling, and given referral for family planning methods, if desired. At the FP clinics, clients received further counselling and assessment and appropriate contraceptive methods. Client at FP clinics received HIV counselling and referral letter to HIV counselling and testing clinic if desired. Data on completed referrals were added to the FP register to facilitate data flow. Overall, mean attendance of FP clinics increased significantly from pre to post-integration, $p<.0001$. Service ratio of referrals from each of the HIV clinics was low but increased in the post-integration period. Service ratios were higher in primary health care settings than in hospital settings. Attendance by men at FP clinics was significantly higher among clients referred from HIV clinics.

Coyne 2007.In a serial cross-sectional study conducted in the UK, a special family planning clinic was started alongside the HIV clinic to provide a model of integrated sexual health care for HIV positive women, including screening for STIs, family planning, pre-conception counselling and cervical cytology, to see if integrating FP and HIV services would improve process and behavioral outcomes. The integrated clinic was staffed by providers trained in both STI management and FP. Improvement was seen on all process outcomes, including receipt of cervical cytology, recording of method of contraception, recording of sexual history, and offering of STI screen. The use of condoms only as contraception declined, but authors interpret this as better provision of more reliable contraceptives.

HIV counselling and testing adding family planning services

There were eight peer-reviewed articles from 7 studies(Bradley 2009, Brou 2009, Creanga 2007, Gillespie 2009, Hoffman 2008, King 1995, Liambila 2009, Peck 2003) that evaluated interventions linking HIV testing and family planning services, including two serial cross sectional, 2 pre-post,1 time series,1 cross-sectional, and 1 prospective cohort. Two studies were conducted in Ethiopia, and one study each was conducted in Côte d'Ivoire, Kenya, Rwanda, and Malawi.

Bradley 2009/Gillespie 2009 This serial cross sectional study conducted in Ethiopia integrated FP services into VCT clinics. The intervention included training counsellors, ensuring contraceptive supplies in VCT facilities and monitoring services, and developing FP messages for VCT clients. Counselors provided FP counselling, condoms and oral contraceptive pills during VCT sessions. Nurse counsellors additionally provided injectable contraceptives, while VCT counsellors referred clients to on-site FP services for clinical FP methods. Following integration of FP services, there was a significant increase in the percent of VCT clients who received contraceptive counselling (41%, 29% of women and men, respectively) compared to before the intervention (2%, 3% of women and men, respectively). Rates of discussion of contraceptive and HIV-related topics all increased following the intervention. Contraceptive uptake increased from less than 1% to approximately 6% among both men and women. This was statistically significant, though modest increase given the substantial improvement in the provision of contraceptive counselling. Authors noted an unexpectedly low level of sexual activity and unmet need for contraception in this particular population that impacted the uptake of the intervention.

Brou 2009 A time series study evaluated integration of HIV counselling and testing and family planning during a PMTCT program in Côte d'Ivoire. HIV counselling and testing was offered to women presenting at PMTCT clinics. Both HIV positive and negative women were offered post-test and post-partum family planning during follow-up visits, in addition to information on STIs, including HIV, and condom use. Starting in the first post-partum month, they received free access to modern contraceptive methods, including injectable contraceptives, oral contraceptive pills and condoms. They reported that modern contraceptive use was variable from baseline across several waves of follow-up for both HIV-positive and HIV-negative women. Couple-years of protection increased significantly post integration.

Creanga 2007 This cross sectional study evaluated the impact of community-based reproductive agents providing integrated family planning and HIV services in Ethiopia, including FP education and methods, HIV education, referral to VCT and home-based care for persons living with HIV. Community-based reproductive health agents providing integrated services served the same number of clients as those not providing integrated services.

Hoffman 2008 A prospective cohort study examined the effect of an intervention offering HIV testing to women at a FP clinic, STD clinic and VCT center in Malawi on contraceptive use and pregnancy intentions. Women who were HIV-infected and not pregnant were enrolled in HIV care and provided with access to family planning. Contraceptive use increased after HIV testing. Condom use increased from baseline to 1 week and 3 months, but then declined again at 12 months follow-up. Pregnance incidence declined after HIV testing, though declines were not statistically significant.

King 1995 A before and after study conducted in Rwanda evaluated the impact of integrating family planning services into VCT. Women who received VCT were provided with an educational video on contraceptive methods, a group discussion, and family planning commodities (oral contraceptive pills, injectable progestins, and Norplant) were provided free of charge to women who enrolled in the FP program. The percent of women using hormonal contraception increased after the intervention (24% compared to 16% before, p=.002). The rate of incident pregnancies significantly decreased after the intervention for both HIV positive and HIV negative women.

Liambila 2009 A before-after study conducted in Kenya assessed an intervention that trained family planning providers in integrated HIV/STI prevention counselling, including offering HIV VCT with FP counselling. Clients choosing to be tested were either referred or tested onsite during the consultation by a trained FP provider. The proportion of consultations where HIV counselling was provided and testing offered increased significantly. The proportion of all clients tested was significantly higher in the model of integration where onsite testing was conducted by the FP providers compared to the referral model. Quality of care increased significantly post-intervention. Implementing the intervention added, on average, 2-3 minutes per consultation. Integrating HIV prevention counselling and VCT into existing FP services, using either testing or referral methods, was both

feasible and acceptable to clients and providers.

Peck 2003 This serial cross sectional study conducted in Haiti progressively integrated primary care services into a stand alone HIV counselling and testing center to examine the feasibility, demand, and effect of integrating various sexual reproductive health and primary care services as a way to remove barriers to HIV counselling and testing. Services that were progressively added included family planning, prenatal services, post rape services, nutritional support, TB and STI services. Over a 15 year period, the number of patients tested for HIV increased 62-fold. The proportion of those tested who were female or adolescents increased over time as did the proportion of patients tested who were symptom-free.

Excluded studies

We excluded from the review 101 studies for the following reasons: no comparator (n=29), MNCHN-FP focus only (n=8) or HIV focus only (n=7), study design did not meet criteria (n=27),, no organizational or management strategy with the aim of integrating services (n=9), linkages of a population (e.g. HIV-infected women) to an intervention (e.g., family planning) rather than integrated HIV and MNCHN-FP services (n=19), and no key outcomes of interest (n=2).

Risk of bias in included studies

We assessed the risk of bias in all included studies, using the Cochrane tool (Higgins 2008). There were no randomized controlled trials. There was one stepped wedge design trial, and the other studies were non-randomized trials, cohort studies, time series, before-after studies, cross-sectional and serial cross sectional studies. See Figure 2 and Figure 3 for graphic summaries of our bias assessment with the Cochrane tool.

Allocation (selection bias)

Selection bias was high in all but one of the non-randomized studies due to lack of sequence generation and allocation concealment. In one before/after study (Liambila 2009), samples of family planning clients willing to be observed and interviewed were randomly selected, but because we could not determine how the randomisation was conducted and if allocation was concealed, selection bias was unclear.

Blinding (performance bias and detection bias)

Lack of blinding of participants and personnel led to high risk of performance bias in all but three non-randomized studies. Risk of bias was low in Killam 2010 as lack of blinding of personnel and participants was unlikely to introduce performance bias. All non-randomized studies lacked blinding of outcome assessors, which led to high risk of bias in eight studies (Gamazina 2009, King 1995, Kissinger 1995, Liambila 2009, Peck 2003, Potter 2008, Rasch 2006, Simba 2010) and low risk of bias in 9 studies as lack of blinding was felt unlikely to affect outcome assessment (Bahwere 2008, Bradley 2009,Gillespie 2009, Brou 2009, Chabikuli 2009, Coyne 2007, Creanga 2007, Delvaux 2008, Hoffman 2008, Killam 2010). Risk of performance and detection bias was unclear in Ngure 2009 and van der Merwe 2006 as neither participants, personnel, or outcome assessors were blinded.

Incomplete outcome data (attrition bias)

Most of the studies were either cross sectional, serial cross sectional, time series, or before and after studies, so attrition bias was not relevant. Attrition bias was low for the prospective cohort study (Hoffman 2008), the stepped wedge design study (Killam 2010) and for (Bahwere 2008) with both prospective and retrospective cohorts.

Selective reporting (reporting bias)

Selective reporting was high in two studies (Bradley 2009, Gillespie 2009, Brou 2009, Gillespie 2009)due to self-reported outcome data and in another study (Rasch 2006) as the initial design was a follow-up but this approach did not work so cross-sectional analyses were presented instead and because the study protocol was not available. Selective reporting was unclear in three studies (Coyne 2007, Killam 2010, Peck 2003). In Peck 2003, the protocol was not available and most outcomes were only presented after the full integration of services; in Killam 2010 there were missing data on the HIV incidence and HIV-free survival in infants and the protocol was not available; and in Coyne 2007, some outcomes were self-reported and there was possible reporting bias related to stigma toward sexual behavior and contraception. Risk of bias from selective reporting was low in the remaining 13 studies (Bahwere 2008, Chabikuli 2009, Creanga 2007, Delvaux 2008, Gamazina 2009, Hoffman 2008, King 1995, Kissinger 1995, Liambila 2009, Ngure 2009, Potter 2008, Simba 2010, van der Merwe 2006).

Other potential sources of bias

There was no evidence of other sources of bias among five studies (Bradley 2009, Gillespie 2009, Brou 2009, Chabikuli 2009, Creanga 2007, Killam 2010). Risk of bias from other sources was unclear for nine studies (Delvaux 2008, Gamazina 2009, King 1995, Kissinger 1995, Liambila 2009, Peck 2003, Potter 2008, Rasch 2006, Simba 2010). For five studies, risk of other sources of bias as high due to lack of intention-to treat (ITT) analyses (Bahwere 2008), lack of statistical tests of significance performed (Coyne 2007), and other limitations of observational studies.

Study Rigor Score

In addition to risk of bias, study authors assessed rigor on a 9-point scale. The average rigor score for these 19 studies was 2.7 out of 9, with a range of 1-7. See Appendix 3 for rigor assessment and score for all included studies.

Effects of interventions

A total of 20 peer-reviewed articles evaluating 19 distinct interventions met the inclusion criteria. Fifteen were conducted in sub-Saharan Africa, one study each was reported in Haiti, the UK, U.S., and Ukraine. There were no randomized-controlled trials. One study used a stepped wedge design (Killam 2010) and two were prospective cohort studies (one of which also included a retrospective cohort) (Bahwere 2008,Hoffman 2008). The rest of the studies used less rigorous designs including serial cross sectional studies (Bradley 2009, Gillespie 2009, Coyne 2007, Delvaux 2008, Gamazina 2009, Peck 2003, Potter 2008, van der Merwe 2006), cross sectional studies (Creanga 2007, Rasch 2006, Simba 2010), before-after studies (King 1995, Liambila 2009, Chabikuli 2009), non-randomized trial-individual design (Kissinger 1995), non-randomized trial-group design (Ngure 2009), and time series study (Brou 2009).

Integrating MNCHN-FP and HIV services was shown to be feasible across a variety of integration models, settings, and target populations. Most studies reported that integration had a positive impact or apparent improvement on reported outcomes. However several studies also reported mixed effects or no effects, showing either that there were multiple measures of an outcomes that showed inconsistent results or there was no statistically significant difference in the outcome associated with the intervention. Only one study reported negative outcomes due to providing integrated services. The overall lack of negative outcomes could be the result of publication bias, as studies are more likely to be published if they have positive results. Additional details on the health, behavioral and process outcomes of different models of integration are provided in the appendices and are broadly classified into six models of integration: ANC services adding ART for eligible pregnant women (Appendix 5); ANC services integrating PMTCT services (Appendix 6); child malnutrition services adding HIV

testing (Appendix 7); post-abortion care adding HIV testing (Appendix 8), HIV treatment/secondary prevention adding FP services(Appendix 9) and HIV counselling and testing adding FP services (Appendix 10).

Effectiveness

Measures of effectiveness included health and behavioral outcomes. Only a few studies reported on change in health outcomes, specifically pregnancy and recovery from malnutrition related to integrated services, and all showed improvements in these outcomes. Of the two studies that reported on pregnancy outcomes, both found the number of pregnancies decreased after integrated FP-HIV services were introduced. (King 1995,Ngure 2009). No studies reported on mortality or HIV or STI incidence.

The most commonly reported behavioral outcome was contraceptive uptake and use. All seven studies that reported on contraceptive use showed positive results, with an increase in family planning use (both condom and non-condom methods) reported.(Bradley 2009, Gillespie 2009 ,Brou 2009, Chabikuli 2009, Gillespie 2009, Hoffman 2008, King 1995, Ngure 2009, Rasch 2006) Two studies reported on ART initiation and showed positive results. (Killam 2010, van der Merwe 2006). One study showed an increased proportion of treatment-eligible women initiating ART during pregnancy after integration, although there was no effect on 90-day retention rates. (Killam 2010) The other study showed reduced time to treatment initiation (van de Merwe 2006). Five studies examined HIV testing uptake; four found positive effects (Delvaux 2008, Gamazina 2009, Liambila 2009, Peck 2003) and one showed mixed/no effects because the differences in the effect sizes were small and the significance of the difference was not reported (Bahwere 2008) . No studies reported on bed net use

Quality of HIV and MNCHN services

The impact of integration on the quality of HIV or MNCHN services was generally positive; five of seven studies showed improvements on a variety of diverse quality measures. (Bradley 2009, Gillespie 2009, Coyne 2007, Delvaux 2008, Gamazina 2009, Gillespie 2009, Liambila 2009) Of the remaining two, one study showed mixed effects because there was no statistically significant difference in client volume between groups (Potter 2008) and the other showed a potentially negative effect of integration on quality (Simba 2010). The one study that reported a potentially negative effect of integration on quality of services showed that average staff workload was higher in clinics that provided both RCH services and PMTCT services when compared to those that provided RCH services alone (Simba 2010). However the significance of this difference was not reported and there was a wide range in staff workload across clinics.

Coverage of HIV or MNCHN services

Of the six studies that reported on uptake or coverage of HIV or MNCHN services, five reported a positive effect, (Chabikuli 2009, Coyne 2007, Creanga 2007, Delvaux 2008, van der Merwe 2006) while one showed mixed/no effect (Liambila 2009).

Cost and Cost Effectiveness

No studies reported on the provision of integrated services as it relates to cost or cost-effectiveness.

Other Outcomes

No studies reported on the provision of integrated services as it relates to stigma or women’s empowerment.

Discussion

Summary of main results

There is a need to identify effective models of HIV and MNCHN-FP integration that can improve the efficiency, quality, uptake, and effectiveness of critical services for women and children, particularly in low-resource settings. Though integration of services has been identified as a key strategy to optimize HIV care and treatment (WHO 2011) and as part of the global plan to eliminate new HIV infections in children (UNAIDS 2011a) , there is a paucity of evidence from rigorously conducted research to inform implementation strategies. This systematic review conducted a thorough search for studies that examined the effectiveness of integrated MNCHN and HIV services to help inform development of health systems interventions to scale-up both HIV and MCH related interventions.

Overall, a total of 20 studies of 19 interventions were included in the review. There were no randomised controlled trials, and only one rigorous study with an experimental stepped wedge design to examine the direct effect of integrating MNCHN-FP interventions with HIV services. Despite the lack of rigorous evidence, the observational studies included in the review reported that integration of HIV/AIDS and MNCHN-FP services were found to be feasible to implement and can improve a variety of health and behavioral outcomes. This holds true across a variety of integration models, settings and target populations. Of the studies that measured changes in health behavior, all reported increased contraceptive use and most reported improvements in other health behaviors relevant to HIV/AIDS and MNCHN-FP. Although only three studies measured actual changes in health status, all health outcomes for women and children improved with integrated services. In the five studies that reported on uptake and coverage of health services, improvements were generally noted when services were integrated. Service quality mostly improved with integrated service models, although the means of measuring quality differed widely across studies. One study found that staff workload was higher in clinics that provided integrated services; this was the only potentially negative outcome identified. The impact of these integration strategies on incidence of infant HIV infection, STI incidence, unintended pregnancy, bed net use, stigma, women's empowerment, cost or cost-effectiveness was not measured.

Although this review included a number of studies, it also identified several gaps in the existing evidence. Inadequately studied interventions included integration of HIV services with infant and child health services, nutrition services, post-abortion services, and postnatal/postpartum services. Insufficiently reported outcomes included health outcomes, such as mortality, rates of new cases of HIV or STI, and cost outcomes. Most of the studies reviewed were not conducted with rigorous methods, so the estimates of effect are likely not precise. Most studies were conducted in sub-saharan Africa, with one study each conducted in Haiti and the Ukraine. Models of integration among underserved populations were also conducted in high-income countries (US, and the UK) .

Two studies (Killam 2010, van der Merwe 2006) reported that integrated services consistently resulted in increased uptake of ART among treatment eligible pregnant women. In the stepped wedge design study with the highest rigor score (Killam 2010), providing ART in the ANC clinic doubled the percentage of treatment-eligible pregnant women initiating ART during pregnancy compared to active referral to the ART clinic, and in another observational study (van der Merwe 2006) reduced time to treatment initiation. Measuring CD4 counts at first ANC visit is particularly important in reducing delays in ART initiation. This is also important as most women who initiate ART were asymptomatic. In the Killam study, the integrated strategy did not affect the timeliness of ART initiation (mean gestational age of ART initiation) or 90 day retention rate; however both groups received an average of 10 weeks of ART during pregnancy. Despite improvements in service delivery in both studies

integrating HIV treatment in ANC, there were still 25% to 62% of treatment eligible pregnant women who did not initiate ART during pregnancy. Further improvements in service delivery or targeted strategies may be needed to optimize uptake. Loss to follow-up was a challenge. To improve retention, the authors of the Killam study intend to extend follow-up in the integrated clinic through weaning post partum. However, the cost effectiveness or impact of integration on the incidence of infant HIV infection or quality of MNCHN services was not measured.

Although many studies have demonstrated the scale-up of PMTCT, few have evaluated the impact of integration of PMTCT services on the quality of ANC care. We found three studies, all of low scientific rigor, examined the impact of PMTCT integration on ANC services. In the Delvaux study, integrating PMTCT into ANC led to no change or improvements in quality of ANC care outcomes, while HIV testing and Nevirapine use both increased. (Delvaux 2008) In the Potter study, documented RPR screening improved when PMTCT and research were added to ANC; there was no change when PMTCT research alone was added, and there was a decrease after PMTCT service alone was added. Documented syphilis treatment among RPR-positive screened women did not change after PMTCT research, service, or both were added to ANC (Potter 2008). In the Simba study, average staff workload was higher in clinics that provided PMTCT services compared to those that provided reproductive and child health services alone; however the significance of this difference was not reported and there was a wide range in staff workload across clinics (Simba 2010). This is consistent with a recent systematic review that found almost no evidence from experimental design studies on the effect of integrating PMTCT with other health services on coverage, uptake, quality of care and health outcomes (Tudor Car 2011).

An overall increase in family planning use (both condom and non-condom methods) was reported across four studies that examined the integration of HIV care and treatment with family planning services. Only one study, that integrated male involvement as part of their couples counselling intervention, reported an impact on health outcomes post-integration (Ngure 2009). This study was designed as a non randomized trial with a rigor score of 8. The intervention focused on FP training, specific messages, appointment cards, checklists, and specific staff to monitor contraceptive supplies to ensure availability. The number of pregnancies decreased in HIV-serodiscordant couples after the integrated FP-HIV services were introduced. This comprehensive intervention was conducted within a research clinic setting, however, and data on the effectiveness in HIV service delivery settings is needed.

Across the seven studies that added FP services to HIV VCT services, most were of very low scientific rigor. Some studies reported clients were more likely to receive contraceptive counselling, obtain a contraceptive method, and have fewer pregnancies after integration, but others noted more variable results. Few studies addressed nutrition or post-abortion care and HIV services and additional studies are needed to identify effective integration strategies in these vulnerable populations.

Factors promoting or inhibiting integration

The success of an integrated program is dependent on a wide variety of contextual factors as well. Authors noted a number of factors that either promoted or inhibited the success of integrated services. Across studies, stakeholder and staff support, along with the support of the local community was found to be important in success as well as adequate investment in staff training and supervision. Simple and inexpensive interventions, added to existing services were more likely to succeed. Additional factors associated with promoting the success of integration included on-site provision of family planning, flexibility of clinic in rescheduling appointments, male partner involvement, rapport between health providers and clients, and integrated electronic patient record systems. Inhibiting factors included additional referral waiting times, user cost fees, lack of knowledge of effective FP options, particularly for HIV-infected women, staff turnover, cost and logistics of commodity procurement and supply.

Overall completeness and applicability of evidence

The two main strengths of this review are its broad scope and systematic methodology. We attempted to define and cover the entire field of MNCHN, FP, nutrition, and HIV models of integration. We also used standard Cochrane methods to systematically review and analyze this body of evidence.

There was heterogeneity among the studies in terms of study objectives, models of interventions, study designs, locations, and reported outcomes. Most were conducted in clinic and hospital settings (n=17). The most commonly studied model of MNCHN-FP and HIV integration was family planning integrated with HIV counselling and testing, however the rigor of these studies was low, with an average score of 1.9 and a range of 1 to 3 (out of 9). Few studies assessed models of integration of infants and child services or nutrition services with HIV services. For the model of integrating ART into ANC clinics, there was one stepped-wedge cluster randomised trial design (Killam 2010) that had a rigor score of 7, though rigor scores for the two serial cross sectional studies in this category were 4 (van der Merwe 2006) and 2 (Gamazina 2009). Based on these three studies, integrated strategies consistently resulted in increased uptake of ART among treatment eligible pregnant women. Measuring CD4 counts at first ANC visit is particularly important in reducing delays in ART initiation. Nevertheless, despite improvements, there were still many eligible pregnant women who did not initiate ART during pregnancy. Further improvements in service delivery or targeted strategies may be needed to optimize uptake. Few studies evaluated the integration of HIV and child health services, only one study evaluated post abortion care and HIV services, and only one study evaluated nutrition and HIV services. Therefore, evidence is too limited for these models of integration. Additionally, cost data are lacking and are critical for applicability to low resource settings.

Quality of the evidence

There were no randomised controlled trials and only one stepped wedge design trial. Risk of bias was found to be high in all of the studies. Study designs used to evaluate the interventions were often of low rigor; the average rigor score was 2.7 out of 9 (range 1-7). Although it is difficult to blind integrated models of care, most of these studies did not include control or comparison groups.

Potential biases in the review process

The strengths of this review are also its limitations. Because this review was so broad in scope, it was difficult to synthesize data due to the enormous heterogeneity in the types of studies included. The included studies were heterogeneous in terms of their interventions, populations, research questions and objectives, study designs, rigor, and outcomes. Publication bias is an inevitable limitation of systematic reviews of the literature, as studies with negative findings are less likely to be published.

Agreements and disagreements with other studies or reviews

Our findings are consistent with other recent reviews that we conducted, including one on integrated MNCHN and FP (Brickley 2011) and one on integrated sexual and reproductive health services and HIV services (Kennedy 2010, Spaulding 2009).

One Cochrane review evaluating strategies for integrating primary health services at the point of delivery in middle-and low-income countries found few rigorously conducted studies and inconclusive evidence about the effectiveness of integration (Briggs 2009). Another recent Cochrane review of the effectiveness of integrating PMTCT programs with other health services in developing countries found only one study and could not make definitive conclusions about the effect of integration with other services compared to stand-alone services (Tudor Car 2011). Another systematic review on integration of targeted health interventions into health systems found few programs where a health intervention was fully integrated, but a wide variation in the extent of integration and a paucity of well-designed studies (Atun 2009). All of these reviews called for more robust study designs,

comparable control and intervention groups where possible, valid and reliable outcomes and analysis of costs.

Authors' conclusions

Implications for practice

MNCHN-FP and HIV/AIDS service delivery integration shows promise in improving various outcomes, and the articles included in this review provide promising models for integration which programs may consider. However, significant evidence gaps remain. Rigorous research comparing outcomes of integrated with non-integrated services, including cost, mortality and pregnancy-related outcomes, is greatly needed to inform programs and policy.

Implications for research

There is a need for more rigorously designed evaluation studies to evaluate the effectiveness and cost-effectiveness of integrated MNCHN-FP and HIV services across a variety of settings. Some findings of research gaps include:

1. No studies specifically compared integrated MNCHN and HIV services to the same services offered separately; only one study compared on-site integrated services to referrals;
2. There was a lack of evidence on the impact of integration on existing services;
3. No studies reported comparative cost data for different models of integration;
4. Most studies did not have sufficient follow-up to measure long-term effects of the interventions;
5. Most studies targeted women; fewer included men or couples and none targeted adolescents;
6. Few interventions were community-based, and few used community health workers or lower cadres of health care worker to deliver care, including through referrals;
7. Few studies evaluation integration of HIV and child health services; only one study evaluated post abortion care and HIV services, and only one study evaluated nutrition and HIV services

Several key outcomes were not reported in any studies: (a) HIV incidence; (b) STI incidence; (c) unintended pregnancy; (d) bed net use; (e) stigma, and (f) women's empowerment.

The rigor score criteria used in this review can provide a guide for improving the quality of future evaluations of integrated MNCHN-FP-HIV services. Using these techniques will allow a basis of comparison for post-intervention evaluation data and will also reduce bias and confounding. Three techniques offer a basis of comparison: following a cohort of subjects over time; collecting pre-intervention data to compare to post-intervention data; and including a control or a comparison group. A number of techniques can be used to reduce bias and confounding in evaluation studies, including randomly assigning participants to the intervention group; randomly selecting subjects, or including all subjects who participated in the intervention, for assessment; retaining as many subjects in the evaluation over time as possible; having comparison groups that are equivalent at baseline on socio-demographic and outcome measures; and using data analytic techniques that control for potential confounders. Although it is not always possible to use all of these techniques, employing as many as feasible will improve the quality of the evaluation and make the results more reliable.

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Contributions of authors

All authors participated in the design and conduct of this review as well as with manuscript drafting and revisions.

Declarations of interest

None.

Differences between protocol and review

None.

Published notes

Characteristics of studies

Characteristics of included studies

Bahwere 2008

Methods	Non-randomized cohort study (retrospective and prospective) were carried out to assess whether HIV testing can be integrated into Community-based Therapeutic Care (CTC), to determine if CTC can improve the identification of HIV-infection children and to assess the impact of CTC programs on the rehabilitation of HIV-infection children with Severe Acute Malnutrition. The study was conducted from December 2002 to May 2005.
Participants	Community-based study targeting caregivers and children (<5 years) who were enrolled or had recently graduated from a community-based therapeutic care (CTC) program run by the MOH and the NGO Concern Worldwide in the Dowa District, Central Malawi.
Interventions	Caregivers and children in the CTC program were offered HIV testing and counselling. Basic medical care (Vitamin A, de-worming, anemia treatment, antibiotics for bacterial infections, and malaria prophylaxis) and community nutrition rehabilitation was provided for children with severe acute malnutrition (SAM). During RC recruitment a protection ration was given to households of admitted children. No protection ration was given during PC recruitment.
Outcomes	Biological: HIV prevalence; median weight gain; median MUAC change; median LoS; malnutrition rate (RC only); defaulted, died, and recovered (PC only). Behavioral: VCT uptake
Notes	None

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Allocation to intervention based on consenting caregivers and graduates of CTC program.
Allocation concealment (selection bias)	High risk	Participants were either in the Prospective Cohort or Retrospective Cohort and knew which group they were assigned to.
Blinding of participants and personnel (performance bias)	High risk	Same as above.
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessment not blinded but unlikely to influence outcomes.
Incomplete outcome data (attrition bias)	Low risk	No missing outcome data
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	High risk	Authors did not use ITT analyses so the percentages were higher than they should have been (i.e. only included nutritional recovery info for those who were actually tested for HIV or had test results). For the retrospective cohort, nutritional measurement accuracy could not be verified. The statistical power of these analyses was limited by the small number of HIV-positive children included in the study and data from LTFU. RC might be subject to survival bias.

Bradley 2009

Methods	Non-randomized serial cross-sectional study (pre- and post-intervention) conducted to determine whether VCT counsellors could feasibly offer family planning and whether clients would accept such services.
Participants	Male and female VCT clients attending 8 public sector VCT clinics in Oromia region, Ethiopia, in 2006 and 2008
Interventions	FP services were integrated into VCT clinics. The intervention included developing FP messages for VCT clients, training counsellors, ensuring contraceptive supplies in VCT facilities and monitoring services. FP messages targeted young, single and premarital clients and included basic information on FP benefits and methods. Counselors provided FP counselling, condoms and pills during VCT sessions. Referrals were made to on-site FP nurses for clinical methods, except when VCT

	counsellors were also trained as nurses and could provide injectables.
Outcomes	Behavioral Outcomes Client obtained a contraceptive method during VCT Process Outcomes/Output Client received contraceptive counselling during VCT Other Client intent to use condoms during the 2 months post-intervention
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	No VCT clients received FP services during VCT before integration; all VCT clients received FP services after integration
Allocation concealment (selection bias)	High risk	Study design based on data collected before and after integration. Participants either received FP services (the intervention) or did not.
Blinding of participants and personnel (performance bias)	High risk	Same as above.
Blinding of outcome assessment (detection bias)	Low risk	Same as above; lack of blinding unlikely to influence outcomes.
Incomplete outcome data (attrition bias)	Low risk	Not a cohort study; no follow up data was collected
Selective reporting (reporting bias)	High risk	Outcomes based on self-report
Other bias	Low risk	None detected.

Brou 2009

Methods	Non-random time series study comparing contraceptive use and pregnancy incidence between HIV-positive and HIV-negative women who were offered HIV counselling and testing during a PMTCT program.
Participants	Women attending district or local PMTCT and ANC clinics in Abidjan, Côte d'Ivoire from March 2001/June 2003 to 2005
Interventions	HIV counselling and testing was offered to women presenting at PMTCT clinics. Both HIV+ and HIV- were offered post-test and post-partum family planning during follow up visits In addition, all women were offered information on sexually transmitted infections (STIs), including HIV/AIDS, and condom use. After childbirth, they received free access to modern contraceptive methods (injectable contraceptives, contraceptive pills, and condoms) beginning in the first post-partum

	month.
Outcomes	Behavioral Outcomes % of women using modern contraception (condom, pills, IUDs, injectables) during follow-up
Notes	All statistical tests are comparing HIV positive to HIV negative women at each time period. There are no tests of significance comparing HIV positive women's contraceptive use from baseline to follow-up.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Participants were not allocated to the intervention randomly. All those tested for HIV were offered FP services.
Allocation concealment (selection bias)	High risk	Same as above.
Blinding of participants and personnel (performance bias)	High risk	All those tested for HIV were offered FP services.
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessment not blinded; outcome measurement not likely to be affected by lack of blinding.
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data.
Selective reporting (reporting bias)	High risk	Outcomes based on self-report. HIV+ women seem to have been afraid to reveal their desire for pregnancy for fear of being judged by providers, which might cause under-reporting or over-reporting of FP use.
Other bias	Low risk	None detected.

Chabikuli 2009

Methods	Serial cross-sectional study to measure changes in service utilization of a model integrating family planning with HIV counselling and testing, antiretroviral therapy and prevention of mother-to-child transmission in the Nigerian public health facilities.
Participants	FP clinic clients and HIV clinic clients at 71 tertiary and secondary hospitals and primary healthcare centers in Nigeria (all states) from March 2007 to Jan 2009.
Interventions	FP and HIV services were integrated in Nigerian public health facilities. The intervention focused on strengthening the skills of providers, supporting them on the job, formalizing referral between FP and HIV clinics and M&E by adding HIV data elements in the FP register, and streamlining data flow from facility to the state and federal levels. Each FP clinic received a packet of 4 job aids. Clients at HIV clinics were routinely counselled on FP methods and were given a referral

	letter if desired. At the FP clinics, clients received further counselling and assessment before an appropriate contraceptive method was dispensed and they were also counselled on HIV and given a referral letter to HCT if desired.
Outcomes	Process Outcomes/Output attendance at FP clinic; proportion of referrals from HIV clinics; service ratios for referrals; couple-years of protection
Notes	Only a small proportion of HIV clients completed a referral to FP clinics. Client years of protection was reported but not coded because was not a primary outcome. Limited evidence due to the lack of a control group.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-random sample. Before and after data collected.
Allocation concealment (selection bias)	High risk	Non-random allocation to intervention. All who attended FP and HIV clinics after integration received the intervention.
Blinding of participants and personnel (performance bias)	High risk	Same as above.
Blinding of outcome assessment (detection bias)	Low risk	Same as above; outcome and outcome measurement unlikely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias)	Low risk	No missing outcome data.
Selective reporting (reporting bias)	Low risk	Outcome assessment based on patient registry data.
Other bias	Low risk	None detected.

Coyne 2007

Methods	Non-random serial cross-sectional study to assess whether integrating FP and HIV services would improve process and behavioral outcomes
Participants	HIV+ women attending FP Plus, an FP clinic integrated with a nearby HIV clinic (The Garden Clinic) in Slough, UK, in 2002 and 2005.
Interventions	The Garden Clinic for HIV+ women started a specific clinic (FP Plus) to provide HIV-positive women clients with screening for STIs, contraception, pre-conception counselling, and cervical cytology. The Garden Clinic already worked on a model of integrated sexual health care, and FP Plus is staffed by doctors and senior nurses trained in both STI management and FP.

Outcomes	Behavioural Outcomes Using condom only as contraception Process Outcomes/Output cervical cytology, recording of method of contraception, recording of sexual history, and offering of STI screen
Notes	No statistical tests of significance were performed.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-random sampling method used
Allocation concealment (selection bias)	High risk	All participants who attended the FP clinic received the intervention.
Blinding of participants and personnel (performance bias)	High risk	Same as above.
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessment not blinded but not likely to influence outcomes. Outcome data collected only from those who received the intervention (attended the FP clinic).
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data.
Selective reporting (reporting bias)	Unclear risk	Outcomes based on self-report and clinical tests. Possible reporting bias due to stigma towards sexual behavior and contraception.
Other bias	High risk	No statistical tests of significance were performed.

Creanga 2007

Methods	Non-random cross-sectional study of community-based reproductive health agents (CBRHA) to compare whether integrating HIV information and services would increase client volume.
Participants	CBRHA in Amhara and Oromiya regions of Ethiopia, April-May 2005. Comparison groups: those who integrated HIV services and those who did not.
Interventions	Intervention group of community-based reproductive health agents (CBRHAs) integrated HIV education, referral to VCT, and home-based care for PLHIV into their services.
Outcomes	Process Outcomes/Output Client volume
Notes	This study focuses on the providers, not the recipients of the intervention.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non random study design.
Allocation concealment (selection bias)	High risk	No ability to conceal allocation - Intervention group provided integrated services while non-intervention group did not.
Blinding of participants and personnel (performance bias)	High risk	No ability to blind participants or personnel - same as above.
Blinding of outcome assessment (detection bias)	Low risk	No blinding but not likely to affect outcome assessment. Outcomes based on self-report and confirmed by client records.
Incomplete outcome data (attrition bias)	Low risk	No missing outcome data.
Selective reporting (reporting bias)	Low risk	Self-reported outcomes confirmed by client records.
Other bias	Low risk	None detected.

Delvaux 2008

Methods	A non-random serial cross-sectional study was conducted to evaluate changes in the quality of maternal health services before (2002-2003) and after (2005) the implementation of a PMTCT program.
Participants	Pregnant women attending antenatal clinics and delivery wards in one regional hospital and four health centers in Abidjan and San Pedro, Côte d'Ivoire.
Interventions	Implementation of PMTCT (including HIV testing) in ANC and delivery facilities, including renovating or constructing buildings, supplying equipment and training health staff.
Outcomes	Behavioral Outcomes: HIV testing, Nevirapine use Process Outcomes/Output: HIV testing offered, quality of antenatal care, quality of delivery care Other outcomes (not key outcomes): Proportion of health facility staff in favor of recommending an HIV test, proportion of health facility staff willing to be tested when pregnant (or their wife)
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-random sample
Allocation concealment (selection bias)	High risk	No ability to conceal allocation - Before and after data collected; intervention group received integrated services while non-intervention group did not.
Blinding of participants and personnel (performance bias)	High risk	No ability to blind participants or personnel - same as above.
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessors not blinded but unlikely to influence outcomes - same as above.
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data.
Selective reporting (reporting bias)	Low risk	No reason to believe that any bias due to presence of external observers differed between study phases (before and after).
Other bias	Unclear risk	Possible observation bias due to different observation staff before and after intervention implementation.

Gamazina 2009

Methods	Non-random serial cross-sectional study to strengthen the quality of information, counselling and referrals that pregnant women receive and on addressing factors contributing to HIV-related stigma (provider knowledge, skills, and attitudes). Data collected through direct observation of providers and clients and exit interviews with clients. Comparison groups: providers who were trained vs those who were not.
Participants	Providers and women attending antenatal clinics in Mykolayiv and Sevastopol, Ukraine, from Oct 2004 – Sep 2007.
Interventions	Two interventions: 1. Provider training (midwives and ob-gyns) on how to provide high-quality, comprehensive HIV counselling and referrals, and 2. Development of behavior change IEC materials and referral to peer support programs.
Outcomes	Behavioral Outcomes: HIV testing Process Outcomes/Output: 1. interpersonal communication and counselling skills, 2. Number (%) of clients who received specified counselling components, 3. Complete counselling experience, 4. Personal risk assessment and reduction index
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-random selection to intervention.
Allocation concealment (selection bias)	High risk	Intervention involved training so it was not possible to conceal allocation.
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible - same as above.
Blinding of outcome assessment (detection bias)	High risk	Blinding not possible - outcomes assessed through direct observation of providers and clients receiving intervention, and client exit interviews
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data
Selective reporting (reporting bias)	Low risk	Client exit interviews supported observations
Other bias	Low risk	

Gillespie 2009

Methods	Nonrandom serial cross-sectional proof-of-concept study for the integration of family planning into semi-urban hospitals and health centers and to train VCT service providers in family planning.
Participants	VCT clients attending eight health facilities in Oromia region, Ethiopia between 2006-2008.
Interventions	VCT counselors were trained to counsel clients on family planning and to offer condoms and contraceptive pills during VCT sessions. Nurse counselors were also authorized to provide injectable contraceptives.
Outcomes	Behavioural Outcomes: Accepted contraceptive method Process Outcomes/Output: Discussed: contraceptive options, fertility intentions, condom use, how HIV is transmitted
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Nonrandom sampling method used
Allocation concealment (selection bias)	High risk	Participants (facilities) were allocated to intervention non-randomly

Blinding of participants and personnel (performance bias)	High risk	Participants (clients receiving integrated services) and personnel (staff receiving training as part of integration) were not blinded to intervention
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessment was not blinded - before and after interviews were conducted with clients
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data
Selective reporting (reporting bias)	High risk	Outcome data based on client self-report, article did not contain discussion of likelihood of reporting bias. VCT counselor logbooks were also assessed but unclear what data was collected.
Other bias	Low risk	

Hoffman 2008

Methods	Non-random prospective cohort study to estimate the effect of receiving HIV-positive test results on intentions to have future children and on contraceptive use and to assess the association between pregnancy intentions and pregnancy incidence among HIV-positive women in Malawi
Participants	HIV positive but not pregnant women attending FP, STD clinics and VCT centers in Lilongwe, Malawi between 2003-2006
Interventions	Women at an FP clinic, STD clinic, and VCT center were offered HIV testing; women who were HIV-positive and not pregnant were enrolled and received HIV care and access to FP.
Outcomes	Behavioral: contraceptive use, condom use, dual protection use, pregnancy incidence Other: desire for a child
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-random selection: all women meeting criteria were offered enrolment and women self-selected into intervention
Allocation concealment (selection bias)	High risk	All women enrolled were allocated to intervention; no control group.
Blinding of participants and personnel (performance bias)	High risk	No blinding of participants or personnel
Blinding of outcome assessment (detection bias)	Low risk	Only those receiving intervention were assessed for outcomes; lack of blinding unlikely to influence outcomes

Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data
Selective reporting (reporting bias)	Low risk	No likelihood of reporting bias
Other bias	High risk	Outcome effect possibly greater due to one recruitment site being an FP clinic where presenting clients already had a previous intent to access FP services; future pregnancy intention may be biased due to unclear timeframe implied in phrasing of question (Would you like to have another child?).

Killam 2010

Methods	Stepped-wedge cluster randomised trial (group randomised trial) to evaluate whether providing antiretroviral therapy (ART) integrated in antenatal care (ANC) clinics results in a greater proportion of treatment-eligible women initiating ART during pregnancy compared with the existing approach of referral to ART. The study was conducted from July 2007 to July 2008.
Participants	Women initiating ANC (and found eligible for ART) at public ANC clinics in the Lusaka district, Zambia. Mean age, yrs (SD) Control: 27.3 (5.3); Intervention: 27.5 (5.2).
Interventions	If CD4 cell count < 250 cells/ul, patient was considered eligible for ART and enrolled into ART care on day she received CD4 results. Standard written protocols and team approach were used. During enrolment visit, Clinical officer performed detailed history and physical, WHO staging, and treatment of OIs; nurse midwife provided health education and ANC services; peer educator provided counselling on ART drugs, including need for lifelong adherence. At enrolment, patients started on CTX prophylaxis, multivitamins, and iron and were asked to return in 2 weeks for ART initiation. If patient was late in gestation (34-36 weeks), ART initiation was usually recommended at enrolment visit. If CD4 >250, referral to general ART clinic for care was made. Both the general and ANC-integrated ART clinics used same schedule of visits, lab evaluations, record systems and QA systems. They were staffed by same cadres of providers: a clinical officer, a nurse, and a peer educator. Nurses and clinical officers staffing both the general and integrated ANC clinic received ministry-approved ART training. Women were followed with active follow-up. Women received ART in the ANC clinics until 6 weeks postpartum, and then were referred to the general ART clinic. At 6 weeks postpartum, infant CTX prophylaxis and testing for HIV DNA were recommended. Comparison or Standard of care: Women found to be HIV+ through ANC testing had CD4 cell count routinely sent. Post-test counselling stressed importance of returning for CD4 results within 2 weeks and benefits of ART if woman found to be eligible. Those with advanced HIV disease based on WHO symptom screen and those with CD4 less than 350 cells/ul were referred urgently to the ART clinics, located on the same premises as ANC but physically separate and separately staffed. Local peer educators provide

	additional education and support to women who qualify for ART and were asked to escort them to ART clinic. Those who do not meet criteria for ART are provided with ARV prophylaxis for PMTCT and non urgent appointment at ART clinic for long-term care and follow-up.
Outcomes	Behavioral: ART retention rate Process: ART enrolment; ART initiation; mean gestational age at first ANC visit among women who initiated ART; mean gestational age at ART initiation; mean weeks of ART initiation before delivery
Notes	None.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Included all HIV-infected, ART-eligible pregnant women in eight public sector clinics in Lusaka district, Zambia.
Allocation concealment (selection bias)	High risk	Between October 2007 and May 2008, one new site per month (total of 8) upgraded its services to provide ART in the ANC clinic.
Blinding of participants and personnel (performance bias)	Low risk	No blinding but unlikely to introduce performance bias.
Blinding of outcome assessment (detection bias)	Low risk	No blinding but unlikely to introduce detection bias.
Incomplete outcome data (attrition bias)	Low risk	No missing outcome data.
Selective reporting (reporting bias)	Unclear risk	The study protocol is not available. Incidence of infant HIV infection or HIV-free survival not reported. However, this study identified strategies to maximize ART provision to eligible pregnant women, which is the major challenge in PMTCT.
Other bias	Low risk	Stepped wedge rollout of the intervention allowed a controlled evaluation, unbiased by time trends, while allowing all sites to participate in the enhanced ART in ANC intervention.

King 1995

Methods	Before-after study design to evaluate the impact of a FP intervention among HIV+ and HIV- women. Baseline was conducted from September 1992 - May 1993. Follow-up dates were not reported.
Participants	Women attending pediatric and prenatal clinics in Kigali, Rwanda. Age range: 20-44.

Interventions	Women who had received VCT were shown a 15 minute educational video on contraceptive methods, followed by a group discussion to ensure understanding of the information presented. Oral contraceptive pills, injectable progestins, and Norplant were then provided, free of charge, to women who chose to enroll in the FP program.
Outcomes	Health outcomes: pregnancy incidence (among HIV-positive and HIV-negative women) Behavioral outcomes: hormonal contraception use (overall and among potential new users)
Notes	None.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	All women who attended the pediatric and prenatal clinics and who had previously undergone VCT were included in the study.
Allocation concealment (selection bias)	High risk	All participants received the intervention. No concealment.
Blinding of participants and personnel (performance bias)	High risk	No blinding of participants or personnel.
Blinding of outcome assessment (detection bias)	High risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Low risk	No missing outcome data.
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	Unclear risk	The decline in incident pregnancy among HIV+ women may be due to factors other than the intervention (i.e. death of a spouse, infertility, etc.). Condoms were not promoted in this intervention due to previous intervention failures.

Kissinger 1995

Methods	Non-randomized trial (individual) to assess on-site provision of MNCH services onto an existing HIV outpatient clinic. The study was conducted from June 1991 to December 1992.
Participants	HIV+ women attending an HIV outpatient clinic in New Orleans, Louisiana, USA.
Interventions	A maternal-child program was started within an HIV outpatient program and comprehensive primary care centre. To improve clinic attendance among women, the following interventions were implemented: (1) a separate area in the clinic

	where the waiting rooms and examination rooms were private and oriented to mothers and children, (2) an increase in the number of female health providers, (3) on-site child care services free of charge, (4) coordination of transportation services, (5) combined pediatric and maternal clinics, merging scheduled visits for mothers and children, (6) daily availability of health care providers for urgent visits, and (7) on-site colposcopy and gynecologic services within the primary care clinic.
Outcomes	Behavioral outcome: at least 75% attendance of scheduled visits
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-randomized selection of HIV+ patients attending an HIV outpatient clinic.
Allocation concealment (selection bias)	High risk	No allocation concealment.
Blinding of participants and personnel (performance bias)	High risk	Neither participants nor personnel were blinded in the trial.
Blinding of outcome assessment (detection bias)	High risk	Outcome assessment was not blinded.
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data.
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	Unclear risk	Since several interventions were implemented simultaneously, the impact of each intervention individually is not known, but this could be examined in future studies.

Liambila 2009

Methods	A before-after study to assess an intervention for increasing access to and use of HIV testing among family clients through provider-initiated testing and counselling for HIV. The study was conducted from May 2006 to February 2007.
Participants	Family planning clients at public sector hospitals, health centers, and dispensaries in Central Province, Kenya.
Interventions	All FP providers were trained in an algorithm that integrates HIV/STI prevention counselling, including offering HIV VCT, with FP counselling. Clients choosing to be tested were either referred or tested during the consultation by a trained FP provider.

Outcomes	Process outcomes: quality of care; FP consultation time; HIV test consultation time; discussion of FP and STIs; discussion of condom use; discussion of HIV testing and counselling; referral voucher uptake.
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Samples of family planning clients willing to be observed and interviewed were randomly selected (538 pre intervention, 520 postintervention) and their informed consent obtained to observe their consultation.
Allocation concealment (selection bias)	Unclear risk	Same as above and could not determine how the randomisation was conducted and if allocation was concealed.
Blinding of participants and personnel (performance bias)	High risk	No blinding of participants or personnel.
Blinding of outcome assessment (detection bias)	High risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data.
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	Unclear risk	One region was predominately rural and one was urban.

Ngure 2009

Methods	Non-randomized trial (group) to evaluate a multi pronged approach to promote dual contraceptive use by women within heterosexual HIV-1 serodiscordant partnerships. The study was conducted from June 2006 through September 2008.
Participants	Women aged 18-45 in HIV serodiscordant relationships were recruited from research clinics conducting the Partners in Prevention HSV/HIV Transmission Study in Thika (intervention), Eldoret, Kisumu, and Nairobi (control), Kenya.
Interventions	Contraceptive multi pronged promotion intervention that included staff training, couples family planning sessions and free provision of hormonal contraception on-site: 1) Training of clinical and counselling staff on contraceptive methods, including practical demonstrations and discussions of common myths and barriers to use 2) Provision of free contraceptive methods (oral contraceptive pills (OCP), injectables, implants, and IUDs to study participants (from June 2006 to May 2007, the Thika site offered injectable depot and OCP free at the research clinic, whereas other methods were offered by referral)

	3) Use of contraceptive appointment cards with clear dates for renewal of time-dependent methods (e.g., injectable depot) to avoid lapses in hormonal contraception 4) Designation of one staff member to ensure staff received ongoing training in contraceptive counselling and sufficient contraceptive supplies were available on-site 5) Introduction of check lists in chart notes to remind staff to discuss and provide contraceptive methods during study visits. 6) Weekly meetings with clinicians, counselors and pharmacy staff to share experiences discussing contraception with participants 7) Discussion of challenges to contraceptive uptake with study couples individually and in psychosocial support groups; insights were reported back to study team to strengthen contraceptive messages 8) Involvement of male partners during contraceptive counselling sessions during routine study visits. 9) Review of unintended pregnancies among HIV-1 + women to identify reasons why these pregnancies were not avoided
Outcomes	Biological outcome: Pregnancy incidence Behavioral outcomes: Reported use of non condom contraception (current use of IUD, surgical method, injectable, implantable or oral hormonal methods)
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Participants were not randomised in receiving the intervention. At all study sites, contraceptive methods were offered onsite or by referral on voluntary basis as a part of routine clinical care.
Allocation concealment (selection bias)	High risk	No allocation concealment. At all study sites, contraceptive methods were offered onsite or by referral on voluntary basis as a part of routine clinical care.
Blinding of participants and personnel (performance bias)	Unclear risk	No blinding of participants or personnel.
Blinding of outcome assessment (detection bias)	Unclear risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Unclear risk	No incomplete outcome data reported.
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.

Other bias	High risk	HIV+ women had a higher contraceptive uptake compared to HIV- women, which might be related to visit frequency (monthly for HIV+ and quarterly for HIV-), pregnancy intention (greater desire to avoid unwanted pregnancies to prevent HIV transmission to child), and study staff may have focused FP messages more strongly towards HIV+ women as protocol required discontinuation of study drug for HIV+ women who became pregnant. This intervention was conducted within a clinical trial setting and this limits the generalizability of findings to other FP and HIV prevention/ care programs with fewer resources and less frequent follow-up.

Peck 2003

Methods	Serial cross-sectional study (non-random) to examine the feasibility, demand, and effect of integrating various SRH and primary care services into a stand-alone VCT clinic as a way to effectively remove barriers to HIV counselling and testing. The study was evaluated in 1985, 1988, 1995, and 1999.
Participants	Study participants were recruited from VCT centers around Port au Prince, Haiti.
Interventions	Progressive integration of primary care services into VCT. GHESKIO HIV counselling and testing centre opened in 1985; this centre also provided HIV care through on-site adult and pediatric clinics. In 1989, TB services were added. In 1991, STI management was added. In 1993, family planning services and nutritional support for families affected by HIV were added. In 1999, prenatal services for HIV+ pregnant women (including PMTCT), post-rape services (including counselling, EC, and PEP), and PEP for health care workers accidentally exposed to HIV were all added. HIV+ Mothers were placed on long-term HAART when they developed WHO stage 4 or CD4<200.
Outcomes	Health outcome: HIV prevalence Behavioral outcome: HIV testing
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-random selection of participants.
Allocation concealment (selection bias)	High risk	Allocation concealment was not conducted.
Blinding of participants and personnel (performance bias)	High risk	No blinding of participants or personnel.

Blinding of outcome assessment (detection bias)	High risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Unclear risk	Most outcomes are only presented in 1999 after the full integration of services; the outcomes listed here are the only ones compared across the different time periods.
Selective reporting (reporting bias)	Unclear risk	The study protocol is not available and most outcomes are only presented in 1999, after the full integration of services.
Other bias	Unclear risk	Also, given the long length of this study, time trends may have affected outcomes more than the integration of services.

Potter 2008

Methods	Serial cross sectional (non-random) via retrospective chart review to assess whether PMTCT programs added to ANC had a positive or negative effect on a marker of good antenatal care: syphilis RPR testing and treatment for women identified as RPR positive. The study was conducted from 1997-2004.
Participants	Pregnant women attending ANC clinics in Lusaka, Zambia.
Interventions	PMTCT-related research studies and service programs, including universal counselling and voluntary HIV testing with same-day test results and single-dose nevirapine for HIV-infected pregnant women and their infants, were introduced into antenatal care clinics, where RPR testing for syphilis was routine.
Outcomes	Process outcome: Quality of care (documented RPR screening and documented treatment among RPR-positive screened women).
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non randomised.
Allocation concealment (selection bias)	High risk	No allocation concealment.
Blinding of participants and personnel (performance bias)	High risk	No blinding of participants or personnel.
Blinding of outcome assessment (detection bias)	High risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data reported.

Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	Unclear risk	Retrospective chart review of first ANC visits was the method of data abstraction.

Rasch 2006

Methods	Cross-sectional (non-random) study to address the neglected areas of unsafe abortion and the risk of HIV infection among women experiencing such abortions. A logical way to do this would be to offer VCT as part of post-abortion care.The study was conducted from Jan 2001 to July 2002.
Participants	Women of reproductive age presenting at a municipal hospital after an unsafe (illegally induced) abortion in Dar es Salaam, Tanzania.
Interventions	Women with incomplete abortion presenting at a municipal hospital were approached and interviewed using an empathetic approach. Women who revealed having had an illegally induced abortion were characterized as having an unsafe abortion. Women were offered HIV testing, as well as contraceptive counselling and services and counselling about STIs/HIV. Re-counselling and contraceptive service were provided at follow-up. Promotion of condoms and double protection was included.
Outcomes	Behavioral outcome: Contraceptive choice (condom, double, hormonal).
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	No randomised sequence generation; all women were approached.
Allocation concealment (selection bias)	High risk	No allocation concealment.
Blinding of participants and personnel (performance bias)	High risk	No blinding of participants or personnel.
Blinding of outcome assessment (detection bias)	High risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Unclear risk	Initially had follow-up design but that didn't work so cross-sectional analyses were presented in this paper.
Selective reporting (reporting bias)	High risk	The study protocol is not available and initially had follow-up design but that didn't work so cross-sectional analyses were presented in this paper.

Other bias	Unclear risk	Contraceptive choice apparently came *after* pre-test counselling for VCT, FP counselling and methods, and STI/HIV counselling, but *before* learning HIV test results and post-test counselling. Low return for follow-up among women tested for HIV; this is probably the result of a combination of being tested for HIV and having post-abortion status.

Simba 2010

Methods	Cross sectional study (non-random selection of clinics; all providers sampled within each selected clinic) to assess whether average staff workload was higher if PMTCT services were provided in RCH clinics compared to RCH clinics that did not provide these additional services.
Participants	Pregnant women utilizing reproductive and child health services in Dar es Salaam, Kilimanjaro, Mwanza, Mbeya, and Kagera regions, Tanzania.
Interventions	PMTCT component added to reproductive and child health services.
Outcomes	Process outcome: quality of care (average staff workload).
Notes	Unit of analysis is staff workload per year by clinic.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	No randomised sequence was generated.
Allocation concealment (selection bias)	High risk	No allocation concealment was done.
Blinding of participants and personnel (performance bias)	High risk	Neither participants nor personnel was blinded.
Blinding of outcome assessment (detection bias)	High risk	No blinding of outcome assessment.
Incomplete outcome data (attrition bias)	Low risk	No incomplete outcome data was reported.
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	Unclear risk	Authors noted that untrained providers seem to obscure staffing gaps giving the false impression of staff adequacy.

van der Merwe 2006

Methods	Serial cross-sectional (non-random) study to assess the effectiveness of interventions to increase the uptake of ART during pregnancy, specifically the effects of strengthening linkages and integrating key components of ART within ANC. The study was conducted from June 2004 to July 2005.
Participants	HIV-infected pregnant women attending the ANC clinic at secondary public health facility providing pediatric and Ob/Gyn services (Coronation Women and Children Hospital) in Gauteng Province, South Africa.
Interventions	1) Health workers from ART clinic at Helen Joseph Hospital (HJH) (public ART site) attend weekly clinic for HIV-infected pregnant women at coronation Hospital 2) CD4 counts performed at first ANC visit for women with HIV (not clear if this was done before) 3) Two weeks later, at 2nd ANC visit, women receive CD4 cell counts results and those with <250/ul have baseline lab tests for ART initiation 4) For women with indications for ART, adherence counselling and treatment preparation occur during their second ANC visit. Women are then referred to HJH for initiation and follow-up of ART, provided by same staff members who began treatment preparation 5) Ongoing monitoring systems assess uptake and time between HIV diagnosis and initiation of ART
Outcomes	Biological outcome: risk of HIV infection among infants Process outcomes: days from HIV diagnosis to ART initiation; days from HIV diagnosis to receiving CD4 cell count result; gestational age at ART initiation; number of weeks from ART initiation to childbirth; proportion of medically eligible pregnant women who initiate ART.
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	No randomised sequence was generated.
Allocation concealment (selection bias)	High risk	No allocation concealment was conducted.
Blinding of participants and personnel (performance bias)	Unclear risk	Neither participants nor personnel was blinded.
Blinding of outcome assessment (detection bias)	Unclear risk	No blinding of outcome assessment was reported.
Incomplete outcome data (attrition bias)	High risk	Substantial number of infants have unknown HIV status (219 out of 1027 (21.3%) have no information on infant HIV diagnosis.

Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified.
Other bias	High risk	Limitations in the before/after cross sectional approach and unavailable data from hospital records.

Footnotes

Characteristics of excluded studies

Aboud 2009

Reason for exclusion	Not an organizational/management strategy with the aim of integrating services

Balkus 2007

Reason for exclusion	This was a population linkage and was not an organizational or management strategy

Baylin 2005

Reason for exclusion	This was a population linkage and was not an organizational or management strategy

Bradley 2008

Reason for exclusion	No outcomes of interest

Buhendwa 2008

Reason for exclusion	Not an organizational/management strategy with the aim of integrating services

Dhont 2009

Reason for exclusion	This was a population linkage and was not an organizational or management strategy

Fogarty 2001

Reason for exclusion	This was a population linkage and was not an organizational or management strategy

Homsy 2009

Reason for exclusion	This was a population linkage and was not an organizational or management strategy

Sukwa 1996

Reason for exclusion	Not an organizational/management strategy with the aim of integrating services

Temmerman 1992

Reason for exclusion	This was a population linkage and was not an organizational or management strategy

Footnotes

Characteristics of studies awaiting classification

Footnotes

Characteristics of ongoing studies

Footnotes

Summary of findings tables

Additional tables

References to studies

Included studies

Bahwere 2008

Bahwere P, Piwoz E, Joshua MC, Sadler K, Grobler-Tanner CH, Guerrero S, et al. Uptake of HIV testing and outcomes within a Community-based Therapeutic Care (CTC) programme to treat severe acute malnutrition in Malawi: a descriptive study. BMC infectious diseases 2008;8:106. [PubMed: 18671876]

Bradley 2009

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Brou H, Viho I, Djohan G, Ekouevi DK, Zanou B, Leroy V, et al. [Contraceptive use and incidence of pregnancy among women after HIV testing in Abidjan, Ivory Coast] [Pratiques contraceptives et incidence des grossesses chez des femmes apres un depistage VIH a Abidjan, Cote d'Ivoire.]. Revue d'epidemiologie et de sante publique 2009;57(2):77-86. [PubMed: 19304422]

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Studies awaiting classification

Ongoing studies

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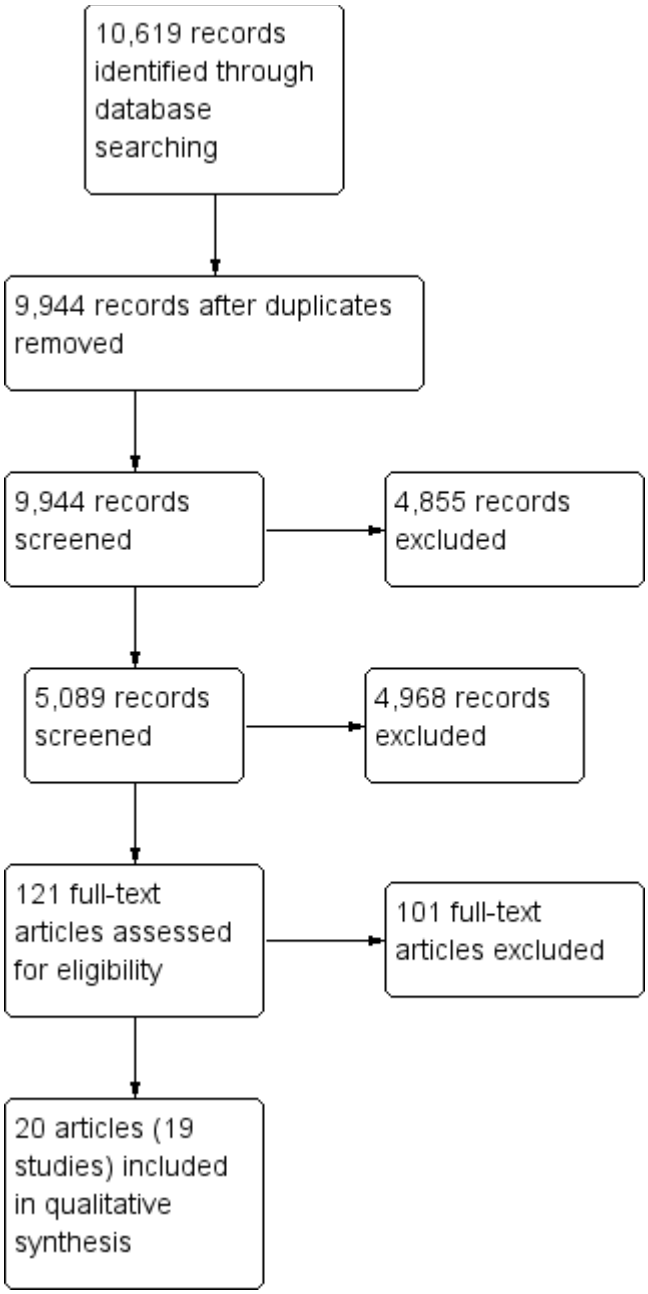
Other published versions of this review

Data and analyses

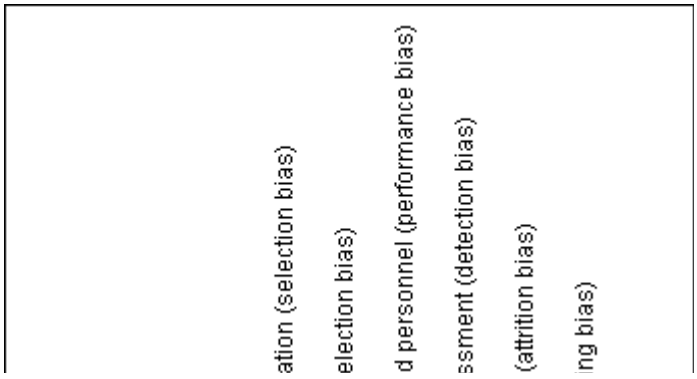
Figures

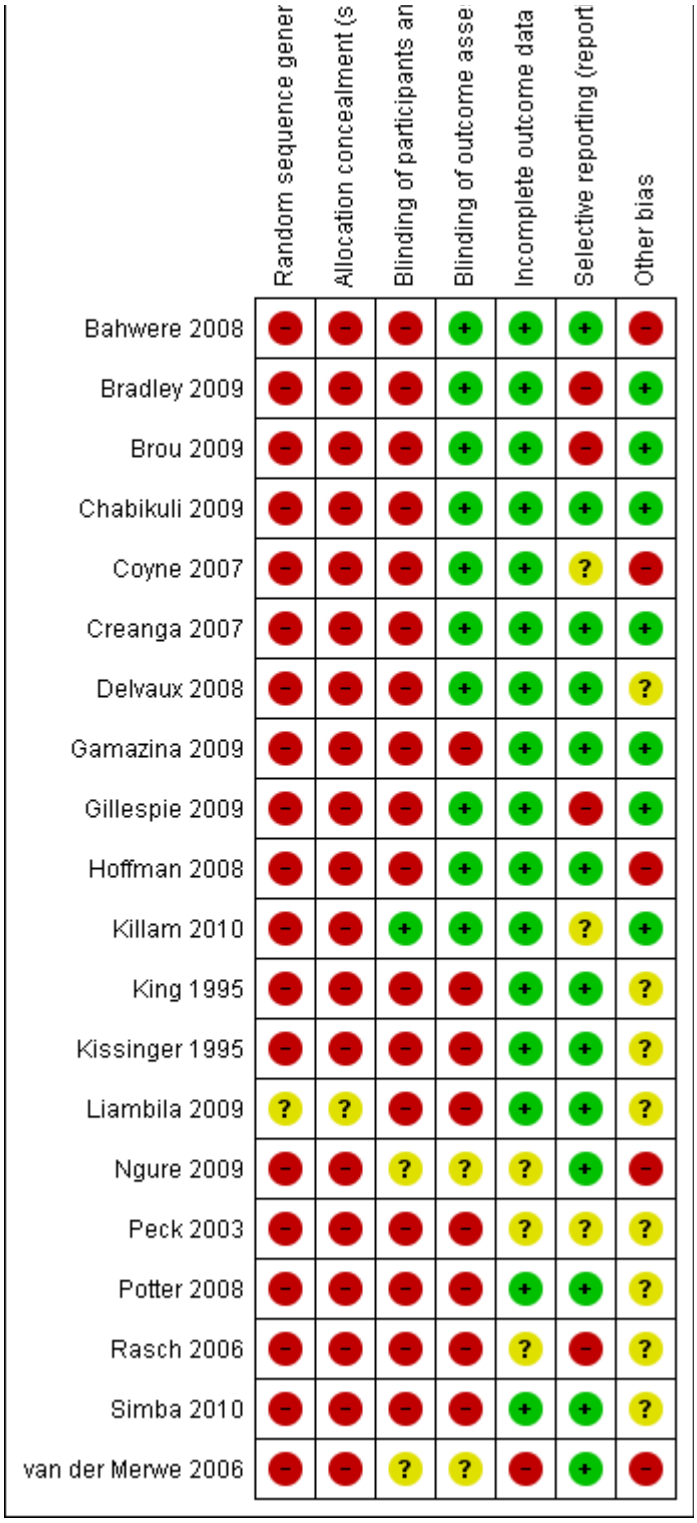
Figure 1



Study flow diagram.

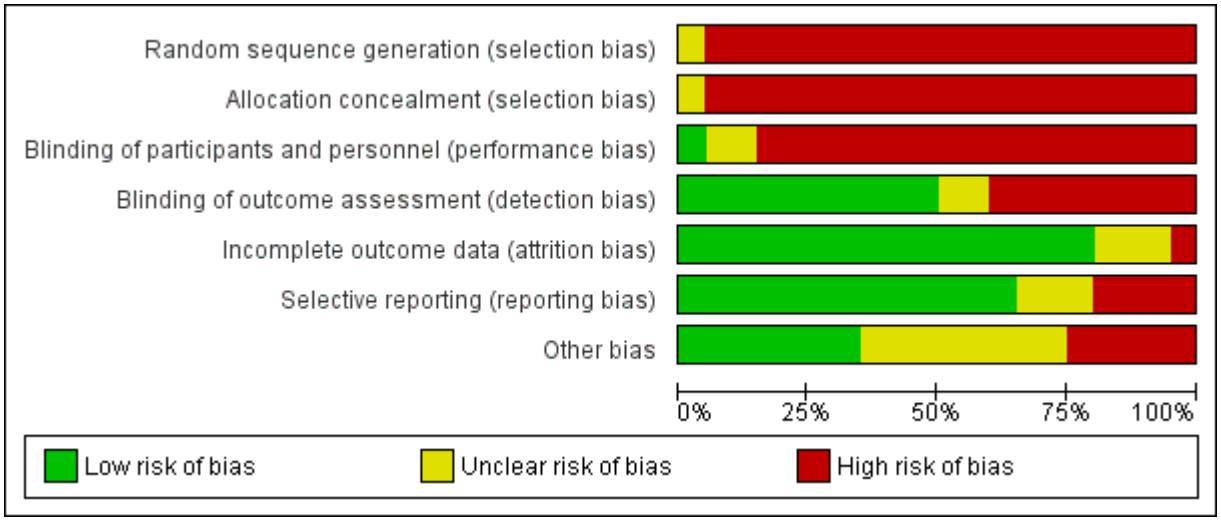
Figure 2





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

Figure 3



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

Sources of support

Internal sources

- Global Health Sciences, University of California, San Francisco,, USA

External sources

- United States Agency for International Developement (USAID), USA

Feedback

Appendices

1 MNCHN-FP and HIV integration matrix

Matrix of peer-reviewed study results by model of MNCHN-FP and HIV Integration

		HIV Interventions			
		HIV counseling & testing	Prevention of secondary HIV transmission	HIV care and treatment	Psychosocial and other services
MNCHN Interventions	Family Planning	11	3	4	5
	Antenatal Services	5	3	5	0
	Post-Abortion Services	1	0	0	0
	Intrapartum/Child birth Services	2	0	1	1

	Postnatal/Postpartum Services	1	0	0	0
	Infant/Child Services	2	0	2	0
	Nutrition Services	1	0	1	0

2 Example of PubMed search strategy, which was modified as appropriate for use in the other databases

PubMed: 15 October 2010 **Range:** 01 January 1990 - 15 October 2010		
#1	HIV Infections[MeSH] OR HIV[MeSH] OR hiv[title/abstract] OR hiv-1[title/abstract] OR hiv-2*[title/abstract] OR hiv1[title/abstract] OR hiv2[title/abstract] OR hiv infect*[title/abstract] OR human immunodeficiency virus[title/abstract] OR human immune deficiency virus[title/abstract] OR human immuno-deficiency virus[title/abstract] OR human immune-deficiency virus[title/abstract] OR ((human immun*) AND (deficiency virus[title/abstract])) OR acquired immunodeficiency syndromes[title/abstract] OR acquired immune deficiency syndrome[title/abstract] OR acquired immuno-deficiency syndrome[title/abstract] OR acquired immune-deficiency syndrome[title/abstract] OR ((acquired immun*) AND (deficiency syndrome[title/abstract])) or “sexually transmitted diseases, viral”[mh]) OR HIV[title/abstract] OR HIV/AIDS[title/abstract] OR HIV-infected[title/abstract] OR HIV[title] OR HIV/AIDS[title] OR HIV-infected[title]	235996
#2	(maternal[Title/Abstract] OR mother*[title/abstract] OR mom[title/abstract] OR mama[title/abstract] OR woman[title/abstract] OR women[title/abstract] OR woman’s[title/abstract] OR female[title/abstract] OR girl[title/abstract] OR girls[title/abstract] OR girl’s[title/abstract]) OR ("Women"[Mesh] OR "Female"[Mesh]OR "Maternal Health Services"[Mesh] OR "Family Planning Services"[Mesh] OR "Obstetrics"[Mesh] OR "Gynecology"[Mesh] OR "Reproductive Health Services"[Mesh] OR "Parturition"[Mesh] OR "Labor, Obstetric"[Mesh] OR "Obstetric Labor Complications"[Mesh] OR "Obstetric Labor, Premature"[Mesh] OR obstetric*[Title/Abstract] OR gynecolog*[Title/Abstract] OR gynaecolog*[Title/Abstract] OR antenatal[Title/Abstract] OR (ANC AND pregnan*)[Title/Abstract] OR prenatal[Title/Abstract] OR pre-natal[Title/Abstract] OR postnatal [Title/Abstract] OR post-natal [Title/Abstract] OR postpartum[Title/Abstract] OR post-partum[Title/Abstract]OR intrapartum[Title/Abstract] OR birth[Title/Abstract] OR childbirth[Title/Abstract] OR pregnan*[Title/Abstract] OR “family planning”[title/abstract] OR reproductive[title/abstract]) OR (child*[title/abstract] OR neonat*[Title/Abstract] OR adolescent*[title/abstract] OR pediatric[title/abstract] OR paediatric[title/abstract] OR baby[title/abstract] OR babies[Title/Abstract] OR infant[title/abstract] OR offspring[title/abstract] OR newborn[title/abstract] OR kids[title/abstract] OR "Child"[Mesh] OR "Child, Preschool"[Mesh]) OR "Infant"[Mesh]) OR "Adolescent"[Mesh])	2350186
#3	randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized controlled trials[mh] OR random allocation[mh] OR double-blind method[mh] OR single-blind method[mh] OR clinical trial[pt] OR clinical trials[mh] OR ("clinical trial"[tw]) OR ((singl*[tw] OR doubl*[tw] OR trebl*[tw] OR tripl*[tw]) AND (mask*[tw] OR blind*[tw])) OR placebos[mh] OR placebo*[tw] OR random*[tw] OR non-randomi*[tw] OR before after study[tw] OR time series[tw] OR “case control”[tw] OR	5460160

	prospective*[tw] OR retrospective*[tw] OR cohort[tw] OR cross-section*[tw] OR prospective[tw] OR retrospective[tw] OR research design [mh:noexp] OR comparative study[mh] OR evaluation studies[mh] OR follow-up studies[mh] OR prospective studies[mh] OR control*[tw] OR prospectiv*[tw] OR volunteer*[tw] OR longitud*[tw] OR descripti*[title/abstract] OR study[title/abstract] OR evaluat*[title/abstract] OR “odds ratio”[tw] OR “hazard ratio”[tw] OR “relative risk”[tw] OR “risk ratio”[tw] OR AOR[tw] OR RRR[tw] OR NNT[tw]	
#4	#1 AND #2 AND #3	6571

3 Study rigor

Study	Study design includes pre/post intervention data	Study design includes control or comparison group	Study design includes cohort	Comparison groups equivalent at baseline on socio-demographics	Comparison groups equivalent at baseline on outcome measures	Random assignment (group or individual) to the intervention	Participants randomly selected for assessment	Control for potential confounders	Follow-up rate (≥ 75% counts toward total score)	Total rigour score (min score= 1; max score= 9)
Bahwere 2008	No	No	Yes	Yes	Yes	No	No	No	NR (FU only with RC, and nutritional status of HIV-infected children only is reported).	4
Bradley 2009	Yes	No	No	NA	NA	No	No	Yes	N/A	2
Brou 2009	Yes	No	Yes	NA	NA	No	No	No	NR	2
Chabikuli 2009	Yes	No	No	N/A (before/after)	N/A (before-after)	No	No	No	N/A	1

Coyne 2007	Yes	Yes	No	N/A	N/A	No	No	No	N/A (serial cross-sectional)	2
Creanga 2007	No	Yes	No	N/A	N/A	No	No	Yes	N/A (cross-sectional)	2
Delvaux 1998	Yes	No	No	No	NA	No	No	Yes (for overall analysis of quality score only)	N/A	2
Gamazina 2009	Yes	Yes	No	NR	NR	No	No	NR	NA(serial cross-sectional)	2
Gillespie 2009	Yes	No	No	NR	N/A	No	No	No	N/A (serial cross-sectional)	1
Hoffman 2008	Yes	No	Yes	NA	NA	No	No	NA	Yes	3
Killam 2010	No	Yes	Yes	Yes	Yes	Yes	No (Took all eligible patients)	Yes	Yes, 90 day follow-up rate 87.8% intervention and 91.3% in control	7

King 1995	Yes	No	Yes	N/A	N/A	No	No	N/A	100% (by design)	3
Kissinger, 1995	Yes	Yes	Yes	No	Yes	No	No	Yes	100% (by design)	6
Liambila 2009	Yes	No	No	N/A	N/A	No	Yes	No	N/A	2
Ngure 2009	Yes	Yes	Yes	Yes	Yes for pregnancy incidence likely no for contraceptive use	No	No	Yes (checked and adjusted numbers were not meaningfully different so presented unadjusted numbers)	NR	6
Peck 2003	Yes	No	No	N/A	N/A	No	No	No	N/A (serial cross-sectional)	1
Potter 2008	Yes	No	No	NR	NA	No	No	No	NA	1
Rasch 2006	No	Yes	No	NR	N/A	No	No	Yes	N/A	2

Simba 2010	No	Yes	No	NR	NA	No	No	Yes	NA	1
van der Merwe 2010	Yes	Yes	No	Yes	Yes (there were no difference in pregnancy outcomes, there was a difference in – infant feeding mode)	No	No	No	NA	4

4 Integration implementation

Study	Type of Integration	Study Objective	Integration Promoting Factors	Integration Inhibiting Factors	Recommendations	Other
Bahwere 2008	**Direction:** MNCH adding HIV services **Setting:** Community-based study **Format:** Provider has all services plus HIV testing in one location **Level:** Regional (district level)	**Objective:** To assess whether HIV testing can be integrated into Community-based Therapeutic Care (CTC), to determine if CTC can improve the identification of HIV-infection children and to asses the impact of CTC programs on the rehabilitation of HIV-infection children with Severe Acute Malnutrition.	**Promoting factors:** The authors speculate that the improved recovery rates arise from the decentralized nature of the CTC model of care that is designed to remove barriers to access and promote early presentation before serious complications develop due to SAM. It is possible that the CTC design, which uses community mobilization and referral for early	**Inhibiting factors:** CTC would have to be combined with other community-based VCT programs in order to obtain good coverage as it only targets households with malnourished children.	**Recommendations:** CTC is a valuable entry point for HIV testing for severely malnourished children and good recovery rates can be achieved in HIV-infected severely malnourished children admitted to the program. These results indicate that CTC can be used to improve the coverage of HIV services, especially in rural areas. The fact that	**Other:** They did not use ITT analyses so the percentages were higher than they should have been (i.e. only included nutritional recovery info for those who were actually tested for HIV or had test results). For the retrospective cohort, nutritional measurement accuracy could not be verified. The statistical power of these analyses was limited by the

			identification and treatment of SAM also improves long-term recovery compared to hospital-based treatment programs. The authors believe that the “opt-out” approach to HIV testing contributed to high VCT uptake and that offering testing through a program such as CTC that is well established in the community improves trust and reduces the fear of stigmatization.		HIV-positive children recovered from malnutrition even without ART suggests that the presence of malnutrition should not be the sole criteria for initiating ART in food insecure settings. One possibility is that initiation of ART could be reserved for children who do not respond to CTC or at least could be delayed until nutrition improvement to minimize side-effects. Reducing recovery time and subsequent length and cost of participation will reduce default rates. Adapting CTC routine antibiotic treatment for HIV-related infections and inclusion of routine prophylactic CTX for HIV-positive children may improve recovery too.	small number of HIV-positive children included in the study and data from LTFU. RC might be subject to survival bias.

Bradley 2009	**Direction:** HIV services adding MNCH services **Setting:** 8 public sector VCT clinics **Format:** On-site provision of services **Level:** District	**Objective:** To determine whether VCT counselors could feasibly offer family planning and whether clients would accept such services.	**Promoting factors:** There was strong country support for VCT and inclusion of FP as a standard component of VCT. Men attending facilities with lower client loads and more counseling rooms were more likely to receive contraceptive counseling and methods. Sexually active men and women and those with more perceived HIV risk were more likely to obtain contraceptive methods.	**Inhibiting factors:** Ethiopia is a large, sparsely populated country with rapid population growth, a lack of resources and a lack of financial support for FP. At the facility level, although concrete steps were taken to ensure a dependable supply of contraceptives, the perception of inadequate supplies persisted among counselors, and this perception was highly associated with their clients' contraceptive uptake and condom use intentions.	**Recommendations:** The benefits of integrating FP and VCT services may be more pronounced among higher risk populations. Testing for an STD and providing contraceptives to a population which is not very sexually active is not likely to be the optimal use of resources. An education and mobilization campaign that focuses on what constitutes risk behavior and who should be tested could well result in a client profile more in need and desirous of HIV testing and FP services.	**Other:** The study had several limitations. The data were cross-sectional, so the results do not reflect attitude or behavioral changes over time. All outcomes are based on self-report, and the analysis excluded clients with missing provider level data. The client population and service sites may not be representative of other locations in Ethiopia.
Brou 2009	**Direction:** HIV services adding MNCH services **Setting:** PMTCT/ANC clinics **Format:**	**Objective:** To compare contraceptive use and pregnancy incidence between HIV-positive and HIV-negative women who were offered HIV	**Promoting factors:** The message delivered to HIV+ women was not to avoid becoming pregnant but to avoid undesired pregnancies, to space births and	**Inhibiting factors:** HIV+ women seem to have been afraid to reveal their desire for pregnancy for fear of being judged by providers	**Recommendations:** FP for HIV+ women can be a good strategy for PMTCT	**Other:**

	Provider/onsite **Level:** Local/district	counseling and testing during a PMTCT program.	to ensure adequate follow-up in the case of a new pregnancy. HIV+ women seem to have better adhered to this advice during Ditrame Plus than in the previous project.			
Chabikuli 2009	**Direction:** Simultaneous **Setting:** Tertiary and secondary hospitals and primary healthcare centers **Format:** Referral (FP clients referred to HIV clinic and HIV clients referred to FP clinic) **Level:** National (all states in Nigeria)	**Objective:** To measure changes in service utilization of a model integrating family planning with HIV counseling and testing, antiretroviral therapy and prevention of mother-to-child transmission in the Nigerian public health facilities.	**Promoting factors:** They were able to use routine health data to evaluate the intervention. Due to confidentiality they were not able to track FP data by HIV status.	**Inhibiting factors:** Limited evidence due to the lack of a control group. Use of FP clinics and contraceptives is low in Nigeria. Counseling alone may not increase uptake of contraception and male partners must be more involved in the decision making process. User fees for contraceptives are a barrier for people. The additional wait time in the referral model of integration is a deterrent.	**Recommendations:** A one-provider/one-session integration model would be better than the referral model. Integration at the PHC level may be easier and efficient. Men attending HIV services seem to be approachable for FP services; this opportunity for male involvement in PF should be used more efficiently. Improvements of service organization within facilities, accessibility of FP-HIV services particularly at the PCH level and the review of	**Other:** Only a small proportion of HIV clients completed a referral to FP clinics. Client years of protection was reported but not coded because was not a primary outcome.

					user's fees for contraceptives will attract more clients.	
Coyne 2007	**Direction:** HIV services adding MNCH services **Setting:** HIV clinic **Format:** Provider X	**Objective:** An audit demonstrated that the sexual and reproductive health needs of the HIV-positive female clients were not being met, so a specific clinic was started to provide SRH services to these women.	**Promoting factors:** The FP Plus clinic runs alongside the general GU medicine and HIV clinics, using a single set of notes, ensuring that at every visit sexual health issues can be addressed.	**Inhibiting factors:** NR	**Recommendations:** Clinics looking after HIV+ people need to have local care pathways to address their sexual health. The authors would propose their integrated clinic model as an effective means of providing this service to women with HIV.	**Other:** It is concerning that it was not always recorded whether women with potentially serodiscordant partners were using condoms; changes were planned to ensure that all women see a health advisor shortly after diagnosis to discuss safe sex and disclosure issues. No statistical tests of significance were performed.
Creanga 2007	**Direction:** MNCH services adding HIV services **Setting:** Community **Format:** On-site provision of services and off-site referral to services	**Goal:** CBRHAs have typically been mobilized for SRH and MCH care, but there is a growing need for them to provide HIV/AIDS services.	**Promoting factors:** Many CBRHAs are already performing integrated HIV and FP services. Personality traits, duration of experience and willingness/ ability to visit more households were associated with providing integrated services. More	**Inhibiting factors:** Promoting integrated service delivery likely will not increase the volume of clients served by CBRHAs. Providing integrated service delivery appears to increase the amount of time that agents must spend with each	**Recommendations:** A valid referral system should be put in place and the relationships between the different types of community health workers well defined. Need more outreach workers instead of expecting existing ones to do more integrated	**Other:** This study focuses on the providers, not the recipients of the intervention.

			working experience is also associated with performing integrated services. Finally, the active involvement of community leaders creates a sense of responsibility and ownership for such projects and enhances their overall support for CBRHAs.	client, and because they have finite time available, this constrains their ability to serve many clients. A personal interest in health work and enjoying community service were not significant motivations for CBRHAs. Being a community leader was not associated with servicing a high number of clients.	services.	
Delvaux 1998	**Direction:** MNCH services adding HIV services **Setting:** Antenatal clinics and delivery wards **Format:** Provider On site provision of services **Level:** Local (5 facilities in 2 cities)	**Objective:** To evaluate changes in the quality of maternal health services before and after the implementation of a PMTCT program in five health facilities	**Promoting factors:** *Substantial training, supervision, and investment:* Substantial onsite training, intense supervision, improvement in work conditions, provision of sufficient equipment or instruments for routine activities, and involvement of the staff in decision making regarding their needs. The highest score for delivery care was reached by the health facility	**Inhibiting factors:** Some staff were newly deployed and did not receive the same training. Low uptake of HIV testing may be partly due to women's fears about breaches of confidentiality, difficulties reported with clinic staff or procedures, the desire to ask their husband first and to avoid the anguish of a positive test.	**Recommendations:** Introduction of comprehensive PMTCT services, including HIV counseling and testing, can lead to an improvement in the quality of ANC and delivery care in general, and should be translated into enhanced collaboration between HIV and MCH programs. Some aspects of quality of services such as infection prevention need to be	**Other:** Many general obstetric practices remained worryingly substandard-particularly hand washing and infection prevention. Infection prevention was not covered in the formal PMTCT training or systematic supervision.

			where investment was most important and where staff received additional training on obstetric care (outside PMTCT training). *Transferability of training to different domains:* Emphasis on communication skills in PMTCT training may have alerted staff to the need for better communication in general.		addressed**.** PMTCT should be taken as an opportunity to strengthen overall maternity services. This should be not only written into guidelines but translated into action with an enhanced collaboration between HIV and maternal/RH programs and increased funding for maternal/RH services.	
Gamazina 2009	**Direction:** MNCH services adding HIV services **Setting:** Antenatal clinics **Format:** Provider **Level:** Local	**Objective:** To strengthen the quality of information, counseling and referrals that pregnant women receive and on addressing factors contributing to HIV-related stigma (provider knowledge, skills, and attitudes).	**Promoting factors:** The interactive component of the counseling session helped clients feel comfortable and supported.	**Inhibiting factors:** Supervision responsibility not included in one's formal job and is viewed as voluntary work, which reduces motivation. Additional trainings and refresher courses for counselors and a feedback system for clients are not budgeted for.	**Recommendations:** Adjust curriculum to include content on quality assurance. Encourage MOH to include VCT supervision responsibilities in job descriptions for appropriate personnel. Encourage MOH to adopt and formally institutionalize the VCT provider training curriculum into	**Other:** The training program for ob-gyns and midwives (modeled after this intervention) now fully corresponds with the national VCT protocol.

					the pre-diploma and post-diploma training programs of ob-gyns and midwives. Conduct regular follow-up VCT training. Extend VCT training to pediatricians, who are responsible for offering HIV testing of infants, to strengthen HIV-related continuum of care. Increase availability of training and information materials on secondary prevention, and in particular, on family planning, specific to HIV-positive women. Involved experience NGO counselors in conducting PMTCT psychosocial support trainings.	
Gillespie	**Direction:** HIV services adding	**Objective:** A proof-of-concept study for the	**Promoting factors:** The incremental cost	**Inhibiting factors:** There was a low level	**Recommendations:** Family planning can be	**Other:** While the authors report that 4019 clients

2009	MNCH services **Setting:** VCT clinic **Format:** On-site provision of services	integration of family planning into semi-urban hospitals and health centers and to train VCT service providers in family planning.	of integrating family planning is modest. Quality of both HIV and family planning counseling improved, indicating that service integration is possible in this context.	of sexual activity among VCT clients. More than 40% of women had never had sex, and an additional 32% had not had sex during the last month. Many sexually active clients were already using contraception. Among married and other sexually active women, 70% were using contraceptives. Of women in current sexual unions, 17% had unmet contraceptive need, about half the unmet need in the general population (34%).	integrated into VCT clinics. However, policy-makers and program managers should carefully consider the characteristics and reproductive health needs of target populations when making decisions about service integration.	were interviewed before and 4027 clients were interviewed after the intervention, the outcomes in the paper (figure 1) are only among 1946 and 2027 clients respectively. Also, demographic data are only presented for female clients.
Hoffman 2008	**Direction:** Both **Setting:** FP clinic, STD clinic, and VCT center **Format:** Provider **Level:** Local	**Objective:** To estimate the effect of receiving HIV-positive test results on intentions to have future children and on contraceptive use and to assess the association between pregnancy intentions and	**Promoting factors:** Supportive reproductive counseling and easy access to FP and HIV clinical services	**Inhibiting factors:**	**Recommendations:** Each woman who tests HIV+ should receive informational counseling about the effects of pregnancy and childbirth on maternal and infant mortality and on the positive and negative social and personal	**Other:**

		pregnancy incidence among HIV-positive women in Malawi			implications of their reproductive choices. Barriers to FP services should be reduced; optimally, FP services could be integrated into HIV care. There is a need for stronger proactive partner notification systems that include couples counseling. HIV testing and counseling services should be implemented in clinical settings such as FP, antenatal, and STD clinics.	
Killam 2010	**Direction:** MNCH adding HIV services **Setting:** Public sector ANC clinics **Format:** Provider/onsite **Level:** Local/district	**Objective:** To evaluate whether providing antiretroviral therapy (ART) integrated in antenatal care (ANC) clinics results in a greater proportion of treatment-eligible women initiating ART during pregnancy compared with the existing approach of referral to ART	**Promoting factors:** *Integrated electronic patient record systems* allowed capture of comprehensive information related to ART eligibility, enrollment into care, initiation of ART and retention *Avoid inconvenience of enrolling into often crowded*	**Inhibiting factors:**	**Recommendations:** Provision of ART in ANC is feasible in resource-limited setting, although it may involve greater investment in laboratory capacity, drugs and staff. Cost and human resources involved in implementation of these strategies are areas for future	**Other:** Stepped wedge rollout of the intervention allowed a controlled evaluation, unbiased by time trends, while allowing all sites to participate in the enhanced ART in ANC intervention Although 38% of eligible pregnant women were on ART before delivery, 62% did

				ART clinics and high visit burden associated with separate ART and ANC care. *Staff may have taken more ownership and initiative* in counseling and following eligible patients when ART provision was integrated into ANC *Greater focus and interest* in providing ART to pregnant women in integrated setting		analysis, but deploying this strategy to other district clinics is recommended as essential step along the pathway to goal or eradicating pediatric HIV and promoting maternal health.	not initiate during pregnancy. Future studies will try to elucidate reasons for their not accessing ART and will target strategies to improve uptake further. Incidence of infant HIV infection or HIV-free survival not reported. However, this study identified strategies to maximize ART provision to eligible pregnant women, which is the major challenge in PMTCT. Though most women initiating therapy took it at least until their delivery, there were losses to follow-up. It is possible that by encouraging patients who feel well to initiate ART, long-term retention after delivery was reduced. On the basis of these finding, they made a programmatic

						decision to keep women in the integrated clinic until weaning at 8 months postpartum.
King 1995	**Direction:** HIV services adding MNCH services **Setting:** Project clinic **Format:** On-site provision of services	**Objective:** Since contraception is an effective way of preventing vertical transmission of HIV, this study evaluated the impact of a FP intervention among HIV+ and HIV- women.	**Promoting factors:** Information and reliable follow-up can reduce contraception attrition rate due to side effects. General information about reproductive anatomy and physiology was low in this population, resulting in the incorrect use of FP methods (including sharing birth control packets, etc.). Norplant has less of a chance of misuse.	**Inhibiting factors:** The use of dual methods to prevent HIV and pregnancy is recommended, but owing to the past failure of condoms in this population, condoms were not promoted strongly as a FP method. A gap was seen between intention to use contraceptive methods and actual use. Most women who abandoned hormonal contraceptives did so because of side effects. The decision to use FP is not always made by both partners together. The fact that women are financially dependent and culturally subordinate to men may deter them from using contraceptives.	**Recommendations:** With respect to fertility, intention to change behavior should not be used as a reliable proxy for actual behavioral change. General info about reproductive biology is needed to reduce incorrect use of FP. Knowledge of and access to Norplant may be insufficient. Education and counseling on FP side effects are needed. Additional research into video as a mode of education and the role of men in FP decision making are needed. The IUD should be considered for women who do not want birth control or Norplant. Video was an effective method of	**Other:** The decline in incident pregnancy among HIV+ women may be due to factors other than the intervention (i.e. death of a spouse, infertility, etc.). Condoms were not promoted in this intervention due to previous intervention failures.

					information transmission, but only for women who watched the video with their partners and participated in the post-video discussion.	
Kissinger 1995	**Direction:** HIV services adding MNCH services **Setting:** HIV outpatient clinic **Format:** On-site provision of services	**Objective:** Barriers to health care specific to women with HIV have been identified. Women have obstetric and gynecologic needs that require special care. If the woman has to make additional clinic visits or is not offered a private setting, she may refuse services.	**Promoting factors:** The interventions were relatively simple to implement and most were done at no additional cost to the clinic (i.e., reorganization of existing staff, changing of scheduling scheme, moving of examination rooms). The clinic's policy to reschedule visits promptly for those who miss appointments may contribute to high attendance. Success may be due to the rapport between the health care providers and the clients.	**Inhibiting factors:** NR	**Recommendations:** The implementation of this program was associated with improved attendance. It was relatively simple and cheap to implement. These interventions are applicable to other public HIV care sites. Understanding barriers to accessing care and developing strategies to address this for other segments of the HIV-infected population is important.	**Other:** Since several interventions were implemented simultaneously, the impact of each intervention individually is not known, but this could be examined in future studies.
Liambila 2009	**Direction:** MNCH services adding HIV services **Setting:**	**Objective:** To assess an intervention for increasing access to and use of HIV testing among	**Promoting factors:** The testing method seems best for those who previously had an HIV test,	**Inhibiting factors:** Although the result of an HIV test was not recorded by the observer and so	**Recommendations:** Provider-initiated VCT is feasible and acceptable in FP services, does not	**Other:** The majority of clients were using hormonal contraception, mostly injectables.

	Family planning clients at public sector hospitals, health centers and dispensaries **Format:** Provider conducts HIV test at same time or refers for on-site or off-site HIV testing **Level:** Regional	family clients through provider-initiated testing and counseling for HIV.	and would appreciate the opportunity to have a test within their FP consultation. The referral method would seem to appeal to those for whom the HIV test would be their first as it gives them the opportunity to think and discuss before proceeding with taking a test. Clinics with high FP client loads more likely to participate Integrated consultation was not more time consuming than pre-integration and was assessed as being "reasonable" Costs of offering integrated services were not higher than stand-alone services.	it is not possible to compare the median duration of counseling for positive or negative outcomes, very few clients tested positive. FP providers seem comfortable having general discussions about HIV/STIs but remain unwilling to engage their clients in a discussion of their personal sexual behavior. The inability to confirm whether FP clients given referral vouchers were actually tested limits the validity of conclusions about the effectiveness of this model.	adversely affect the quality of the FP consultation and increases access to and use of HIV testing in a population who would benefit from knowing their status.	2 integration models were proposed "referral" and "testing" One region was predominately rural and one was urban.
Ngure 2009	**Direction:** HIV services adding MNCH services	**Objective:** To evaluate a multipronged approach to promote dual	**Promoting factors:** *Training* Staff training was essential part of	**Inhibiting factors:** *Resources*	Training of counselors and staff, counseling sessions that	**Other:** HIV+ women had a higher contraceptive uptake

	Setting: Research clinics **Format:** Provider, on-site **Level:** Local	contraceptive use by women within heterosexual HIV-1 serodiscordant partnerships	intervention, as many HCP lack knowledge of effective family planning options, particularly for women with HIV. *Male partner involvement* Integration of male partners in contraceptive counseling *Higher frequency of follow-up at research clinics*		include the male partners, and provision of free contraceptive services on-site can lead to a significant increase in uptake of contraceptive methods without decreasing condom use. This integration model may be able to be adapted to HIV service delivery settings. These successful efforts promoting FP and dual contraceptive use may inform programmatic efforts to prevent unplanned pregnancies and decrease HIV-1 transmission risk among HIV-serodiscordant couples, especially given low use of both barrier and nonbarrier contraceptive services in Kenya.	compared to HIV- women, which might be related to visit frequency (monthly for HIV+ and quarterly for HIV-), pregnancy intention (greater desire to avoid unwanted pregnancies to prevent HIV transmission to child), and study staff may have focused FP messages more strongly towards HIV+ women as protocol required discontinuation of study drug for HIV+ women who became pregnant. This intervention was conducted within a clinical trial setting and this limits the generalizability of findings to other FP and HIV prevention/ care programs with fewer resources and less frequent follow-up Before the intervention in Thika, the Kisumu and Eldoret sites did not provide non

						condom methods at the research clinic, but referred women to nearby facilities; the Nairobi site offered injectables and oral contraceptives free of charge at the research clinic site These results are particularly relevant to clinical trial populations where periodic study visits permit opportunities for ongoing counseling regarding FP options.
Peck 2003	**Direction:** HIV services adding MNCH services **Setting:** VCT centre **Format:** On-site provision of services	**Objective:** Under the hypothesis that VCT and primary care have synergistic benefits, this study examined the feasibility, demand, and effect of integrating various SRH and primary care services into a stand-alone VCT clinic as a way to effectively remove barriers	**Promoting factors:** VCT attracts a population with high rates of comorbid disease in need of services for STIs, TB, and reproductive health; reciprocally, on-site services attract more people to VCT including populations that are at high risk for HIV infection.	**Inhibiting factors:** NR	**Recommendations:** Integration of SRH and HIV services is feasible and not time-consuming or complicated. Treating STIs in a high-risk population, such as those accessing VCT, may have more impact. Also, the efficacy of VCT may be improved with the addition of integrated services.	**Other:** Most outcomes are only presented in 1999 after the full integration of services; the outcomes listed here are the only ones compared across the different time periods. Also, given the long length of this study, time trends may have affected outcomes more

		to HIV counseling and testing.	The availability of integrated services is an important variable in patient risk/benefit calculations when they decide to test.			than the integration of services.
Potter 2008	**Direction:** MNCH services adding HIV services **Setting:** ANC clinics **Format:** Provider/onsite **Level:** Local/district	**Objective:** To assess whether PMTCT programs added to ANC had a positive or negative effect on a marker of good antenatal care: syphilis RPR testing and treatment for women identified as RPR positive.	**Promoting factors:**	**Inhibiting factors:**	**Recommendations:** Health policy makers in resource-limited settings, and donor country research and service implementers, should plan explicitly for how targeted programs can have a broader programmatic impact. Ways to maximize ancillary benefits while minimizing potential health system drains are warranted. Full integration of PMTCT services in ANC is desirable.	**Other:**
Rasch 2006	**Direction:** MNCH services adding HIV services **Setting:** A municipal hospital	**Objective:** All pregnant women should be offered VCT, including those who seek induced abortions and women receiving	**Promoting factors:** The willingness among single women to accept condom use indicates that it is possible to reach this group with	**Inhibiting factors:** The only factor significantly associated with HIV test acceptance in adjusted analyses was	**Recommendations:** About half of women admitted with an alleged miscarriage had had an unsafe abortion - a serious public	**Other:** Contraceptive choice apparently came *after* pre-test counseling for VCT, FP counseling and methods, and

	Format: Provider	post-abortion care. Hence there is a need to address the neglected areas of unsafe abortion and the risk of HIV infection among women experiencing such abortions. A logical way to do this would be to offer VCT as part of post-abortion care.	HIV preventative measures.	earning and income; housewives were less likely to accept HIV testing. The reason for this may be that housewives have stable partner relationships and thus do not consider HIV a problem, or they fear a number of obstacles when informing their partner about their HIV status and translating this into safer sex. Married couples may be unwilling to use a condom at every sexual intercourse, and condoms may not be the best FP method when both partners have tested HIV negative. Loss-to-follow-up is a big problem in post-abortion care.	health problem which needs to be addressed by improving reproductive health programs, including comprehensive post-abortion care. VCT should be made available and acceptable to couples. Post-abortion counseling should discuss gender and power imbalances and discourage adolescent girls in particular from being involved in unequal relationships. Reproductive health programs should discuss different HIV prevention strategies and involve men. Program managers should be aware of the problem of loss to follow-up when introducing post-abortion care and VCT services and ensure an empathetic approach.	STI/HIV counseling, but *before* learning HIV test results and post-test counseling. Low return for follow-up among women tested for HIV; this is probably the result of a combination of being tested for HIV and having post-abortion status. Initially had follow-up design but that didn't work so cross-sectional analyses were presented in this paper.

Simba 2010	**Direction:** MNCH services adding HIV services **Setting:** RCH clinics **Format:** Provider/onsite **Level:** Local/district	**Objective:** To assess whether average staff workload was higher if PMTCT services were provided in RCH clinics compared to RCH clinics that did not provide these additional services.	**Promoting factors:**	**Inhibiting factors:**	**Recommendations:** Staff productivity is an important factor that must be considered when determining the staffing gap. Efforts to resolve the human resource crisis will need to go beyond increasing numbers to improving performance and tackling the problem of staff maldistribution.	**Other:** Untrained providers seem to obscure staffing gaps giving the false impression of staff adequacy.
vander Merwe 2006	**Direction:** MNCH adding HIV **Setting:** Secondary level facility offering ANC **Format:** On site provision of services/referral **Level:** Local provider unit	**Objective:** To assess the effectiveness of interventions to increase the uptake of ART during pregnancy, specifically the effects of strengthening linkages and integrating key components of ART within ANC.	**Promoting factors:** *Inclusion of health workers from ART services within ANC* aimed to streamline transition form ANC to long-term ART services and to ensure consistent counseling and messages and necessary oversight of the program.	**Inhibiting factors:** *Presentation for care in second or third trimester of pregnancy*	**Recommendations:** Implementation of ART is important opportunity to strengthen existing health systems, including services for HIV-related prevention and cared. Additional inputs available for implementing ART may, with adequate planning, have positive impact, such as preventing HIV infection in infants.	**Other:** Several interventions occurred simultaneously, making it hard to determine the relative importance of each intervention. Additional attention and resources may be required to achieve high levels of uptake and well-functioning linkages between ART and other key entry points such as VCT, TB and STD clinics.

					To identify pregnant women who require ART, may be necessary to include CD4 cell count testing in minimum care packages for pregnant women with HIV.	Additional evidence is needed of specific practical steps necessary for establishing such linkages and reducing missed opportunities for facilitating entry into HIV-related services after HIV diagnosis Limitations in the before/after cross sectional approach and unavailable data from hospital records. Substantial number of infants have unknown HIV status (219 out of 1027 (21.3%) have no information on infant HIV diagnosis HGH hospital located 1 km from the coronation hospital

5 ANC services adding ART for eligible pregnant women

ANC Services Adding ART for Eligible Pregnant Women

Studies	**3 peer-reviewed studies (**Killam 2010**;** van der Merwe 2006**;** Gamazina 2009**).**	
Locations	**1 in South Africa.** **1 in Zambia.**	**1 in Ukraine.**
Interventions	· Two interventions integrated CD4 testing in ANC at first ANC visit with results available within 2 weeks to identify treatment eligible HIV-infected pregnant women. · One intervention trained the ANC staff to initiate ART in the ANC clinic according to same approach as in general ART clinics. The general and ANC-integrated ART clinics employed the same cadre of providers (a clinical officer, a nurse and a peer educator) and scheduled visits, lab evaluations, record systems and quality assurance systems were also similar across clinics. Nurses and clinical officers received Ministry of Health ART training. Women received ART in the ANC clinics until six weeks postpartum and then were referred to the general ART clinic. If the patient was late in gestation (34-36 weeks), ART initiation was usually recommended at enrollment visit. · One intervention brought health workers from the ART clinic to the ANC clinic weekly to conduct treatment preparation, including adherence counseling for HIV-infected pregnant women with indications for ART during their second ANC visit, and then referral to the ART clinic, staffed by the same health workers in the general ART clinic at a separate site for ART initiation and follow-up. · One intervention provided HIV testing in ANC and postnatal care, with referrals provided for HIV care and psychosocial support.	
Study Design	1 Stepped-wedge cluster randomized trial (group randomized trial). 2 Serial cross-sectional.	
Reported Outcomes	Behavioral outcomes: % of treatment eligible pregnant women enrolling on ART care before delivery, % of treatment eligible pregnant women initiating ART during pregnancy, retention rate. VCT uptake. Process outcomes: Mean gestational age of ART initiation; mean weeks of ART initiation before delivery; days from HIV diagnosis to ART initiation; days from HIV diagnosis to receiving CD4 cell count result; mean gestational age at first ANC among those initiating ART; quality of services.	
Findings	· Rigor of the three studies varied. Out of a possible 9 points, one study, using a stepped-wedge cluster randomized trial design had a rigor score of 7; the other two serial cross-sectional studies had scores of 4 and 2. · Integrated services consistently resulted in increased uptake of ART among treatment eligible pregnant women. One study showed that providing ART in the ANC clinic doubled the percentage of treatment-eligible pregnant women initiating ART during pregnancy as compared to active referral to the ART clinic (32.9% vs. 14.4%; AOR 2.01, 95% CI 1.27-3.34). Another study showed reduced time to treatment initiation (from median of 56 days to 37 days, p=.041). · Measuring CD4 counts at the first ANC visit is particularly important in reducing delays in ART initiation. This is also important as most women who initiate ART were asymptomatic. · One study showed that the integrated strategy did not affect the timeliness of ART initiation (mean gestational age of ART initiation) or 90-day retention rate; however both groups received an average of 10 weeks of ART during pregnancy.	

	· While both studies showed improvements in service delivery integrating HIV treatment in ANC, 25% to 62% of eligible pregnant women did not initiate ART during pregnancy. Further improvements in service delivery or targeted strategies may be needed to optimize uptake. Loss to follow-up was a challenge. To improve retention, follow-up in the integrated clinic will be extended through about six months postpartum. · The study examining HIV testing and referral for care in ANC and postnatal care settings found an improvement in VCT uptake and a significant improvement in the quality of care with integrated services. · The cost or impact of integration on incidence of infant HIV infection or quality of MNCHN services was not measured.

6 Effect of PMTCT integration on ANC services

Effect of PMTCT* Integration on ANC Services

(*HIV testing and short-course treatment with Nevirapine or other ART drugs to prevent vertical transmission of HIV to infants.)

Studies	**3 peer-reviewed articles (**Delvaux 2008**;** Potter 2008**;** Simba 2010**).**	
Locations	**1 in Côte d'Ivoire.** **1 in Zambia.**	**1 in Tanzania.**
Interventions	All interventions added PMTCT services to ANC and examined the effect on ANC and PMTCT services.	
Study Design	1 cross-sectional.	2 serial cross-sectional (including 1 retrospective chart review).
Reported Outcomes	Behavioral outcomes: HIV testing, Nevirapine use. Process data/outcomes: Quality of ANC care, documented RPR screening and syphilis treatment, staff workload.	
Findings	· The rigor score of these studies was low, with an average score of 1.3 and a range of 1–2 (out of 9). · One study showed that integrating PMTCT into ANC led to no change or improvements in quality of ANC care outcomes, while HIV testing and Nevirapine use both increased. · In one study, documented RPR screening improved when PMTCT and research were added to ANC; there was no change when PMTCT research alone was added, and there was a decrease after only PMTCT service was added. Documented syphilis treatment among RPR-positive-screened women did not change after PMTCT research, service or both were added to ANC. · One study showed that average staff workload was higher in clinics that provided PMTCT services compared to those that provided reproductive and child health services alone. However the significance of this difference was not reported and there was a wide range in staff workload across clinics (RCH and PMTCT services: average workload 50.5%, range: 8-147%; RCH services alone: average workload 37.8%, range: 11-82%).	

7 Child malnutrition services adding HIV testing

Child Malnutrition Services Adding HIV Testing

Studies	**1 peer-reviewed study (Bahwere 2008).**
Locations	**1 in Malawi.**
Interventions	HIV testing and counseling was offered to caregivers and children enrolled in, or recently graduated from, a community-based therapeutic care program for malnutrition. Additionally, basic medical care (vitamin A, de-worming, anemia treatment, antibiotics for bacterial infections, and malaria prophylaxis) and community nutrition rehabilitation were provided to children with severe acute malnutrition (SAM).
Study Design	Prospective and retrospective cohorts.
Reported Outcomes	Biological outcomes: % Recovered from malnutrition (prospective cohort), % Defaulted (prospective cohort), and Survival status (prospective cohort). Behavioral outcomes: VCT uptake.
Findings	· Only one cohort study was identified with a rigor score of 4 out of 9. · 59.1% of HIV-infected children in the prospective cohort recovered to a satisfactory nutritional status using program protocols, suggesting that SAM can be managed in the community for many HIV-infected children. · Although two-thirds of HIV-infected children remained adequately nourished at the 15-month follow-up, this percentage was significantly lower than the rate among HIV-negative children. Further, HIV-positive children had slower nutritional recovery than HIV-negative children. · There were high rates (94.0%) of VCT uptake among children and adult caregivers (64%) in the study.

8 Post-abortion care adding HIV testing

Post-abortion Care Adding HIV Testing

Studies	**1 peer-reviewed study (Rasch 2006).**
Locations	**1 in Tanzania (Temeke Municipal Hospital).**
Interventions	Women needing medical care for an incomplete abortion were counseled on unsafe abortions; those who underwent an illegal, unsafe abortion were provided with contraception and HIV/STI counseling and offered HIV testing. They were also offered contraceptives (injection Depo-Provera, oral contraceptives, and condoms) and asked to return for HIV testing, counseling and contraceptive services.
Study Design	Cross-sectional
Reported Outcomes	Behavioral outcomes: VCT uptake, contraceptive choice, condom use.

Findings	· Only one cross-sectional study was identified with a rigor score of 2 out of 9. · 58% of women who underwent an unsafe abortion accepted VCT when offered. · Among women who accepted VCT, 73% said they would use a condom alone or in combination with hormonal contraception after receiving contraceptive counseling. Women who accepted VCT were twice as likely to use a condom and three times as likely to use a double method (condoms as well as a hormonal method) than women who did not accept VCT. · Only 30% of HIV-infected women returned for follow-up. This may be the result of a combination of two sensitive issues of post-abortion care and HIV testing and having post-abortion status simultaneously. · Additional research is needed for additional strategies in this vulnerable population.

9 HIV treatment/secondary prevention adding FP services

HIV Treatment/Secondary Prevention Adding FP Services

Studies	**4 peer-reviewed studies (**Ngure 2009**;** Chabikuli 2009**;** Coyne 2007**;** Kissinger 1995**).**	
Locations	**1 in the United Kingdom.** **1 in the United States.**	**1 in Kenya.** **1 in Nigeria.**
Interventions	· All interventions integrated HIV treatment and FP services. · Interventions took place at health care delivery points (hospitals and HIV clinics); specifically, one study was a referral-based co-located FP-HIV integration model. · Two of the four studies added HIV services to existing MNCHN services; one intervention consisted of MNCHN services being added to an existing HIV service; and the remaining study simultaneously added HIV and MNCHN services to their package. · One study integrated male involvement as part of the routine couples counseling intervention.	
Study Design	2 non-randomized trials. 1 pre-post.	1 serial cross-sectional.
Reported Outcomes	Health outcomes: Pregnancy incidence. Behavioral outcomes: Contraceptive use (condom and non-condom) and appointment adherence. Process data/outcomes: Uptake of HIV or MNCHN services; coverage of HIV or MNCHN services; and quality of HIV or MNCHN services.	
Findings	· Out of a possible score of 9, two studies each had a rigor score of 6; one had a score of 2 and one study had a score of 1. · An overall increase in contraceptive use (both condom and non-condom methods) was reported across studies. · In a study that examined an intervention to improve MCH clinic attendance of HIV-infected women, adherence to appointments increased. This positive effect was sustained at both six- and 12-month follow-ups. · One study found that referrals to FP clinics from HIV clinics were low, but increased post-integration. · The number of pregnancies decreased in HIV-serodiscordant couples after the introduction of integrated FP-HIV services.	

	· A number of factors that promoted the success of integrated services were identified, including on-site provision of contraception; flexibility of clinic in rescheduling appointments; ease of transitioning into an integrated service delivery clinic; staff training in FP methods for HIV-infected women; male involvement; and rapport between health providers and clients. · Additional referral waiting times and user cost fees were identified as inhibiting factors.

10 HIV counseling and testing adding FP services

HIV Counseling and Testing Adding FP Services

Studies	**8 peer-reviewed articles from 7 studies (**Bradley 2009**;** Brou 2009**;** Creanga 2007**;** Gillespie 2009**;** Hoffman 2008**;** King 1995**;** Liambila 2009**;** Peck 2003**).**	
Locations	**1 in Haiti.** **2 in Ethiopia.** **1 in Côte d'Ivoire.**	**1 in Kenya.** **1 in Rwanda.** **1 in Malawi.**
Interventions	· All interventions linked HIV services with FP services. · Two interventions integrated FP services into VCT, while a third progressively implemented FP and other services into VCT. · One intervention added FP to PMTCT. · One intervention integrated provider-initiated HIV testing into FP services. · One intervention offered HIV testing to women at an FP clinic, STD clinic, and VCT center; women who were HIV-positive and not pregnant were enrolled and received HIV care and access to FP. · One intervention had community-based reproductive health agents provide FP and HIV education, FP methods (including condoms), VCT referral, and home-based care for PLHIV.	
Study Design	2 serial cross-sectional. 2 pre-post. 1 time series.	1 cross-sectional. 1 prospective cohort.
Reported Outcomes	Health outcomes: Pregnancy incidence. Behavioral outcomes: HIV testing, Nevirapine use, contraceptive method acceptance and use, condom use, dual method use. Process data/outcomes: Client volume, quality of care, provider discussion about various MNCH/HIV topics.	
Findings	· The rigor score of these studies was generally low, with an average score of 1.9 and a range of 1 to 3 (out of 9). · After FP services were added to VCT, clients were more likely to receive contraceptive counseling, obtain contraceptives, and have fewer pregnancies. · Number of HIV tests conducted increased over time with the addition of FP and other services to a VCT clinic. · After adding FP to PMTCT services, modern contraceptive use was variable across several waves of follow-up for both HIV-positive and HIV-negative women. · Adding HIV testing into FP services improved quality of care and added two to three minutes to consultation time for each client. · After HIV testing in a variety of settings, contraceptive use increased and pregnancy	

	incidence declined after HIV testing. Condom use increased from baseline to one week and three months, but then declined again at 12 months. Dual method use increased, but rates remained very low. Community-based reproductive health agents providing integrated services served the same number of clients as those not providing integrated services.

11 Study Descriptions

Table: Study Descriptions—MNCHN-FP-HIV Integration

Study	Matrix Cells	Location, Setting and Target Group	Years	Intervention	Study Design	Sample Size	Age	Gender	Length of Follow-up
Bahwere 2008	MH 21, MH 25	**Location:** Dowa District, Central Malawi **Setting:** Community-based study **Target group:** Caregivers and children who were enrolled or had recently graduated from a community-based therapeutic care (CTC) program, run by the MOH and the NGO Concern Worldwide.	**Years of program:** NR **Years of evaluation:** December 2002–May 2005	**Name:** Community-based Therapeutic Care (CTC) **Intervention:** Caregivers and children in the CTC program were offered HIV testing and counseling. Basic medical care (Vitamin A, de-worming, anemia treatment, antibiotics for bacterial infections, and malaria prophylaxis) and community nutrition rehabilitation was provided for	**Study design:** Retrospective and prospective cohorts **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Retrospective cohort n=1273 Prospective cohort n=735 Total = 2,008 (RC HIV+ n=29; PC HIV+ n=22)	**Age:** Total: <12 (14.4%); 12-<24 (41.1%); 24-<36 (28.1%); >=36 (16.4%) PC: <12 (10.5%); 12-<24 (46.1%); 24-<36 (25.9%); >=36 (17.5%) 26.5 months at admission (median: 23.0, IQR: 16.9-34.1) RC: <12 (16.8%); 12-<24 (37.9%); 24-<36 (29.5%); >=36 (15.8%)	**Gender:** **Total:** Female: 51.3% Male: 48.7% RC: 52.4% female and 47.6% male PC: 49.4% female and 50.6% male	**Follow-up:** RC: Not applicable (is retrospective) PC: Not reported

				children with severe acute malnutrition (SAM). During RC recruitment, a protection ration was given to households of admitted children. No protection ration was given during PC recruitment.			47.2 months average age at study enrollment (median: 44.3 months, IQR: 34.4-57.2)		
Bradley 2009	MH1	**Location:** Oromia region, Ethiopia **Setting:** Eight public sector voluntary counseling and testing (VCT) clinics **Target group:** VCT clients	**Years of program:** 2006–ongoing **Years of evaluation:** Pre: July–October 2006 Post: 2008	**Name:** Voluntary HIV Counseling and Testing Integrated with Contraceptive Services (VICS) study **Intervention:** Family Planning (FP) services were integrated into VCT clinics. The intervention included developing FP messages for VCT clients, training counselors,	**Study design:** Serial cross-sectional **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Pre: 4019 Post: 4027	**Age:** Mean ages in years: Pre: Women: 23.5 Men: 22.0 Post: Women: 25.6 Men: 24.5	**Gender:** Pre: Women: 1192 Men: 1187 Post: Women: 1731 Men: 1643	**Follow-up:** NA, no cohort. Post-intervention data was collected 18 months after FP services were integrated.

				ensuring contraceptive supplies in VCT facilities and monitoring services. FP messages targeted young, single and premarital clients and included basic information on FP benefits and methods. Counselors provided FP counseling, condoms and contraceptive pills during VCT sessions. Referrals were made to on-site FP nurses for clinical methods, except when VCT counselors were also trained as nurses and could provide injectables.					
Brou	MH1, MH2	**Location**: Abidjan, Cote d'Ivoire	**Years of program:** 2001–200	**Name:** Ditrame Plus	**Study design:** Time series	**Sample size:** Baseline	**Age:** Overall median age:	**Gender:** 100% female	**Follow-up:** 24 months

2009		**Setting:** PMTCT clinics **Target group:** Women attending PMTCT clinics	5 **Years of evaluation** March 2001; June 2003–2005	**Intervention:** Women presenting at PMTCT clinics were given an HIV test. Both HIV+ and HIV- women were offered post-test and post-partum family planning during follow-up visits. In addition, all women were offered information on condom use and sexually transmitted infections (STIs) including HIV/AIDS. After childbirth, they received free access to modern contraceptive methods (injectable contraceptives, contraceptive pills and condoms) beginning in the first post-partum month.	**Unit of analysis:** Individual **Selection of participants:** Non-random	: N=980	26 years (IQR: 22–30 years)			

Chabikuli 2009	MH1, MH2,MH3, MH4	**Location:** Nigeria **Setting:** Four tertiary hospitals; 60 secondary hospitals; seven primary health care clinics **Target group:** FP clinic clients and HIV clinic clients	**Years of program:** 2007–present **Years of evaluation:** March 2007–January 2009	**Name:** Global HIV/AIDS Initiative Nigeria (GHAIN) **Intervention:** The intervention focused on strengthening the skills of providers; supporting them on the job; formalizing referrals between FP and HIV clinics; and strengthening M&E by adding HIV data elements in the FP register and streamlining data flow from facility to the state and federal levels. Each FP clinic received a packet of four job aids. Clients at HIV clinics were routinely counseled on FP methods and given a	**Study design:** Before-after study **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Pre-intervention: 44,589 Post-interventio n: 28,360 (FP clinics) Post-interventio n: 28,891 (HIV clinics)	**Age:** Results presented for two age groups - <15 years and >=15 years but the number was not reported	**Gender:** Not reported for entire pre/post group but for different models: Non-referred group: 97.0% females, 3.0% males Referred from HCT clinic: 76.2% females, 23.8% males Referred from ART clinic: 81.7% males Referred from PMTCT clinics: 100% female	**Follow-up:** Post-intervention was 9 months later

				referral letter if desired. At the FP clinics, clients received further counseling and assessment before an appropriate contraceptive method was dispensed. They were also counseled on HIV and given a referral letter to HCT if desired.					
Coyne 2007	MH4	**Location:** Slough, United Kingdom **Setting:** HIV clinic **Target group:** HIV-positive women	**Years of program:** 2002–present **Years of evaluation:** 2002 and 2005	**Name:** FP Plus Clinic **Intervention:** The Garden Clinic, for HIV+ women, started a specific clinic (FP Plus) to provide HIV+ women with screening for STIs, contraception, pre-conception	**Study design:** Serial cross-sectional **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Total: 60 women Time 1: 30 women Time 2: 30 women	**Age:** Time 1: NR Time 2: 28 of 30 women (93%) were aged 18-44	**Gender:** 100% female	**Follow-up:** N/A (serial cross-sectional)

				counseling and cervical cytology. The Garden Clinic already worked on a model of integrated sexual health care, and FP Plus is staffed by doctors and senior nurses trained in both STI management and FP.					
Creanga 2007	MH1, MH4	**Location:** Amhara and Oromiya regions, Ethiopia **Setting:** Community **Target group:** Community-based reproductive health agents	**Years of program:** NR **Years of evaluation:** April–May 2005	**Name:** NR **Intervention:** Community-based reproductive health agents (CBRHAs) provide FP education and methods (including condom distribution); HIV education; referral to VCT; and home-based care for PLHIV. CBRHAs provide health	**Study design:** Cross-sectional **Unit of analysis:** Individual unit of analysis; providers, not clients, used as unit of analysis. **Selection of participants:** Non-random	**Sample size:** Total: 340 CBPRHAs I (integrated services): 162 C (not integrated services): 178	**Age:** Distribution: 18–30: 144 (42.4%) 31–35: 93 (27.4%) >35: 103 (30.3%)	**Gender:** Male: 130 (38.2%) Female: 210 (61.8%)	**Follow-up:** N/A (cross-sectional)

				outreach services to households, often in rural areas, on a voluntary basis, though it is common for them to receive non-monetary incentives, such as uniforms, supplies and travel reimbursement.					
Delvaux 2008	MH 5, MH 6, MH 13	**Location:** Abidjan and San Pedro, Cote d'Ivoire **Setting:** One regional hospital and four health centers, all publicly funded, that provided antenatal care and deliveries **Target group:** Pregnant women attending antenatal and delivery clinics	**Years of program:** PMTCT program began first semester 2004: January in San Pedro and May in Abidjan **Years of evaluation:** Baseline: July 2002–May 2003; Follow-up: second semester 2005	**Name:** National Programme and Projet Retro-CI **Intervention:** Implementation of PMTCT in ANC and delivery facilities, including renovating or constructing buildings, supplying equipment and training health staff. Training consisted of a theoretical (3 days) and	**Study design:** Serial cross-sectional study **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Women ANC: Before: N=606 After: N=591 Delivery: Before N=229 After N=231 Providers: Before: N=102 After: N=99	**Age:** Average age of antenatal consultations: 25 years. Average age of delivery care after PMTCT was older than those before: 26 vs. 24 years, P=.02.	**Gender:** Consultations: 100% female Health facility staff: NR	**Follow-up:** Not applicable (not a cohort)

				on-site (6 weeks) component, followed by frequent supervision visits. Theoretical training was provided to 63 health care workers, including all maternity care services staff. Training covered strategies to prevent MTCT, individual and group counseling techniques, safe obstetric practices, prevention of blood transmission of HIV, care of neonates and HIV+ women; it also included psychosocial support and frequent supervision visits. On-site training consisted of						

				day-to-day assistance, feedback and support by experienced PMTCT staff, mainly during ANC and in the laboratory.					
Gamazina 2009	MH 5, MH 7, MH 13, MH 15, MH 16, MH 17	**Location:** Mykolayiv and Sevastopol, Ukraine **Setting:** Antenatal clinics **Target group:** Women attending antenatal clinics	**Years of program:** Oct 2004–Sept 2007 **Years of evaluation** Oct 2004–Sep 2007	**Name:** N/A **Intervention:** Two interventions were developed: 1. Provider trainings Trained midwives and OB-GYNs to provide interactive, high-quality and comprehensive counseling, including HIV-related pre- and post-counseling sessions and appropriate referrals. 2. IEC materials	**Study design:** Serial cross-sectional **Unit of analysis:** Individual **Selection of participants:** Non-randomized	**Sample size:** Providers (EL only): Total=69 I=37 C=32 Clients (BL): Total=65 I=35 C=30 Clients (EL): Total=69 I=37 C=32	**Age:** NR	**Gender:** 100% female	**Follow-up:** 1–7 months later

				and peer support programs Engaged local NGOs in activities to improve the quality of VCT services for pregnant women by developing behavior change IEC materials and a referral system to NGO-based peer support programs.					
Gillespie 2009	MH1	**Location:** Oromia region, Ethiopia **Setting:** VCT clinics **Target group:** VCT clients	**Years of program:** 2006–present **Years of evaluation:** Before: 2006 After:18 months later	**Name:** Voluntary HIV Counseling and Testing Integrated with Contraceptive Services **Intervention:** VCT counselors were authorized to counsel clients on FP and to offer condoms and contraceptive pills during VCT	**Study design:** Serial cross-sectional **Unit of analysis:** Individual (clients) **Selection of participants:** Non-random	**Sample size:** Total: 8046 Before: 4019 After: 4027	**Age:** Reported for women only Average age: 22 years 15–24 years: 74.4%	**Gender:** NR	**Follow-up:** N/A (serial cross-sectional)

				sessions. Nurse counselors were also authorized to provide injectable contraceptives. Pathfinder provided a full-range of contraceptive supplies to both VCT and family planning units in all eight facilities. Monthly monitoring visits helped to ensure contraceptive availability within the facilities and resolve problems faced by the VCT counselors. VCT providers' logbooks were modified to facilitate collection of information about FP counseling and services, and these data were						

				routinely assessed by Pathfinder, in addition to contraceptive stocks.					
Hoffman2008	MH 1, MH3	**Location**: Lilongwe, Malawi **Setting:** FP clinic, STD clinic, and VCT center **Target group:** HIV+ women	**Years of program:** NR; presumably same as evaluation **Years of evaluation:** December 2003; January 2005 – 2004/2006	**Name:** **Intervention:** Women at an FP clinic, STD clinic, and VCT center were offered HIV testing; women who were HIV+ and not pregnant were enrolled and received HIV care and access to FP.	**Study design:** Prospective cohort **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Baseline: N=227 12 months N=200	**Age:** Overall median age: 26 years (IQR: 23–30 years)	**Gender:** 100% female	**Follow-up:** 12 months
Killam2010	MH7	**Location**: Lusaka district, Zambia **Setting:** Public sector district ANC clinics **Target group:** Women initiating ANC and found eligible for ART	**Years of program:** October 2007–May 2008 **Years of evaluation** July 2007 and July 2008 (?)	**Name:** **Intervention:** If the patient's CD4 cell count < 250 cells/ul, she was enrolled into ART care on the day she received the CD4 results. Standard written protocols and a team approach were used.	**Study design:** Stepped-wedge cluster randomized trial (group randomized trial) **Unit of analysis:** Individual **Selection of participants:** Non-random All eligible	**Sample size:** N=13,917 referral to ART (control cohort) M=17,619 integrated ART in ANC (intervention cohort) Treatme	**Age:** Mean age in years (SD): Control: 27.3 (5.3) Intervention: 27.5 (5.2) P=.38	**Gender:** 100% female	**Follow-up:** First 90 days of treatment

				During the enrollment visit, a clinical officer performed a detailed history and physical, WHO staging, and treatment of OIs; a nurse midwife provided health education and ANC services; a peer educator provided counseling on ART drugs, including need for lifelong adherence. At enrollment, patients started on CTX prophylaxis, multivitamins and iron, and they were asked to return in two weeks for ART initiation. If patient was late in gestation (34 to 36	women were included in record review **Data collection:** through electronic medical records systems used in public sector	nt eligible patients N=716 (control) N=846 (interve ntion)			

				weeks), ART initiation was usually recommended at enrollment visit. If CD4 >250, referral to general ART clinic for care was made. Both the general and ANC-integrated ART clinics used the same schedule of visits, lab evaluations, record systems and QA systems. They were staffed by the same cadres of providers: a clinical officer, a nurse, and a peer educator. Nurses and clinical officers staffing both the general and integrated ANC clinic received ministry-approved ART training.					

				Active follow-up with patients occurred. Women received ART in the ANC clinics until six weeks postpartum, and then were referred to the general ART clinic. At six weeks postpartum, infant CTX prophylaxis and testing for HIV DNA were recommend ed. **Compariso n or standard of care:** Women found to be HIV+ through ANC testing had CD4 cell count routinely sent. Post-test counseling stresses the importance of returning for CD4 results within two weeks						

				and the benefits of ART when the patient is eligible. Those with advanced HIV, based on the WHO symptom screen and those with CD4<350 cells/ul are referred urgently to the ART clinics, located on the same premises as ANC but physically separate and separately staffed. Local peer educators provide additional education and support to women who qualify for ART and escort them to the ART clinic. Those who do not meet criteria for ART are provided with ARV prophylaxis for PMTCT and a						

				non-urgent appointment at an ART clinic for long-term care and follow-up.					
King 1995	MH 1, MH4	**Location:** Kigali, Rwanda **Setting:** Project clinic **Target group:** Women attending pediatric and prenatal clinics	**Years of program:** Began 1992 **Years of evaluation:** Baseline: September 1992– May 1993 Follow-up: NR	**Name:** Project San Francisco **Intervention:** Women who had received VCT were shown a 15-minute educational video on contraceptive methods, followed by a group discussion to ensure understanding of the information presented. Oral contraceptive pills, injectable progestin, and Norplant were then provided, free of charge, to women who chose to enroll in the FP program.	**Study design:** Pre-post **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Total: 502 Potential new contraceptive users (i.e. not already users): 408 Follow-up: 502	**Age:** Range: 20–44 Distribution: 20–24: 22 25–29: 144 30–34: 184 35–39: 129 40–44: 23	**Gender:** 100% female	**Follow-up:** Mean FU for FP use: 5.4 months, incident pregnancy: 12 months

Kissinger 1995	MH 7, MH 23	**Location:** New Orleans, Louisiana, USA **Setting:** HIV outpatient clinic **Target group:** HIV+ women attending an HIV outpatient clinic	**Years of program:** January 1991– present **Years of evaluation:** June 1991 – Dec. 1992	**Name:** The HIV Outpatient Program (HOP) at the Medical Centre of Louisiana in New Orleans (MCLNO) **Intervention:** A maternal-child program was started within an HIV outpatient program and comprehensive primary care centre. To improve clinic attendance among women, the following interventions were implemented: (1) A separate area in the clinic with private waiting and examination rooms that were oriented toward mothers and children; (2) an increase in the	**Study design:** Non-randomized trial – individual **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Total: 700 I (Women): 143 C (Men): 557	**Age:** Percent less than 22 years of age: Total: 7% I: 22% C: 4%	**Gender:** 80% male, 20% female	**Follow-up:** 12 months

				number of female health providers; (3) on-site child care services free of charge; (4) coordination of transportation services; (5) combined pediatric and maternal clinics, merging scheduled visits for mothers and children; (6) daily availability of health care providers for urgent visits; and (7) on-site colposcopy and gynecologic services within the primary care clinic.					
Liambila 2009	MH1	**Location:** Central Province, Kenya **Setting:** Family planning clients at	**Years of program:** 2005–2007 **Years of evaluation:** May 2006–February 2007	**Name:** NR **Intervention:** All FP providers were trained in an algorithm that	**Study design:** Before-after study **Unit of analysis:** Individual	**Sample size:** Pre-intervention: 538 Post-interventio	**Age:** NR	**Gender:** 100% female	**Follow-up:** 10 months

		public sector hospitals, health centers and dispensaries **Target group:** Family planning clients		integrates HIV/STI prevention counseling, including HIV VCT with FP counseling. Clients who chose to be tested were either referred or tested during the consultation by a trained FP provider.	**Selection of participants:** Randomly selected participants	n: 520			
Ngure 2009	MH 1, MH 2, MH 3, MH4	**Location:** Intervention: Thika Control: Eldoret, Kisumu and Nairobi All in Kenya **Setting:** Research clinics conducting the Partners in Prevention HSV/HIV transmission study- HIV prevention clinical trial setting **Target group:** HIV-1	**Years of program:** Began in June 2007 Dec 2004–May 2007, enrollment into prevention trial **Years of evaluation** I: Before: June 2006 –May 2007 I: After: June 2007–September 2008 C: Before: December 2004–May 2007	**Name:** Partners in Prevention HSV/HIV Transmission Study **Intervention:** 1. Training of clinical and counseling staff on contraceptive methods, including practical demonstrations and discussions of common myths and barriers to use. 2. Provision of free contraceptive methods	**Study design:** Non-randomized trial-group **Unit of analysis:** Individual clinic visits by female study participants **Selection of participants:** Non-random	**Sample size:** **Thika:** HIV-1 sero-discordant couples: 213 HIV-1 sero-positive women: 159 “Before” visits: 372 “After” visits: 751 HIV-1 sero-negative women: 54 “Before”	**Age:** **Thika:** Median age: HIV+ : 30.2 yrs (IQR:26.3–34.0) HIV- : 30.9 yrs (IQR 26–37.7) HIV+ 18–24: 18.2% 25–34: 60.1% 35–44: 16.9% 45+: 4.7% HIV- 18–24: 20.4% 25–34: 50.0% 35–44: 24.1% 45+ 5.6% **Eldoret, Kisumu and Nairobi** Median age:	**Gender:** 100% Female	**Follow-up:** **Thika:** Median duration of follow-up: HIV+: 18 months; (IQR 15-24) HIV-: 18 months; (IQR 18-24) **Eldoret, Kisumu and Nairobi:** Median follow-up: 24 months for both HIV+ and HIV- women, reflecting that Thika site was the last site to

		sero-discordant couples	C: After: June 2007–September 2008	(oral contraceptive pills (OCP), injectables, implants and IUDs to study participants. (From June 2006 to May 2007, the Thika site offered injectable depot and OCP free at the research clinic, whereas other methods were offered by referral.) 3. Use of contraceptive appointment cards with clear renewal dates for time-dependent methods (e.g., injectable depot) to avoid lapses in hormonal contraception. 4. Designation of one staff member to ensure staff received		visits: 119 “After” visits: 261 **Eldoret, Kisumu and Nairobi** 1216 couples HIV-1 sero-positive women: 832 HIV-1 sero-negative women: 384	HIV-1 sero-positive women: 28.2 yrs (IQR 24-33); p=0.002 compared with the Thika site.		initiate the study.

				ongoing training in contraceptive counseling and sufficient contraceptive supplies were available on-site. 5. Introduction of check lists in chart notes to remind staff to discuss and provide contraceptive methods during study visits. 6. Weekly meetings with clinicians, counselors and pharmacy staff to share experiences discussing contraception with participants. 7. Discussion of challenges to contraceptive uptake with study couples individually and in						

				psychosocial support groups. Insights were reported back to study team to strengthen contraceptive messages. 8. Involvement of male partners during contraceptive counseling sessions during routine study visits. 9. Review of unintended pregnancies among HIV-1 + women to identify reasons why these pregnancies were not avoided					
Peck 2003	MH 1, MH 3, MH 5, MH 21, MH 7, MH	**Location:** Port au Prince, Haiti **Setting:** VCT centre **Target group:** General population	**Years of program:** 1985–present; SRH services integrated 1991–99 **Years of evaluation:**	**Name:** GHESKIO (Groupe Haitien d'Etude du Sarcome de Kaposi et des Infections Opportunistes)	**Study design:** Serial cross-sectional **Unit of analysis:** Individual	**Sample size:** Number tested for HIV: Total: 13,749 1985: 142 1988:	**Age:** Percent adolescents (aged 13–19 years): 1985: 0% 1988: 1% 1995: 7% 1999: 9%	**Gender:** Percent female: 1985: 27% 1988: 36% 1995: 58%	**Follow-up:** NA (serial cross-sectional)

	23, MH 27		1985, 1988, 1995, and 1999	**Intervention:** Progressive integration of primary care services into VCT. GHESKIO HIV counseling and testing centre opened in 1985; this centre also provided HIV care through on-site adult and pediatric clinics. In 1989, TB services were added. In 1991, STI management was added. In 1993, FP services and nutritional support for families affected by HIV were added. In 1999, prenatal services for HIV+ pregnant women (including PMTCT), post-rape services (including counseling,	**Selection of participants:** Non-random	209 1995: 5,223 1999: 8,175		1999: 62%	

				EC and PEP), and PEP for health care workers accidentally exposed to HIV were all added. HIV+ mothers were placed on long-term HAART when they developed WHO Stage 4 or CD4<200.					
Potter 2008	MH5, MH6	**Location**: Lusaka, Zambia **Setting:** ANC clinics **Target group:** Pregnant women	**Years of program:** PMTCT introduced 2000–2003; ongoing **Years of evaluation** 1997–2004	**Name: Intervention:** PMTCT-related research studies and service programs—including universal counseling and voluntary HIV testing with same-day test results and single-dose nevirapine for HIV+ pregnant women and their infants—were introduced into antenatal	**Study design:** Serial cross-sectional (retrospective chart review) **Unit of analysis:** Individual **Selection of participants:** Non-random (but systematic)	**Sample size:** 5801 visits to 22 ANC clinics	**Age:** NR	**Gender:** 100% female	**Follow-up:** NA (serial cross-sectional)

				care clinics, where RPR testing for syphilis was routine.					
Rasch2006	MH1, MH9	**Location:** Dar es Salaam, United Republic of Tanzania **Setting:** A municipal hospital **Target group:** Women presenting after an unsafe (illegally induced) abortion	**Years of program:** NR **Years of evaluation:** January 2001–July 2002	**Name:** Temeke Municipal Hospital **Intervention:** Women who presented an incomplete abortion at a municipal hospital were approached and interviewed using an empathetic approach. Women who revealed having had an illegal abortion were characterized as having an unsafe abortion. Women were offered HIV testing, contraceptive counseling and services and counseling for STIs/HIV. Follow-up	**Study design:** Cross-sectional **Unit of analysis:** Individual **Selection of participants:** Non-random	**Sample size:** Total: 706 I: 407 C: 299	**Age:** Range: <19: 153 (21.7%) 20–24: 236 (33.4%) 25–30: 175 (24.8%) 30+: 142 (20.1%)	**Gender:** 100% female	**Follow-up:** N/A

				counseling and contraceptive service were provided. Promotion of condoms and double protection was included.					
Simba2010	MH5, MH6	**Location**: Dar es Salaam, Kilimajaro, Mwanza, Mbeya and Kagera regions; Tanzania **Setting:** Reproductive and child health (RCH) services **Target group:** Pregnant women	**Years of program:** PMTCT introduced 2002–2004; ongoing **Years of evaluation** 2004	**Name:** **Intervention:** RCH services added PMTCT.	**Study design:** Cross-sectional **Unit of analysis:** Staff workload per year by clinic **Selection of participants** Non-random selection of clinics; all providers sampled within each selected clinic	**Sample size:** 60 health facilities 43 offered integrated RCH-PMTCT services; 17 offered RCH services only.	**Age:** NR	**Gender:** NR	**Follow-up:** NA (cross-sectional)
vanderMerwe2	MH7	**Location:** Gauteng Province, South Africa **Setting:** ANC at secondary public health facility	**Years of program:** June 2004–July 2005 **Years of evaluation** Before: June	**Name:** **Intervention:** 1. Health workers from ART clinic at Helen Joseph Hospital (a	**Study design:** Serial cross-sectional **Unit of analysis:** Individual	**Sample size:** Women-infant pairs received sd-NVP: 863	**Age:** Mean Age 1d Sd-NVP prophylaxis: 28.4 yrs (SD 5.3) Compared to those	**Gender:** 100% female	**Follow-up:** NA

006		providing pediatric and OB/GYN services; Coronation Women and Children Hospital **Target group:** HIV-infected pregnant women	1, 2004–January 13, 2005 After: January 15, 2005–July 15, 2005 Audit was conducted in January 2005 among women attending during six week period; December 1, 2005–January 13, 2005. Intervention regarding changes in service delivery began January 15, 2005.	public ART site) attended a weekly clinic for HIV+ pregnant women at Coronation Hospital. 2. CD4 counts performed at first ANC visit for women with HIV (not clear if this was done before). 3. Two weeks later during second ANC visit, women receive CD4 cell count results; those with <250/ul have baseline lab tests for ART initiation. 4. For women with indications for ART, adherence counseling and treatment preparation occur during their second ANC visit. Women are then referred	**Selection of participants:** Non-random	Women initiated treatment during pregnancy: 164 After intervention initiated: N=132 Before intervention: N=32	initiating ART, p=.005 Initiating ART Before: 29.4 yrs (SD=4.7) After 29.7 yrs (SD 5.0), p=NS			

				to HJH for initiation and follow-up of ART, provided by same staff members who began treatment preparation. 5. Ongoing monitoring systems assess uptake and time between HIV diagnosis and initiation of ART.					

Table. Study Outcomes—MNCHN-FP-HIV Integration

Study	**Reported Outcomes and Results (I=Intervention; C=Comparison; NS=Non-significant p>0.05; Sig=Significant p<0.05; NR=Not reported; BL=Baseline; EL=Endline; FU=Follow-up)**	**Summary of Outcomes**
Bahwere 2008 **Intervention description** HIV testing and counseling provided to caregivers and children enrolled in a community-based therapeutic care program for malnutrition. **Study design** Retrospective and prospective cohorts	Biological Outcomes **1. HIV-positive** 22/735 (2.9%) prospective cohort vs. 29/1273 (2.3%) retrospective cohort (p=0.45) **2. Recovered (defined as achieving discharge for appropriate weight for height)—prospective cohort** HIV-positive children 13/22 (59.1%) vs. 523/627 (83.4%) (p=0.002, SIG) **3. Defaulted—prospective cohort** HIV-positive children 5/22 (22.7%) vs. 89/627 (14.2%) (p<0.001, SIG) **4. Died—prospective cohort**	59.1% of HIV-positive children in the prospective cohort recovered to a satisfactory nutritional status using CTC protocols, suggesting that SAM can be managed in the community for many HIV-infected children. Although two-thirds of HIV-positive children remained adequately nourished at 15-months FU, this was significantly lower than the rate among HIV-negative children. HIV-positive children had slower nutritional recovery than HIV-negative children. There were high rates of VCT uptake in the study among children and adult

	HIV-positive children 4/22 (18.2%) vs. 11/627 (1.8%) (p<0.001, SIG) **5. Median weight gain—prospective cohort** HIV-positive children 20/22 (2.8 g/kg/day, IQR 1.3-3.9) vs. HIV-negative children 614/627 (4.7 g/kg/day, IQR 2.9-6.7) (p<0.007, SIG) **6. Median MUAC change—prospective cohort** HIV-positive children 9/22 (0.11 mm/day (-0.03-0.31)) vs. HIV-negative children 361/627 (0.21 mm/day [0.05-0.39] [p=0.223, NS]) **7. Median LoS—prospective cohort** HIV-positive children 20/22 (56 days (36-68 IQR) vs. HIV-negative children 622/627 (42 days [28-63 IQR] [p=0.25, NS]) **8. Median weight gain—retrospective cohort** HIV-positive children 24/29 (2.2 g/kg/day, IQR 1.6-4.0) vs. HIV-negative children 880/1244 (3.1 g/kg/day, IQR 1.1-5.9) (p=0.309, NS) **9. Median MUAC change—retrospective cohort** HIV-positive children 11/29 (0.22 mm/day [0.01-0.45 IQR]) vs. HIV-negative children 476/1244 (0.25 mm/day [0.03-48] [p=0.891, NS]) **10.Median LoS—prospective cohort** HIV-positive children 25/29 (63 days (42-128 IQR) vs. HIV-negative children 912/1244 (42 days [28.67 IQR] [p=0.002, SIG]) **11. Malnutrition rate—retrospective cohort** HIV-positive children 10/28 (35.7%) vs. HIV-negative children 22/1094 (2.0%) (p=0.001, SIG)	caregivers.

	Behavioral Outcomes **1. VCT uptake** Total: 94.0% PC: 97.1% RC: 92.2% (Sig NR)	
Bradley 2009 **Intervention description** FP services were integrated into VCT clinics. **Study design** Serial cross-sectional	Behavioral Outcomes Client obtained a contraceptive method during VCT Women: Before: 0.1%; After: 6.5%; Before vs. After sig (P<0.01) Men: Before: 0.8%; After: 6.0%; Before vs. After sig (P<0.01) Process Outcomes/Output Client received contraceptive counseling during VCT Women: Before: 1.6%; After: 40.6%; Before vs. After sig (P<0.01) Men: Before: 3.0%; After: 28.5%; Before vs. After sig (P<0.01) Other reported outcomes (not coded): Client intent to use condoms during the two months post-intervention	After integration, nearly 41% of women and 29% of men received contraceptive counseling compared with 2% and 3%, respectively, before intervention. Contraceptive uptake increased from less than 1% to about 6% among both men and women. This change was statistically significant, though modest given the substantial improvement in the provision of contraceptive counseling.
Brou 2009 **Intervention description** Family planning provided to pregnant women presenting for PMTCT. **Study design** Time series	Biological Outcomes Behavioral Outcomes **Percentage of women using modern contraception (condom, pills, IUDs, injectables) during follow-up:** HIV-positive % (n) HIV-negative % (n) Sig/NS [p-value] Baseline (any use two years prior to pregnancy) 46% (546) 51% (393) **Sig** [p=0.004] Months follow-up 3 41% (523) 26% (384) **Sig [p<0.001]** 6 63% (519) 65% (380) NS 12 65% (487) 75% (364) **Sig [p=0.002]** 18 61% (448) 73% (353) **Sig [p<0.001]** 24 52% (419)	Modern contraceptive use was variable from baseline across several waves of follow-up for both HIV-positive and HIV-negative women.

	67% (332) **Sig [p<0.001]** **Note: All statistical tests are comparing HIV-positive to HIV-negative women at each time period. There are no tests of significance comparing HIV-positive women's contraceptive use from baseline to follow-up.* Knowledge Outcomes Process Outcomes/Output Other	
Chabikuli 2009 **Intervention description** FP integrated into HIV clinics and HIV integrated in to FP clinics in Nigeria. **Study design** Before-after	Process Outcomes/Output **1. Mean attendance at FP clinics** Pre-intervention 16,229 (monthly mean 67.6) vs. post-intervention 28,360 (monthly mean 87.0) (p<0.0001) **2. Proportion of FP attendees referred from HIV clinics** Month 1 14.1% vs. Month 9 27.4% (Sig NR) **3. Service ratios for referrals from HIV counseling and testing clinics to FP clinics** Increased by 4 between month 1 and month 9 **4. Service ratios for referrals from ART clinics to FP clinics** Increased by 34 between month 1 and month 9 **5. Service ratios for referrals from PMTCT clinics to FP clinics** Increased by 42 between month 1 and month 9 **6. Service ratios for referrals from PMTCT clinics to FP clinics from hospitals** Month 1 0.02 vs. Month 5 0.02 (Sig NR) **7. Service ratios for referrals from PMTCT clinics to FP clinics from PHC** Month 1 0.10 vs. Month 5 0.25 (Sig NR)	Mean attendance at FP clinics increased significantly from 67.6 (pre-integration) to 87.0 (post-integration). Service ratio of referrals from each of the HIV clinics was low but increase in the post-integration period. Service ratios were higher in PHC settings than in hospital settings. Attendance by men at FP clinics was significantly higher among clients referred from HIV clinics.

	8. Service ratios for referrals from HCT clinics to FP clinics from hospitals Month 1 0.02 vs. Month 5 0.01 (Sig NR) **9. Service ratios for referrals from HCT clinics to FP clinics from PHC** Month 1 0.09 vs. Month 5 0.25 (Sig NR) **10. Attendance at FP clinic by type and gender** Females: Nonreferred 22,519 (97.0%) vs. referred from HCT clinic 1,739 (76.2%) vs. referred from ART clinic 322 (81.7%) (Sig NR) Males: Nonreferred 697 (3.0%) vs. referred from HCT clinic 542 (23.8%) vs. referred from ART clinic 72 (18.3%) (Sig NR) **11. Couple-years of protection (monthly mean)** Before: 32.3, After: 38.2, Before vs. After sig (p=0.0090)	
Coyne 2007 **Intervention description** FP Plus clinic started to provide STI screening, FP, pre-conception counseling, and cervical cytology to HIV-positive women. **Study design** Serial cross-sectional	Behavioral Outcomes **1. Using condom only as contraception** Before: 30%; After: 7%; Before vs. After: NR Process Outcomes/Output **1. Cervical cytology in 12 months** Before: 63%; After: 83%; Before vs. After: NR **2. Method of contraception recorded** Before: 63%; After: 77%; Before vs. After: NR **3. Sexual history recorded in four weeks** Before: 77%; After: 97%; Before vs. After: NR **4. STI screen offered in six months**	Improvement on all process outcomes: cervical cytology, recording of method of contraception, recording of sexual history, and offering of STI screens. The one behavioral outcome— use of condoms only as contraception—declined. However, the authors interpret this positively as a better provision of more reliable contraceptives.

	Before: 70%; After: 83%;: Before vs. After NR	
Creanga 2007 **Intervention description** Community-based reproductive health agents provided FP and HIV education, FP methods (including condoms), VCT referral, and home-based care for PLHIV. **Study design** Cross-sectional	Process Outcomes/Output **1. High client volume** Log-likelihood*=-382.649; Wald χ^2 (46)=116.15; ρ=0.020; likelihood-ratio test of ρ=0 (p=0.846, NS) *Both models adjusted for the same demographic, personality-related, and work-related variables listed in Tables 2 and 3	Likelihood ratio test shows that providing integrated services does not increase the likelihood of serving more clients.
Delvaux 2008 **Intervention description** Implementation of PMTCT (including HIV testing) in ANC and delivery facilities **Study design** Serial cross-sectional	Behavioral Outcomes **HIV testing (new antenatal care users tested for HIV; from routine clinic data)** Before: (assumed) 0%; After: 42% (range across health facilities: 27–56%); Before vs. After: NR **Nevirapine use (among mothers testing positive for HIV)** Before: (assumed) 0%; After: 83% of mothers; 78% of infants; Before vs. After: NR Process Outcomes/Output **HIV testing offered** Before: 0%; After: 63% (range across health facilities: 42-81%); Before vs. After: NR **Quality of antenatal care (Table 1)** Before PMTCT (N = 606) After PMTCT (N = 591) **Quality of antenatal care—summary score (25 variables) (Table 3)** Multiple linear regression coefficient for study period across clinics (main effect): 3.7, p<0.001 **Sig** CHR San Pedro 3.3 <0.001 2.5 <0.001 Maternite´ Bardot 3.5 <0.001 1.6 0.005 PMI Bardot 2.1 <0.001 – – FSU Jean Delafosse 3.7 <0.001 4.3 <0.001	Offer and uptake of HIV testing was not done before the intervention and increased to relatively high rates (63% and 42% respectively) after the intervention. Most women who tested HIV positive were offered nevirapine after the intervention. Numerous measures were used for quality of services. For both antenatal care and delivery care, the overall quality summary scores increased following the intervention. For antenatal care, all measures of interpersonal communication and confidentiality improved or remained stable following the intervention.

CSU Koumassi 5.7 <0.001 2.4 <0.001

Interpersonal communication

Respectful greeting: Before: 44% (range: 8–59%); After: 70% (range: 25–91%); Before vs. After: p<0.001

Invitation to sit: Before: 69% (range: 38–97%); After: 93% (range: 76–99%); Before vs. After: p<0.001

Language of communication understood: Before: 98% (range: 96–100%); After: 97% (range: 97–100%); Before vs. After: p=0.155

Sr: 13–70%); Before vs. After: p <0.001

Confidentiality/intimacy

Absence of another patient while asking questions: Before: 63% (range: 28–98%); After: 81% (range: 43–99%); Before vs. After: p<0.001

Only provider and patient are present during examination: Before: 98% (range: 97–100%); After: 100% (range: 98–100%); Before vs. After: p=0.035

Individual counseling

Nutrition during pregnancy: 1 1–3 35 29–44 <0.001

Family planning: 3 0–8 28 22–41 <0.001

Prevention of sexually transmitted diseases: 7 0–33 36 28–51 <0.001

IEC group sessions

Received IEC session that day: 20 No IEC–47 42 24–63 <0.001

Among those who received IEC:

Prevention of STI/HIV–HIV test mentioned: 39 0–45 75 53–93 <0.001

Nutrition was addressed: 2 0–13 15 7–24 <0.001

Family planning was addressed: 30 0–27 10 4–9 <0.001

Infection prevention

Wash hands before or after examination: 3 0–12 11 0–37 <0.001

Wear gloves for examination: 100 –

100 – –
Medical interview at first antenatal visit
Previous pregnancies: 44 15–63 58 34–78 0.028
History of Caesarean section: 35 15–52 55 34–73 <0.001
Last menstrual period: 38 5–88 55 15–90 0.002
Age of pregnancy estimated: 76 46–100 81 64–98 0.302
Clinical examination at antenatal visit
Check blood pressure: 82 32–100 76 25–97 0.019
Vaginal examination: 99.5 98–100 99 97–100 0.49
Check uterine height: 95 90–99 98 94–100 0.01
Check fetal heart rate: 67 61–75 79 63–89 <0.001
Check fetal position: 67 61–74 81 66–93 <0.001
Quality of delivery care (Table 2)
Before PMTCT (N = 229) After PMTCT (N = 231)
CHR San Pedro: 3.3 <0.001 2.5 <0.001
Maternite´ Bardot: 3.5 <0.001 1.6 0.005
PMI Bardot: 2.1 <0.001 – –
FSU Jean Delafosse : 3.7 <0.001 4.3 <0.001
CSU Koumassi : 5.7 <0.001 2.4 <0.001
Quality of delivery care—summary score (29 variables) (Table 3)
Multiple linear regression coefficient for study period (main effect): 2.7, p<0.001 **Sig**
Professional attendance at delivery
Doctor: 2 0–8 1 0–5 0.002
Midwife: 86 56–100 79 58–89
Other: 12 0–36 20 11–37
Interpersonal relationship

Explain how to lie down on delivery table: 71 51–97 81 65–92 0.014
Help patient to climb on examination table: 10 2–18 44 28–60 <0.001
Information given on progress of labor: 8 0–15 41 21–67 <0.001
Someone is present to provide support: 19 15–30 27 13–59 0.062
Delivery is not seen by other patients: 65 22–91 81 52–96 <0.001
Safe obstetric procedures
Episiotomy (all women): 24 11–60 14 7–25 0.006
Primiparous women: 64 20–96 25 13–36 <0.001
Infection prevention
Wash hands before delivery: 4 2–8 7 5–25 0.172
Wash perineum before delivery: 9 6–11 27 15–40 <0.001
Wear gloves for delivery: 98 98–100 98 97–100 0.990
Box of sterile instruments for each delivery: 57 0–95 69 14–97 0.007
Instruments in decontamination solution: 95 87–100 66 48–82 <0.001
Evaluation of general condition at first exam
Blood pressure: 41 15–94 65 45–92 <0.001
Pulse: 3 0–9 16 0–42 <0.001
Conjunctiva: 47 28–64 61 47–93 0.002
Examination at admission
Check antenatal card (if available): 91 81–100 98 94–100 0.001
Asked about onset of labor pains: 27 13–40 50 37–78 <0.001
Asked if membranes had ruptured: 33 18–51 43 33–59 0.018
Determine uterine height: 65 48–77 80 72–100 <0.001
Determine position of fetus: 53 20–76 84 74–100 <0.001
Measure fetal heart rate: 60 30–73 80 67–100 <0.001

	Vaginal examination: 96 93–98 97 94–100 0.426 **Monitoring of labor—record keeping** Partograph filled in during labor: 5 2–8 9 0–14 0.08 Partograph ever filled in: 52 19–89 77 45–100 <0.001 **Delivery and third stage of labor** Administer oxytocics after delivery: 83 54–100 90 87–92 0.028 Manual exploration of the uterus: 32 17–58 64 39–75 <0.001 **Post-partum care** Check uterine retraction: 28 12–43 50 48–63 <0.001 Check blood pressure at least once: 34 7–67 38 15–80 0.441 **Newborn care** Apply antimicrobial ointment to eyes: 21 0–81 31 2–93 0.021 Disinfect cord: 83 65–100 99 94–100 <0.001 Other measured outcomes (not key outcomes) · Proportion of health facility staff in favor of recommending an HIV test · Proportion of health facility staff who would be willing to be tested when pregnant (or their wife)	
Gamazina 2009 **Intervention description** Trained providers to provide high-quality, comprehensive HIV counseling in an ANC setting. **Study design** Serial cross-sectional **Total rigor score: 2/9**	**EL: I = 37, C = 32** Biological Outcomes NR Behavioral Outcomes **1. HIV testing** I: 35 (94.6%) vs. C: 25 (78.1 %) NS Knowledge Outcomes NR Process Outcomes/Output **1. Mean (SD) score for quality of observed interpersonal communication and counseling skills by provider (EL) (evaluation range: 0 = did not perform, 3 =**	Providers who participated in the training intervention delivered counseling of consistently higher quality compared to providers who did not take the training. Exit interview data supported results from provider observations. Provision of a complete counseling experience was verified significantly more often by clients in the intervention group than the comparison group.

	best) Establishing rapport with client: I: 2.92 (0.28) vs. C: 1.81 (0.65) **SIG (p<0.001)** Using appropriate terminology, body language, and confidentiality: I: 2.54 (0.56) vs. C: 0.56 (0.67) **SIG (p<0.001)** Conclude session: I: 2.65 (0.72) vs. C: 1.57 (0.63) **SIG (p<0.001)** **2. Number (%) of clients who received the following counseling components (EL)** Discussed personal risk-reduction plan: I: 21 (56.8%) vs. C: 4 (12.5%) **SIG (p<0.001)** Assured that HIV test is voluntary: I: 31 (83.8%) vs. C: 14 (43.8%) **SIG (p<0.001)** Assured that HIV test results are confidential: I: 32 (86.5%) vs. C: 16 (50.0%) SIG (p<0.01) Clear on when and where to get results: I: 31 (83.8%) vs. C: 19 (59.4%) NS Received enough information on support services if needed: I: 19 (51.4%) vs. C: 8 (25%) NS **3. Complete counseling experience (range 0-6)** I: 4.57 (1.72) vs. C: 2.69 (1.67) **SIG (p<0.001)** **4. Personal risk assessment and reduction index (range 0-2)** I: 1.30 (0.81) vs. C: 0.53 (0.67) **SIG (p<0.001)**	
Gillespie 2009 **Intervention description** Family planning integrated into VCT services **Study design** Serial cross-sectional	*Before: n=1946; After: n=2027* Behavioral Outcomes **1. Accepted contraceptive method** Before: 0%; After: 6%; Before vs. After: NR Process Outcomes/Output	Rates of contraceptive method acceptance increased from 0% to 6% after the intervention. Rates of discussion of contraceptive and HIV-related topics all increased following the intervention.

	1. Discussed contraceptive options Before: 18%; After: 82%; Before vs. After: NR **2. Discussed fertility intentions** Before: 4%; After: 34%; Before vs. After: NR **3. Discussed condom use** Before: 52%; After: 74%; Before vs. After: NR **4. Discussed how HIV is transmitted** Before: 89%; After: 98%; Before vs. After: NR	
Hoffman 2008 **Intervention description** Women at an FP clinic, STD clinic, and VCT center were offered HIV testing; women who were HIV-positive and not pregnant were enrolled and received HIV care and access to FP. **Study design** Prospective cohort	Biological Outcomes Behavioral Outcomes **Contraceptive Use** Overall Sample Baseline: 38% 1 week: 52% [pre vs. post **Sig**] 1 month: NR [pre vs. post NS] 3 months: NR [pre vs. post NS] 6 months: NR [pre vs. post NS] 9 months: NR [pre vs. post NS] 12 months: 46% [pre vs. post NS] **Condom Use:** Overall Sample Baseline: 3.5% 1 week: 7.5% [pre vs. post **Sig**] 3 months: 16% [pre vs. post **Sig**] 12 months: 4% [pre vs. post **Sig**] **Use of Dual Protection** Overall Sample Baseline: 0.4% 1 week: 1.32% [pre vs. post NR] **Pregnancy Incidence**	Contraceptive use increased after HIV testing. Condom use increased from baseline to 1 week and 3 months, but then declined again at 12 months. Pregnancy incidence declined after HIV testing.

	Overall Sample: (n = 227) Incidence Rate: 14.5 Pregnancies 0–6 months: 16 Pregnancies 6–12 months: 13 STD Clinic (n=46) Incidence Rate: 20.6 [NS] Pregnancies 0–6 months: 7 Pregnancies: 6–12 months: 1 FP Clinic (n=96) Incidence Rate: 14.9 [NS] Pregnancies 0–6 months: 5 Pregnancies 6–12 months: 9 VCT Center (n=85) Incidence Rate: 10.3 [Referent] Pregnancies 0–6 months: 4 Pregnancies 6–12 months: 3 Knowledge Outcomes Process Outcomes/Output Other: Desire for a future child	
Killam 2010 **Intervention description** Providing ART integrated into ANC, compared to strategy of active referral to the ART clinic for treatment eligible pregnant women. **Study design** Stepped-wedge cluster randomized trial (group randomized trial)	Biological Outcomes Behavioral Outcomes Of patients who initiated ART, the 90-day retention rate (number of women initiated on treatment and still on treatment [not LTFO, dead or transferred out] in first 90 days of treatment) Control 94/103 (91.3%) vs. Intervention 244/278 (87.8%) P=0.3 when analyzed on individual level, and p=0.2 when analyzed by weighted t-test for cluster-level comparison Knowledge Outcomes Process Outcomes/Output Proportion of treatment eligible pregnant women enrolling on ART care within 60 days of HIV diagnosis and before delivery or EDD Control: 181 (25.3%) vs. Intervention: 376 (44.4%) Unadjusted OR 2.36 (95% CI	An integrated ART in ANC strategy doubled the proportion of treatment-eligible women enrolling into ART and initiating ART while pregnant. The integrated ART in ANC strategy did not affect the timeliness of ART initiation, however the average length on ART in both intervention and control cohorts was 10 weeks.

	1.90-2.94) Adjusted OR 2.06; (95% CI 1.27-3.34) Proportion of treatment eligible pregnant women initiating ART during pregnancy (within 60 days of diagnosis and before delivery or EDD) Control: 103 (14.4%) vs. Intervention: 278 (32.9%); Unadjusted OR 2.91 (95% CI 2.26-3.75) Adjusted OR 2.01 (95%CI 1.37-2.95) Mean estimated gestational age at first ANC visit among those women who initiated ART: Control 21.7 weeks vs. Intervention 22.2 weeks, p=0.2 Mean gestational age at ART initiation Control 27.1 weeks vs. Intervention 27.7 weeks, p=0.4 Mean weeks of ART initiation before delivery Control 10.8 weeks vs. Intervention 10 weeks, p=0.3 Other: Reasons for non retention	
King 1995 **Intervention description** Women who had received VCT were shown an FP video and group discussion and then offered FP methods. **Study design** Before-after study design	Health Outcomes **1. Pregnancy incidence** ***Among HIV-positive women*** Before: 22% (402), After: 9% (311), Before vs. After **Sig** (p=0.001) ***Among HIV-negative women*** Before: 30% (934), After: 20% (159), Before vs. After **Sig** (p=0.011) Behavioral Outcomes **1. Hormonal contraception use** ***Overall (n=502)*** Before: 16% (80/502), After: 24% (120/502), Before vs. After **Sig** (p=0.002) ***Among potential new users (n=408)*** Before: 0% (0/408), After: 10% (40/408), Before vs. After NR	Overall, the percent of women using hormonal contraception increased after the intervention. The rate of incident pregnancies decreased, but was a greater reduction for HIV-negative women.

Kissinger 1995 **Intervention description** Maternal-child program started in an HIV outpatient program implementing several interventions to improve attendance among women. **Study design** Non-randomized trial − individual.	Behavioral Outcomes **1. Attended at least 75% of scheduled visits** 6 month FU: I: 66%, C: 51%, I vs C RR*: 1.9 (95%CI: 1.2-3.0), **Sig** (p<0.01) 1 year FU: I: 62%, C: 45%, I vs C RR*: 1.8 (95%CI: 1.2-2.8), **Sig** (p<0.001) **Adjusted for drug abuse, race, age, CD4 cell count, OI, and length of follow-up in the clinic.*	Before the intervention, women were as likely as men to attend at least 75% of their appointments. After the intervention, women were significantly more likely than men to attend at least 75% of their appointments. This change was seen at both 6 months and 1 year after the intervention.
Liambila 2009 **Intervention description** **Study design** Before-after study	**Process Outcomes/Output** **1. Quality of care** Pre-intervention: 9.65 mean score vs. post-intervention 15.84 mean score (range 0−26) (Sig NR) **2. FP consultation time** Pre-intervention 10 minutes vs. post-intervention FP 12−13 minutes (Sig NR) **3. HIV test consultation time** Pre-intervention 10 minutes vs. post-intervention 17 minutes (Sig NR) **Discussion of STIs and FP** **1. Proportion of consultations in which provider discussed client history of STI symptoms − Testing model** Pre-intervention 38/214 (18%) vs. post-intervention 27/210 (13%) (NS) **2. Proportion of consultations in which provider discussed number of sexual partners − Testing model** Pre-intervention 10/214 (5%) vs. post-intervention 23/210 (11%) (p<0.05, SIG) **3. Proportion of consultations in which provider discussed STI/HIV/AIDS − Testing model** Pre-intervention 102/214 (48%) vs. post-intervention 176/210 (84%) (p<0.01, SIG)	The proportion of consultations that offered HIV prevention counseling and HIV testing increased significantly. The proportion of all clients being tested was significantly higher in the testing model compared to the referral model. The quality of care increased significantly post-intervention. Implementing the intervention added, on average, 2−3 minutes per consultation. There were significant differences in the referral model with more clients taking a voucher for off-site testing vs. on-site testing. The study demonstrated that both the testing and referral methods were feasible to implement and acceptable to providers and clients and that the majority of facilities, at all levels, had the capacity to integrate HIV prevention counseling and VCT within existing PF services.

	4. Proportion of consultations in which provider discussed STI/HIV/AIDS risk factors – Testing model Pre-intervention 83/214 (39%) vs. post-intervention 109/210 (52%) (p<0.01, SIG) **5. Proportion of consultations in which provider test client STI increases risk of HIV – Testing model** Pre-intervention 29/214 (14%) vs. post-intervention 14/210 (7%) (p<0.05, SIG) **6. Total score – STI/HIV prevention counseling (0-5)** Pre-intervention 1.24 vs. post-intervention 1.68 (p<0.01, SIG) **7. Proportion of consultations in which provider discussed client history of STI symptoms – Referral model** Pre-intervention 35/324 (11%) vs. post-intervention 117/210 (38%) (p>0.01, SIG) **8. Proportion of consultations in which provider discussed number of sexual partners – Referral model** Pre-intervention 3/324 (1%) vs. post-intervention 58/310 (19%) (p<0.01, SIG) **9. Proportion of consultations in which provider discussed STI/HIV/AIDS – Referral model** Pre-intervention 97//324 (30%) vs. post-intervention 238/310 (77%) (p<0.01, SIG) **10. Proportion of consultations in which provider discussed STI/HIV/AIDS risk factors – Referral model** Pre-intervention 71/324 (22%) vs. post-intervention 213/310 (69%) (p<0.01, SIG) **11.Proportion of consultations in which provider test client STI**	

	increases risk of HIV – Referral model Pre-intervention 64/324 (20%) vs. post-intervention 133/310 (43%) (p<0.01, SIG) **12.Total score – STI/HIV prevention counseling (0-5)** Pre-intervention 0.83 vs. post-intervention 2.46 (p<0.01, SIG) **Discussion of Condom Use** **1. Proportion of consultations in which provider explains condoms protect against STIs/HIV and pregnancy – Testing model** Pre-intervention 47/214 (22%) vs. post-intervention 69/210 (33%) (p<0.01, SIG) **2. Proportion of consultations in which provider encourages use of condoms with use of another method – Testing model** Pre-intervention 68/214 (32%) vs. post-intervention 105/210 (50%) (p<0.01, SIG) **3. Proportion of consultations in which provider gives information on how to use a condom – Testing model** Pre-intervention 19/2014 (9%) vs. post-intervention 69/210 (33%) (p<0.01, SIG) **4. Proportion of consultations in which provider emphasizes correct/consistent condom use – Testing model** Pre-intervention 21/214 (10%) vs. post-intervention 63/210 (30%) (p<0.01, SIG) **5. Proportion of consultations in which provider explains how to negotiate condom use – Testing model** Pre-intervention 17/214 (8%) vs. post-intervention 48/210 (23%) (p<0.01, SIG)	

6. Total score – dual protection counseling (0-5) – Testing model
Pre-intervention 0.8 vs. post-intervention 1.7 (p<0.01, SIG)
7. Proportion of consultations in which provider explains condoms protect against STIs/HIV and pregnancy – Referral model
Pre-intervention 35/324 (11%) vs. post-intervention 176/310 (57%) (p<0.01, SIG)
8. Proportion of consultations in which provider encourages use of condoms with use of another method – Referral model
Pre-intervention 38/324 (12%) vs. 220/310 (71%) (p<0.01, SIG)
9. Proportion of consultations in which provider gives information on how to use a condom – Referral model
Pre-intervention 38/324 (12%) vs. 192/310 (62%) (p<0.01, SIG)
10.Proportion of consultations in which provider emphasizes correct/consistent condom use– Referral model
Pre-intervention 29/324 (9%) vs. 164/310 (53%) (p<0.01, SIG)
11.Proportion of consultations in which provider explains how to negotiate condom use– Referral model
Pre-intervention 22/324 (7%) vs. 142/310 (46%) (p<0.01, SIG)
12.Total score – dual protection counseling (0-5) – Referral model
Pre-intervention 0.51 vs. post-intervention 2.88 (p<0.01, SIG)

Discussion of HIV testing and counseling
1. Proportion of consultations in which provider discusses HIV sero-status – Testing model
Pre-intervention 64/214 (30%) vs.

post-intervention 161/210 (77%) (p<0.01, SIG)

2. Proportion of consultations in which provider mentions testing and counseling – Testing model

Pre-intervention 89/214 (42%) vs. post-intervention 172/210 (82%) (p<0.01, SIG)

3. Proportion of consultations in which provider discusses what the test tells client – Testing model

Pre-intervention 77/214 (36%) vs. post-intervention 138/210 (66%) (p<0.01, SIG)

4. Proportion of consultations in which provider explains about the window period – Testing model

Pre-intervention 2/214 (1%) vs. post-intervention 111/210 (53%) (p<0.01, SIG)

5. Total score – HIV testing and counseling – Testing model

Pre-intervention 1.1 vs. post-intervention 2.78 (p<0.01, SIG)

6. Proportion of consultations in which provider discusses HIV sero-status – Referral model

Pre-intervention 64/324 (20%) vs. 257/310 (83%) (p<0.01, SIG)

7. Proportion of consultations in which provider mentions testing and counseling – Referral model

Pre-intervention 119/324 (37%) vs. post-intervention 285/310 (92%) (p<0.01, SIG)

8. Proportion of consultations in which provider discusses what the test tells client – Referral model

Pre-intervention 100/324 (31%) vs. post-intervention 177/310 (57%) (p<0.01, SIG)

9. Proportion of consultations

	in which provider explains about the window period – Referral model Pre-intervention 22/324 (7%) vs. post-intervention 96/310 (31%) (p<0.01, SIG) **10.Total score – HIV testing and counseling – Referral model** Pre-intervention 0.95 vs. post-intervention 2.64 (p<0.01, SIG) **11.First time HIV testers** Testing model 15% vs. referral model 51% **Receiving a voucher** **1. Clients taking a referral voucher** On-site referral 17% vs. off-site referral 29% (Sig NR)	
Ngure 2009 **Intervention description** Contraceptive multipronged promotion intervention that included staff training, couples FP sessions and free provision of hormonal contraception on-site. **Study design** Prospective cohort	Biological Outcomes **1. Pregnancy incidence** Thika site HIV-1 sero-positive women Before: 13.5 per 100 woman years vs. After: 8.7 per 100 woman years (P<.05) HIV-1 sero-negative women Before: 21.1 per 100 woman years vs. After: 11.0 per 100 woman years (P<.05) All women (HIV-1 + and HIV-1 – women) After vs. Before: hazards ratio (HR) 0.2, 95% CI (0.1-06) Three comparison sites HIV-1 seropositive women Before: 16.8 per 100 woman years vs. After: 21.9 per 100 woman years HIV-1 seronegative women Before: 14.6 per 100 woman years vs. After: 19.7 per 100 woman years	Within the setting of a biomedical prevention trial among Kenyan HIV sero-discordant couples, the multipronged FP intervention substantially increased dual-contraceptive use (condoms along with another effective method) among both HIV-1 sero-positive and sero-negative women in HIV-1 discordant partnerships. Pregnancy incidence declined during this same time period, both compared to pre-intervention at the Thika site and with comparison sites during the intervention period. Major components of the FP intervention included provision and enhanced promotion of free contraceptive services at the research clinic, as well as staff training in FP methods and counseling. Reported condom use was high throughout the entire study follow-up period for both HIV-positive and HIV-negative women from all sites.

	Thika vs. the other 3 comparison sites After Thika vs. After other: hazard ratio (HR) 0.5, 95%CI (0.3-0.8) Before Thika vs. Before other: hazard ratio (HR) 1.0, 95%CI (0.5-1.9) Behavioral Outcomes **1. Reported use of non-condom contraception (i.e., current use of IUD, surgical method, injectable, implantable or oral hormonal methods)** - Thika site HIV-1-sero-positive women Before: 31.5% (117/372) of visits vs. After: 64.7% (486/751) of visits; OR 4.0, 95% CI (3.0-5.3) HIV-1-sero-negative women Before: 28.6% (34/119) of visits vs. After: 46.7% (122/261) of visits; OR 2.2, 95% CI (1.4-3.5) Three other comparison sites HIV-1 sero-positive women Before: 15.6% (523/3344) vs. After: 22.3% (604/2712) of visits; OR 1.5, 95% CI (1.3-1.9) HIV-1 sero-negative women Before: 13.6% (187/1373) vs. After: 12.7% (176/1389) of visits; OR 0.9, 95% CI (0.7-1.3) Thika vs. comparison sites; After intervention: HIV-1 sero-positive women 64.7% vs. 22.3%; OR 6.4, 95%CI (4.6-8.9) HIV-1 sero-negative women 46.7% vs. 12.7%; OR 6.0, 95%CI (3.4-10.7)	

Peck 2003 **Intervention description** Between 1985 and 1999, services for HIV care, TB care, STI management, family planning and other SRH services were sequentially integrated into a VCT clinic. **Study design** Serial cross-sectional	Health Outcomes **1. HIV prevalence** 1985: 99%; 1988: 90%; 1995: 33%; 1999: 26% Behavioral Outcomes **1. HIV testing** Total number: 1985: 142; 1988: 209; 1995: 5223; 1999: 8175 Proportion adolescents (13–19 years): 1985: 0%; 1988: 1%; 1995: 7% ; 1999: 9% Proportion female: 1985: 27%; 1988: 36%; 1995: 58%; 1999: 62% Proportion self-referred to clinic: 1985: 0%; 1988: 1%; 1995: 60%; 1999: 66% Proportion symptom-free: 1985: 0%; 1988: 10%; 1995: 39%; 1999: 51%	Over the course of 15 years, the number of patients testing for HIV increased dramatically (62-fold). The percent of patients who tested HIV-positive declined dramatically, and the percent of tested patients who were symptom-free increased dramatically. The proportion of adolescents and females increased over time.
Potter 2008 **Intervention description** PMTCT added to ANC clinics **Study design** Serial cross sectional (retrospective chart review)	Biological Outcomes Behavioral Outcomes Knowledge Outcomes Process Outcomes/Output **Quality of care: documented RPR screening** *PMTCT research only added to 7 ANC clinics:* Before: 524/807 records (65%); After: 433/693 records (62%); POR (prevalence odds ratio): 0.9 (0.7 to 1.1), p=0.33 NS *PMTCT service only added to 15 ANC clinics:* Before: 1364/1689 records (81%); After: 1045/1406 records (74%); POR: 0.7 (0.6 to 0.8), p<0.0001 **Sig** *PMTCT research and service added to 9 ANC clinics:* Before: 692/1099 records (63%); After: 975/1206 records (81%); POR: 2.5 (2.1 to 3.0), p<0.0001 **Sig** **Quality of care: documented treatment among RPR-positive screened women** *PMTCT research only added to 7*	Documented RPR screening improved after PMTCT research and service were added to ANC. There was no change when PMTCT research alone was added; there was a decrease after PMTCT service alone was added. Documented syphilis treatment among RPR-positive screened women did not change after PMTCT research, service, or research and service were added to ANC.

	ANC clinics: Before: 26/42 records (62%); After: 18/22 records (82%); POR: 2.8 (0.8 to 9.7), p=0.11 NS *PMTCT service only added to 15 ANC clinics:* Before: 92/117 records (79%); After: 75/105 records (71%); POR: 0.7 (0.4 to 1.3), p=0.22 NS *PMTCT research and service added to 9 ANC clinics:* Before: 29/50 records (58%); After: 41/59 records (69%); POR: 1.7 (0.8 [or 0.7, discrepancy between table and text] to 3.6), p=0.21 NS Other	
Rasch 2006 **Intervention description** FP counseling and methods; VCT; and STI/HIV counseling for women attending a hospital after an unsafe (illegally induced) abortion **Study design** Cross-sectional	Behavioral Outcomes **1. Contraceptive choice** **Condom:** I: 80 (19.8%), C: 55 (18.6%) **Hormonal:** I: 108 (26.7%), C: 155 (52.5%) **Double:** I: 216 (53.5%), C: 85 (28.8%) Crude OR, I vs C.: Condom vs. Horm.: 2.09 (95%CI: 1.37-3.18, sig) Crude OR, I vs C.: Double vs. Horm.: 3.65 (95%CI: 2.57-5.18, sig) Adj OR*, I vs C.: Condom vs. Horm.: 1.80 (95%CI: 1.16-2.81, sig) Adj OR*, I vs C.: Double vs. Horm.: 3.07 (95%CI: 2.12-4.43, **sig**) **Adjusted for age, marital status, previous birth and occupation*	Women who received VCT were twice as likely to use a condom and three times more likely to use a double method (the condom as well as a hormonal method) than women who did not receive VCT.
Simba 2010 **Intervention description** PMTCT added to RCH services **Study design** Cross sectional	Biological Outcomes Behavioral Outcomes Knowledge Outcomes Process Outcomes/Output **Quality of care: Average staff workload (actual)** Clinics that provided RCH and PMTCT services: 50.5% (range:	Average staff workload was higher in clinics that provided both RCH and PMTCT services, compared to those that provided RCH services alone. However the significance of this difference was not reported.

	8–47%) Clinics that provided RCH services alone: 37.8% (range: 11–82%); Sig: NR **Quality of care: Average staff workload (standard)** Clinics that provided RCH and PMTCT services: 55.8% (range: 10-168%) Clinics that provided RCH services alone: 45.2% (range: 8–128%); Sig: NR Other	
van der Merwe 2006 **Intervention description** 1) Health workers from ART clinic attend weekly clinic for HIV-positive pregnant women. 2) CD4 at first ANC visit. 3) Two weeks later, during a second ANC visit, women receive CD4 results; if <250/ul, they have baseline lab tests for ART initiation. 4) For women eligible for ART, adherence counseling and treatment preparation is offered during second ANC visit. Women are then referred for ART initiation and follow-up, provided by the same staff members who began ART preparation. 5) Monitoring systems assess uptake and time between HIV diagnosis and ART initiation. **Study design** Serial cross sectional	Biological Outcomes Risk of HIV infection among infants ART during pregnancy, before and after: 5/116 (4.3%) vs. sd-NVP: 74/692 (10.7%); P=.032; OR 2.66 (95%CI 1.05, 6.7) Behavioral Outcomes Knowledge Outcomes Process Outcomes/Output Days from HIV diagnosis to ART initiation Before: N=27; Median 56 days; IQR 30-103; range 7-216 After: N= 127; Median 37 days; IQR 22-63; range 7-168 P=.041 Days from HIV diagnosis to receiving CD4 cell count result Before: N=25; Median 50 days; IQR 22-92; range 3-206 After: N= 124; Median 29 days; IQR 11.5-45; range 2-167 P=.047 Gestational age at ART initiation (wk) Before: N=30; Median 33.5 weeks; IQR 30.7-36.4; range 25.1-43.9 After: N= 130; Median 32.4 weeks; IQR 28.1-34.6; range 10.9-40.9 P=.042 Number of weeks from ART initiation to childbirth	Strengthening linkages and integrating key aspects of ART within ANC reduced delays between HIV diagnosis and treatment initiation for pregnant women eligible for ART. Measuring CD4 counts at first ANC visits is particularly important in reducing delays. Despite improvements in service delivery, only 75% of medically eligible pregnant women initiated ART. Further improvements in service delivery may be needed to optimize uptake.

	Before: N=22; Median 5.1 weeks; IQR 2-10.3; range 0.6-18.1 After: N= 108; Median 7.0 weeks; IQR 3.0-11.2; range 0.3-25.6 P=NS Proportion of medically eligible pregnant women who initiate ART Before: not reported After: 129/171 (75.4%) No increase in uptake from January–July 2005 was observed looking at two month intervals (OR=1.0, p=0.78) Other: Treatment regimen received	