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A review of reproductive health research, guidelines and related gaps for women living with HIV

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The study of pregnancy and motherhood in women living with HIV (WLWH) has concentrated on the health of the unborn baby and the prevention of mother-to-child transmission, whereas consideration of the broader aspects of women's reproductive health has been largely overlooked. The rights of WLWH with respect to their reproductive health should be exactly the same as non-HIV-positive women, however, inequalities exist due to discrimination and also because the treatment guidelines used in the care of women are often based on insufficient evidence. The purpose of this article is to review the available literature on reproductive health issues for WLWH and to identify gaps requiring further investigation. Our review indicates that further research is warranted into a number of aspects of reproductive health among WLWH. Currently, access to the relevant reproductive health resources and services, such as advice on contraception and fertility services, for WLWH is far from optimal in many developed countries and most developing countries. More data are needed on the most appropriate family planning options with the consideration of drug interactions between contraceptives and antiretroviral therapy and the risk of HIV transmission. Also, more research is needed to improve understanding of the maternal health challenges facing WLWH. Similarly, our understanding of the impact of HIV on the physical and emotional health of pregnant women and new mothers is far from complete. Answering these questions and countering these inequalities will help to ensure the reproductive health and child-bearing intentions of WLWH become an integral part of HIV medicine.

Keywords: reproduction; women; HIV; pregnancy; conception

Introduction

While three million women living with HIV (WLWH) give birth each year (UNAIDS, 2010), the clinical guidance on reproductive health in this group has concentrated primarily on the health of the unborn baby and the prevention of mother-to-child transmission (MTCT) rather than on the expectant mother's health. Effective antiretroviral therapy (ART) has reduced MTCT and is less of a concern. With the majority of WLWH being of childbearing-age, reproductive health and rights and access to reproductive care have become important global issues but data are lacking. The purpose of this article is to review existing research and guidance on preconception considerations, contraception, maternal health and post-partum issues for WLWH, and to identify gaps in this evidence that require further investigation.

Methods

This article was written using scoping review methodology (Arksey & O'Malley, 2005) to provide a narrative account of available research into preconception, contraception, maternal health and post-partum issues in WLWH. MEDLINE was searched for articles from 1950 to 2012 using diverse MeSH headings relevant to reproductive health in WLWH (Appendix). Relevant bibliographies, existing networks and HIV organisations, guidelines and conference abstracts were also reviewed, and experts in the field consulted regarding missing publications. Abstracts were scanned to determine if they were relevant to reproductive health in WLWH and to eliminate those focusing on the health of the unborn baby or the prevention of MTCT, before the full articles were reviewed. The quality of guidelines was assessed using the appraisal of guidelines for research and evaluation instrument (Brouwers et al., 2010).

Preconception considerations

Studies, including the meta-analysis by Nattabi, Li, Thompson, Orach, and Earnest (2009), have reported that between 26% and 57% of WLWH intend to have children (Loutfy et al., 2009; Ogilvie et al., 2007). WLWH share the same rights as other women in terms of pregnancy and motherhood, but to fulfil

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these, access to general reproductive, preconception, pregnancy and post-partum counselling should be made to be a part of routine HIV care. This should include discussions about optimising HIV management, standard prenatal counselling, including healthy lifestyle advice, suitable conception options (Table 1), ART for the prospective mother and, potentially, child, as well as adoption and fertility options. An individual or couple should be referred for fertility assessment if there is no conception after 3–12 months (or earlier if the woman is >35 years). Access to these services and costs vary geographically. In addition, access to adoption services can be limited, depending on country (Table 2).

There is a lack of information about conception planning and pregnancy for those wishing to have children (Huynh et al., 2012). Ndlovu et al. (2009) found evidence of inadequate knowledge among people living with HIV (PLWHIV) about pregnancy, despite having regular access to a healthcare professional, and reported that ethnicity influenced the degree of knowledge. PLWHIV and healthcare providers globally have indicated that access to clinical guidelines, pamphlets, workshops and peer-counselling and support are important tools to optimise the care of PLWHIV during preconception and conception (Fakoya et al., 2008; Huynh et al., 2012). Preconception and conception guidelines currently available across Europe, Canada and USA are outlined in Table 2.

Family planning and contraception

Among WLWH, the proportion of unintended pregnancies is high at 50–83% (Floridia et al., 2006; Koenig, Espinoza, Hodge, & Ruffo, 2007; Loutfy et al., 2012a). Tailored reproductive counselling and contraception discussions early in the course of HIV care are crucial for all women to prevent unintended pregnancies. A variety of contraceptive options are available (Table 3) and the choice should take into account potential interactions with ART (Table 4). A recent study has reported that women using hormonal contraceptives, specifically depot medroxyprogesterone acetate (DMPA), had twice the risk of acquiring or transmitting HIV as other women (Heffron et al., 2012). A sub-analysis of the Methods for Improving Reproductive Health in Africa study found that combined oral contraceptive (COC) or progesterone only pills (POP) use was not associated with an increased risk of HIV acquisition [COC: HRa 0.94, 95% CI 0.63–1.39; POP: HRa 0.84, 95% CI 0.45–1.56], but progesterone only injectable contraceptive methods (DMPA and norethisterone enantate) were [HRa 1.41, 95% CI 1.04–1.91], (McCoy et al., 2012).

The Centers for Disease Control and Prevention have recently published updated guidance stating that

Table 1. Conception options for HIV concordant and discordant couples.

HIV- woman and HIV+ man	• IUI following sperm washing[a,b,c] • Timed natural conception (only at ovulation; if effective viral suppression)[a,b,c] • Natural conception (if effective viral suppression)[a,b,c] • IVF or ICSI following sperm washing[a,b,c] • Insemination of donor sperm at ovulation[a,b,c] • PrEP with timed natural conception (only at ovulation; if effective viral suppression)[a,b,c,d] • Adoption[a,b]
HIV+ woman and HIV- man	• Home artificial insemination with partner's sperm during ovulation[a,c] • Timed natural conception (only at ovulation; if effective viral suppression)[a,b,c] • Natural conception (if effective viral suppression)[a,b,c] • Assisted reproduction in case of fertility disorders including IUI, IVF, ICSI[a,b,c] • PrEP with timed natural conception (only at ovulation; if effective viral suppression)[a,b,c] • Adoption[a,b]
HIV+ woman and HIV+ man	• Timed natural conception (only at ovulation; if effective viral suppression)[a,b,c] • Natural conception (if effective viral suppression)[a,b,c] • IUI following sperm washing[a,b] • Insemination of donor sperm at ovulation[a,b] • Assisted reproduction in case of fertility disorders including IUI, IVF, ICSI[a,b,c] • Adoption[a,b]

IUI, intrauterine insemination; IVF, in vitro fertilisation; ICSI, intracytoplasmic sperm injection; PrEP, pre-exposure prophylaxis.
[a]Loutfy et al. (2012b).
[b]Fakoya et al. (2008).
[c]DAIG and Österreichische AIDS-Gesellschaft (2011a).
[d]Vernazza, Graf, Sonnenberg-Schwan, Geit, and Meurer (2011).

Table 2. Fertility and adoption guidelines in European countries, Canada and the USA.[a]

Country	Availability of privately funded assisted reproduction?	Availability of publically funded assisted reproduction?	Is adoption an option?	Availability of guidelines?	Guideline reference
Canada	Yes	Yes[b]	Yes	Yes	Loutfy et al. (2012b)
Denmark	N/A	Yes	No	Yes	Dansk Fertilitetsselskab (2007)
France	N/A	Yes	Yes	Yes	Prise en charge médicale des personnes vivant avec le VIH – Rapport d'Experts (2010)
Germany/ Austria	Yes[c]	Yes[c]	Yes, challenging	Yes	DAIG and Österreichische AIDS-Gesellschaft (2011a)
Italy	Yes[d]	Yes[d]	Yes, challenging	Yes	Ministero della Salute (2011)
Portugal	Yes	Yes[d]	Yes, challenging	No	
Romania	Yes[d]	No	Yes, challenging	Yes	Manual pentru ingrijirea copilului infectat cu HIV, Romania, (2004)
Spain	Yes	Yes[d]	Yes, challenging	Yes	Grupo de expertas y expertos del plan nacional sobre el sida y de gesida (2011)
UK	Yes	Yes[d]	Yes, challenging	Yes	Fakoya et al. (2008)
USA	Yes	No	Yes	Yes	The Ethics Committee of the American Society for Reproductive Medicine (2010)

N/A, not applicable.
[a]Information included in this table has been collected from Women for Positive Action faculty members.
[b]3 cycles of IVF are covered in Quebec; 40% fertility tax credit up to $20,000 is available in Manitoba; IVF is covered for bilateral tube blockage in Ontario; several other provinces have petitions to cover IVF under review.
[c]50% of three treatment cycles covered by statutory health insurance.
[d]Available in a limited number of centres.

(1) the use of hormonal contraceptives, including COC, POP, DMPA and implants, are safe for women at high risk for HIV infection or infected with HIV and (2) all women who use contraceptive methods other than condoms should be counselled regarding the use of condoms and the risk for sexually transmitted infections (STIs; Tepper, Curtis, Jamieson, & Marchbanks, 2012). However, a clarification is added to the recommendation for women at high risk for HIV infection who use DMPA or norethisterone enantate to acknowledge the inconclusive evidence regarding the association between progestin-only injectable use and HIV acquisition.

Since condoms are poor at preventing pregnancy, but required to prevent HIV and STIs, dual protection including a hormonal contraceptive (or copper intrauterine device) and a condom is recommended (Department of Health and Human Services [DHHS], 2011a; WHO, 2012).

Maternal health, HIV and pregnancy

Complications during childbirth lead to the death of one woman every minute (approximately 529,000 each year) (UNICEF, 2009). Prior to combination ART, pre-eclampsia was an uncommon complication of pregnancy in WLWH (Stratton et al., 1999). Although the benefits of taking ART during pregnancy outweigh the risks, the incidence of pre-eclampsia has now risen to a rate similar to that reported among the general population (European Collaborative Study, 2003; Wimalasundera et al, 2002) and the mother should be closely monitored (Lopez et al., 2012). Limited data show a higher prevalence of gestational diabetes in WLWH (2–5% in industrialised countries) compared with the general population (González-Tomé et al., 2008). However, the risk factors in WLWH are largely unclear and the data are contradictory (Watts et al., 2004).

Current guidance on whether ART should be continued or stopped in WLWH with CD4 counts >500 cells/mm^3 following delivery remain unclear and data from ongoing trials are awaited. However, treatment interruptions guided by CD4 cell counts appear to put PLWHIV at an increased risk of disease progression (Strategies for Management of Antiretroviral Therapy [SMART] Study Group et al., 2006), and there is a trend towards an increased risk of AIDS

Table 3. Advantages and disadvantages of contraception options in HIV (Trussell, 2007).

Method	Advantages	Disadvantages[a]
Condoms (male)	• STI/HIV protection	• Partner cooperation needed • Requires correct technique • Inconvenient/may interfere with sexual intercourse • Pregnancy prevention = 85%
Condoms (female)	• STI/HIV protection • Can be controlled by the woman	• Requires correct technique • Inconvenient/may interfere with sexual intercourse • Pregnancy prevention = 79% • Price and availability
Oral contraceptive pill	• Effective • Less blood loss • Can be controlled by the woman • Pregnancy prevention = 92%	• Drug-drug interactions • Possibly increased viral shedding • No STI/HIV protection
Patch, ring, injectable combination	• Effective • Less blood loss • Can be controlled by the woman • Pregnancy prevention = patch: 92%; ring: 92%	• Drug-drug interactions? • Lack of data • Increased viral shedding? • No STI/HIV protection
DMPA	• Low maintenance • Effective • Can be controlled by the woman • Pregnancy prevention = 97%	• No STI/HIV protection • Possibly increased risk of HIV acquisition
Copper intra-uterine device	• Convenient • Effective • Can be controlled by the woman • Pregnancy prevention = 99.2%	• Blood loss • Increased pelvic infection • No STI/HIV protection
Levonorgestrel-releasing intra-uterine system (LNG-IUS)	• Long lasting • Convenient • Can be controlled by the woman • Pregnancy prevention = 99.8%	• Blood loss • No STI/HIV protection • Minimal research available in HIV
Cervical barrier	• Some STI protection • Good contraceptive effectiveness if used correctly • Can be controlled by the woman • Pregnancy prevention = 84%	• Increased urinary tract infections • Requires correct technique • No STI/HIV protection
Sterilisation	• Low maintenance • Effective • Can be controlled by the woman • Pregnancy prevention = 99.5%	• Irreversible • Expensive • Invasive • No STI/HIV protection

STI, sexually transmitted infection; HIV, human immunodeficiency virus.
[a]Pregnancy prevention: The percentage of women who did not experience an unintended pregnancy during the first year of typical use of contraception in the USA.

or all-cause mortality in women who stopped taking ART within 90 days of delivery (Melekhin et al., 2010). Recent UK guidelines recommend that when stopping non-nucleoside reverse transcriptase inhibitor (NNRTI)-based ART post-partum the NNRTI washout period should be covered by two weeks of protease inhibitor (PI)-based therapy (de Ruiter et al., 2012). Cessation of maternal ART in the first year afterbirth has little effect on CD4 levels, but it does have an effect on immune activation (Watts et al., 2009). Considerations of adherence, the overall health of the mother, and her readiness to continue treatment during the post-partum phase need to be assessed on an individual basis, in collaboration with the mother.

Perinatal and post-partum considerations

Perinatal depression refers to depression occurring during pregnancy or up to one-year after the birth and

Table 4. Drug interactions between hormonal contraception and various antiretroviral agents.[a]

Antiretroviral agent	Effect on drug concentration	Recommended action
Protease inhibitors (PI)		
Atazanavir (ATV)	↑ EE AUC 48% ↑ NE AUC 110%	OK for use OCP should contain ≤30mcg EE. Monitor for side effects, or use alternative method
Atazanavir/ritonavir (ATV/r)	↓ EE ↑ norgestimate (active metabolite of NG)	OK for use OCP should contain ≥35mcg EE
Darunavir (DRV), Darunavir/ritonavir (DRV/r)	↓ EE AUC 44% ↓ NE AUC 14%	Do not use
Fosamprenavir (FPV)	With amprenavir: ↑ EE, ↑ NE ↓ amprenavir C^{min} 20%	Do not use
Fosamprenavir/ritonavir (FPV/r)	↓ EE AUC 37% ↓ NE AUC 34%	Do not use
Lopinavir/ritonavir (LPV/r)	↓ EE AUC 42% ↓ NE AUC 17%	Do not use
Nelfinavir (NFV)	↓ EE AUC 47% ↓ NE AUC 18%	Do not use
Saquinavir/ritonavir (SQV/r)	↓ EE SQV kinetics not affected by OCP	Do not use
Tipranavir/ritonavir (TPV/r)	↓ EE AUC 48% NE: no significant change	Do not use
Nonnucleoside reverse transcriptase inhibitors (NNRTI)		
Efavirenz (EFV)	↓ NG AUC 64% ↓ LN AUC 83% EE: no effect	Do not use
Etravirine (ETR)	↑ EE AUC 22% NE: No significant change	OK for use
Nevirapine (NVP)	↓ EE AUC 20% ↓ NE AUC 19%	Do not use
Rilpivirine (RPV)	↑ EE AUC 14% NE: no significant change	OK for use
Integrase inhibitor		
Raltegravir (RAL)	No significant interaction	OK for use
Elvitegravir (ELV)[b]	↓ EE AUC 25%	OK for use OCP should contain ≤30mcg EE. Await more data
CCR5 antagonist		
Maraviroc (MRV)	No significant interaction	OK for use

AUC, area under the time concentration curve (drug exposure); C^{min}, minimum concentration; EE, ethinyl estradiol; LN, levonorgestrel; NE, norethindrone; NG, norgestimate; OCP, oral contraceptive pill.
[a]Adapted from DHHS (2011a), DHHS (2011b), DHHS (2012).
[b]When taken as a elvitegravir/cobicistat/FTC/tenofovir fixed dose 'quad' formulation (German, Wang, Warren, & Kearney, 2011).

includes post-partum depression. Perinatal depression is a common phenomenon (Kapetanovic et al., 2009). In a review from Gaynes et al. (2005), the prevalence of major depression during pregnancy and post-partum ranged from 3.1% to 4.9% and 1.0% to 5.9%, respectively. As PLWHIV are more likely to suffer from depression, WLWH may be at an even higher risk of perinatal depression (Herbert & Cohen, 1993; Sherr, Clucas, Harding, Sibley, & Catalan, 2011).

Factors that may contribute to increased perinatal depression in WLWH include maternal guilt, fear of transmitting HIV to the newborn, concerns related to disclosure, stigma and the negative impacts of maternal HIV on their children, preconception substance use, multiple preconception sexual partners, lower socio-economic status, medication adherence problems, multiparity, lower CD4 pregnancy nadir and impaired physical and cognitive functioning (Chibanda et al., 2010; Greene et al., 2009; Kapetanovic et al., 2009; Leonard, 1998; Morrison et al., 2002; Parsons, Young, Rochat, Kringelbach, & Stein, 2012; Rotheram-Borus, Lightfoot, & Shen, 1999; Rubin et al. 2011). Some causal factors are potentially modifiable, including lack of emotional and social

support, especially from the partner, intimate partner violence, ineffective coping and a history of psychiatric/depressive symptoms (Areias, Kumar, Barros, & Figueiredo, 1996; Bernatsky, Souza, & De Jong, 2007; Blaney et al., 2004; Cutrona, 1984; Gotlib, Whiffen, Wallace, & Mount, 1991; Hartley et al., 2011; Herbert & Cohen, 1993; Hobfoll, Ritter, Lavin, Hulsizer, & Cameron, 1995; Ross, Sawatphanit, & Zeller, 2009; Rubin et al., 2011). Evidence indicating an association between perinatal depression and adverse obstetric and infant developmental outcomes is conflicting. Studies have linked perinatal depression with obstetric complications, neonatal faltering growth, and learning disorders (Alder, Fink, Bitzer, Hösli, & Holzgreve, 2007; O'Brien, Heycock, Hanna, Jones, & Cox, 2004). Others have reported a lack of association (Evans, Heron, Francomb, Oke, & Golding, 2001; Hartley et al., 2011; Kapetanovic et al., 2009).

Breastfeeding

Several conflicting guidelines on HIV and breastfeeding have been published (Table 5). ART can reduce the risk of MTCT via breast milk by over 50% (Kumwenda et al., 2008). While breastfeeding with ART prophylaxis is not as effective as formula feeding in preventing MTCT, lower infant mortality rate with breastfeeding and comparable HIV-free survival for both feeding methods at 18 months have been reported. Therefore, exclusive breastfeeding is recommended in resource-poor countries (Thior et al., 2006; WHO, 2010).

In some communities, a mother risks revealing her HIV status by not breastfeeding (Morgan, Masaba, Nyikuri, & Thomas, 2010), and becoming a target for discrimination. For this reason, some guidelines now recommend supporting women in breastfeeding while taking ART if necessary (BHIVA & CHIVA, 2010; UNICEF, 2009).

Table 5. Available global and European countries' breastfeeding guidelines

Guidelines	Country	Guidance on breastfeeding for mothers living with HIV
WHO (in collaboration with UNAIDS, UNFPA and UNICEF) (2010)	Global	• Mothers with HIV should be counselled about the risks and benefits of infant feeding and provided with specific guidance regarding their situation • Mothers who choose to breastfeed should be supported in their choice • Mothers who choose not to breastfeed should be provided with guidance and support around formula feeding • In low and middle income countries exclusive breastfeeding is recommended for the first six months of life
British HIV Association (BHIVA) and Children's HIV Association (CHIVA) (2010)	UK	• In the UK, mothers with HIV are recommended to refrain from breastfeeding from birth regardless of maternal viral load and ART • All mothers with HIV should be supported to formula feed their infant • In rare circumstances where a mother who is effective on combination ART with a repeatedly undetectable viral load chooses to breastfeed then maternal ART should be carefully monitored and continued until one week after all breastfeeding has ceased. Breastfeeding should be ceased by 6 months
Royal College of Obstetricians and Gynaecologists (RCOG) (2010)	UK	• All mothers with HIV should avoid breastfeeding • Women should be given supportive advice about formula feeding
DAIG and Österreichische AIDS-Gesellschaft (2011b)	Germany	• Mothers are advised not to breastfeed, according to WHO guidelines
Grupo de expertas y expertos del plan nacional sobre el sida y de gesida (2011)	Spain	• All mothers with HIV should avoid breastfeeding • Women should be given supportive advice about formula feeding • Formula is provided free of charge through the Public Health System
Ministero della Salute (2011)	Italy	• All mothers with HIV should avoid breastfeeding • Formula is provided free of charge through the National Health System
Prise en charge médicale des personnes vivant avec le VIH, France (2010)	France	• All mothers with HIV should avoid breastfeeding • Mothers with HIV should be counselled about the risks of breastfeeding and be given supportive advice about formula feeding

Summary of knowledge gaps and research needs in the topic of reproductive health for WLWH

- Preconception medical management in WLWH and couples wishing to parent;
- Optimal contraception methods for WLWH;
- Influence of hormonal contraception on HIV transmission;
- Safety and pharmacokinetics of newer ART regimens during pregnancy;
- Association between HIV-related factors and maternal health outcomes;
- Safety of stopping ART in WLWH who wish to cease treatment;
- Issues in motherhood including stigma, discrimination, perinatal depression and emotional well-being and
- Optimal method of infant feeding.

Conclusions

Working towards answering the many questions around reproductive and maternal health and emotional well-being both during and post-pregnancy in WLWH will help us optimise the health care for WLWH around the world. Addressing these gaps in the literature will direct the development of revised practice guidelines reflecting the specific needs of WLWH.

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References

Alder, J., Fink, N., Bitzer, J., Hösli, I., & Holzgreve, W. (2007). Depression and anxiety during pregnancy: A risk factor for obstetric, fetal and neonatal outcome? A critical review of the literature. *Journal of Maternal-Fetal and Neonatal Medicine*, *20*, 189–209. doi:10.1080/14767050701209560

Areias, M.E.G., Kumar, R., Barros, H., & Figueiredo, E. (1996). Correlates of postnatal depression in mothers and fathers. *The British Journal of Psychiatry*, *169*, 36–41. doi:10.1192/bjp.169.1.36

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, *8*, 19–32. doi:10.1080/1364557032000119616

Bernatsky, S., Souza, R., & De Jong, K. (2007). Mental health in HIV-positive pregnant women: Results from Angola. *AIDS Care*, *19*, 674–676. doi:10.1080/09540120601012705

Blaney, N.T., Fernandez, I., Ethier, K.A., Wislon, T.E., Walter, E., & Koenig, L.J. (2004) Psychosocial and behavioral correlates of depression among HIV-infected pregnant women. *AIDS Patient Care and STDs*, *18*, 405–415. doi:10.1089/1087291041518201

British HIV Association (BHIVA) & Children's HIV Association (CHIVA). (2010). *Position statement on infant feeding in the UK*. Retrieved from http://www.bhiva.org/documents/Publications/InfantFeeding10.pdf

Brouwers, M., Kho, M.E., Browman, G.P., Burgers, J.S., Cluzeau, F., Feder, G., . . . for the AGREE Next Steps Consortium. (2010). AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Canadian Medical Association Journal*, *182*, E839–E842.

Chibanda, D., Mangezi, W., Tshimanga, M., Woelk, G., Rusakaniko, P., Stranix-Chibanda, L., & Shetty, A.K. (2010). Validation of the Edinburgh Postnatal Depression Scale among women in a high HIV prevalence area in urban Zimbabwe. *Archive of Women's Mental Health*, *13*, 201–206. doi:10.1007/s00737-009-0073-6

Cutrona, C.E. (1984). Social support and stress in the transition to parenthood. *Journal of Abnormal Psychology*, *93*, 378–390. doi:10.1037/0021-843X.93.4.378

Dansk Fertilitetsselskab. (2007). *Kliniske Guidelines. Fertilitetsbehandling af HIV og hepatitis B og C positive*. Denmark: Author. Retrieved from http://www.fertilitetsselskab.dk/images/2010_dok/19_guideline_hiv_hepatis09102010.pdf

de Ruiter, A., Taylor, G.P., Palfreeman, A., Clayden, P., Dhar, J., Gandhi, K., ... Wilkins, E. (2012). *Guidelines for the management of HIV infection in pregnant women*. Consultation Draft Version 1. Retrieved from http://www.bhiva.org/documents/Guidelines/Pregnancy/Pregnancy_Guidelines_for_Consultation120125.pdf

Department of Health and Human Services (DHHS). (2011a). Panel on treatment of HIV-infected pregnant women and prevention of perinatal transmission. *Recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States*. Retrieved from http://aidsinfo.nih.gov/contentfiles/PerinatalGL.pdf

Department of Health and Human Services (DHHS). (2011b). Panel on antiretroviral guidelines for adults and adolescents. *Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents*. Retrieved from http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf

Department of Health and Human Services (DHHS). (2012). Panel on treatment of HIV-infected pregnant women and prevention of perinatal transmission. *Recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States*. Retrieved from http://aidsinfo.nih.gov/contentfiles/PerinatalGL.pdf

Deutsche AIDS-Gesellschaft (DAIG) & Österreichische Aids-Gesellschaft. (2011a). Deutsch-Österreichische Leitlinien zur Diagnostik und Behandlung HIV- betroffener Paare mit Kinderwunsch. Retrieved from http://www.daignet.de/site-content/hiv-therapie/leitlinien-1/LL%20HIV%20Paare%20Kinderwunsch%2010_2011.pdf

Deutsche AIDS-Gesellschaft (DAIG) & Österreichische Aids-Gesellschaft. (2011b). *Deutsch-Österreichische Leitlinie zur HIV-Therapie in der Schwangerschaft und bei HIV-exponierten Neugeborenen*. Retrieved from http://www.daignet.de/site-content/hiv-therapie/leitlinien-1/Leitlinien%20zur%20HIV-Therapie%20in%20der%20Schwangerschaft%20und%20bei%20HIV-exponierten%20Neugeborenen.pdf

European Collaborative Study. (2003) Pregnancy-related changes in the longer-term management of HIV-infected women in Europe. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, *111*, 3–8. doi:10.1016/S0301-2115(03)00153-2

Evans, J., Heron, J., Francomb, H., Oke, S., & Golding, J. (2001). Cohort study of depressed mood during pregnancy and after childbirth. *British Medical Journal*, *323*, 257–260. doi:10.1136/bmj.323.7307.257

Fakoya, A., Lamba, H., Mackie, N., Nandwani, R., Brown, A., Bernard, E., & Gazzard, B. (2008). British HIV Association, BASHH and FSRH guidelines for the management of the sexual and reproductive health of people living with HIV infection 2008. *HIV Medicine*, *9*, 681–720. doi:10.1111/j.1468-1293.2008.00634.x

Floridia, M., Ravizza, M., Tamburrini, E., Anzidei, G., Tibaldi, C., Maccabruni, A., & Italian Group on Surveillance on Antiretroviral Treatment in Pregnancy. (2006). Diagnosis of HIV infection in pregnancy: Data from a national cohort of pregnant women with HIV in Italy. *Epidemiology and Infection*, *134*, 1120–1127. doi:10.1017/S0950268806006066

Gaynes, B.N., Gavin, N., Meltzer-Brody, S., Lohr, K.N., Swinson, T., Gartlehner, G., ... Miller, W.C. (2005). *Perinatal depression: Prevalence, screening accuracy, and screening outcomes* (Evidence Report/Technology Assessment No. 119). Rockville, MD: Agency for Healthcare Research and Quality.

German, P., Wang, M., Warren, D., & Kearney, B.P. (2011, April). *Pharmacokinetic interaction between norgestimate/ethinyl estradiol and EVG/COBI/FTC/TDF single tablet regimen*. 12th International Workshop on Clinical Pharmacology of HIV Therapy, Miami. Abstract O_17

González-Tomé, M.I., Ramos Amador, J.T., Guillen, S., Solís, I., Fernández-Ibieta, M., Muñoz, E., ... for the Spanish Cohort of HIV-infected Mother–Infant Pairs. (2008). Gestational diabetes mellitus in a cohort of HIV-1 infected women. *HIV Medicine*, *9*, 868–874. doi:10.1111/j.1468-1293.2008.00639.x

Gotlib, I.H., Whiffen, V.E., Wallace, P.M., & Mount, J.H. (1991). Prospective investigation of postpartum depression: Factors involved in onset and recovery. *Journal of Abnormal Psychology*, *100*, 122–32. doi:10.1037/0021-843X.100.2.122

Greene, S., Tucker, R., Rourke, S.B., Monette, L., Koornstra, J., Sobota, M., ... Watson, J. (2009). "Under My Umbrella": The housing experiences of HIV positive parents who live with and care for their children in Ontario. *Archive of Women's Mental Health*, *13*, 223–32. doi:10.1007/s00737-009-0090-5

Grupo de expertas y expertos del plan nacional sobre el sida y de gesida. (2011). *Documento de consenso de la Secretaría del Plan Nacional sobre el sida /GESIDA sobre la Asistencia en el ámbito sanitario a las mujeres con infección por el VIH*. Retrieved from http://www.gesida.seimc.org/pcientifica/fuentes/DcyRc/gesidadcyrc2011BR-RecomendacionesMujeresVIH.pdf

Hartley, M., Tomlinson, M., Greco, E., Comulada, W.S., Stewart, J., le Roux, I., ... Rotheram-Borus, M.J. (2011). Depressed mood in pregnancy: Prevalence and correlates in two Cape Town peri-urban settlements. *Reproductive Health*, *8*, 9. doi:10.1186/1742-4755-8-9

Heffron, R., Donnell, D., Rees, H., Celum, C., Mugo, N., Were, E., ... for the Partners in Prevention HSV/HIV Transmission Study Team. (2012). Use of hormonal contraceptives and risk of HIV-1 transmission: A prospective cohort study. *The Lancet Infectious Diseases*, *12*, 19–26. doi:10.1016/S1473-3099(11)70247-X

Herbert, T.B., & Cohen, S. (1993) Depression and immunity: A meta-analytical review. *Psychological Bulletin*, *113*, 472–486. doi:10.1037/0033-2909.113.3.472

Hobfoll, S.E., Ritter, C., Lavin, J., Hulsizer, M.R., & Cameron, R.P. (1995). Depression prevalence and incidence among inner-city pregnant and postpartum women. *Journal of Consulting and Clinical Psychology*, *63*, 445–453. doi:10.1037/0022-006X.63.3.445

Huynh, L., Gysler, M., Loutfy, M.R., Margolese, S., Yudin, M.H., Conway, T., ... Librach, C. (2012). Access to conception planning information and services for people living with HIV in Ontario, Canada: A community-based research study. *Vulnerable Children and Youth Studies*, *7*, 6–19. doi:10.1080/17450128.2011.635723

Kapetanovic, S., Christensen, S., Karim, R., Lin, F., Mack, W.J., Operskalski, E., ... Kovacs, A. (2009). Correlates of perinatal depression in HIV-infected women. *AIDS Patient Care and STDs*, *23*, 101–108. doi:10.1089/apc.2008.0125

Koenig, L.J., Espinoza, L., Hodge, K., & Ruffo, N. (2007). Young, seropositive and pregnant: Epidemiologic and psychosocial perspectives on pregnant adolescents with human immunodeficiency virus infection. *American Journal of Obstetrics and Gynecology*, *197*(Suppl. 3), 123–131. doi:10.1016/j.ajog.2007.03.004

Kumwenda, N.I., Hoover, D.R., Mofenson, L.M., Thigpen, M.C., Kafulafula, G., Li, Q., ... Taha, T.E. (2008). Extended antiretroviral prophylaxis to reduce breast-milk HIV-1 transmission. *New England Journal of Medicine*, *359*, 119–129. doi:10.1056/NEJMoa0801941

Leonard, L.G. (1998). Depression and anxiety disorders during multiple pregnancy and parenthood. *Journal of Obstetric, Gynecologic and Neonatal Nursing*, *27*, 329–337. doi:10.1111/j.1552-6909.1998.tb02656.x

Lopez, M., Figueras, F., Hernandez, S., Lonca, M., Garcia, R., Palacio, M., & Coll, O. (2012). Association of HIV infection with spontaneous and iatrogenic preterm delivery: Effect of HAART. *AIDS*, *26*, 37–43. doi:10.1097/QAD.0b013e32834db300

Loutfy, M.R., Hart, T.A., Mohammed, S.S., Su, D., Ralph, E.D., Walmsley, S.L., ... Ontario HIV Fertility Research Team. (2009). Fertility desires and intentions of HIV-positive women of reproductive age in Ontario, Canada: A crosssectional study. *PLoS ONE*, *4*, e7925. doi:10.1371/journal.pone.0007925

Loutfy, M., Raboud, J., Wong, J., Yudin, M., Diong, C., Blitz, S., ... for the Ontario HIV Fertility Research Team. (2012a) High prevalence of unintended pregnancies in HIV-positive women of reproductive age in Ontario, Canada: A retrospective study. *HIV Medicine*, *13*, 107–117. doi:10.1111/j.1468-1293.2011.00946.x

Loutfy, M.R., Margolese, S., Money, D.M., Gysler, M., Hamilton, S., & Yudin, M.H. (2012b). Canadian HIV pregnancy planning guidelines. *Journal of Obstetetrics and Gynaecology Canada*, *34*, 575–590.

Manual pentru ingrijirea copilului infectat cu HIV. (2004) *Program De Prevenire a Transmiterii Verticale a Infectiei HIV*. Implementator: Fundatia Romanian Angel Appeal in colaborare cu Ministerul Santatii. Editie revzuita si adaugita 2004. Bucuresti. Retrieved from http://www.hivability.ro/

McCoy, S., Zheng, W., Montgomery, E., Blanchard, K., van der Straten, A., de Bruyn, G., & Padian, N. (2012, March). *Oral and injectable contraceptive use and risk of HIV acquisition among women: MIRA Study*. Conference on Retroviruses and Opportunistic Infections, Paper No. 20LB, Seattle, WA.

Melekhin, V.V., Shepherd, B.E., Jenkins, C.A., Stinnette, S.E., Rebeiro, P.F., Bebawy, S.S., ... Sterling, T.R. (2010). Postpartum discontinuation of antiretroviral therapy and risk of maternal AIDS-defining events, non-AIDS-defining events and mortality among a cohort of HIV-1-infected women in the United States. *AIDS Patient Care and STDs*, *24*, 279–286. doi:10.1089/apc.2009.0283

Ministero della Salute. (2011). *Linee Guida Italiane sull'utilizzo dei farmaci antiretroviralie sulla gestione diagnostico-clinica delle persone con infezione da HIV-1*. Retrieved from http://www.salute.gov.it/imgs/C_17_pubblicazioni_1301_allegato.pdf

Morgan, M.C., Masaba, R.O., Nyikuri, M., & Thomas, T.K. (2010). Factors affecting breastfeeding cessation after discontinuation of antiretroviral therapy to prevent mother-to-child transmission of HIV. *AIDS Care*, *22*, 866–873. doi:10.1080/09540120903483000

Morrison, M.F., Petitto, J.M., Ten Have, T., Gettes, D.R., Chiappini, M.S., Weber, A.L., ... Evans, D.L. (2002). Depressive and anxiety disorders in women with HIV infection. *The American Journal of Psychiatry*, *159*, 789–796. doi:10.1176/appi.ajp.159.5.789

Nattabi, B., Li, J., Thompson, S.C., Orach, C.G., & Earnest, J. (2009). A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS and Behavior*, *13*, 949–968. doi:10.1007/s10461-009-9537-y

Ndlovu, U., Tharao, W., Read, S., Massaquoi, N., Leonard, L., Samson, L., ... Gruslin, A. (2009, November). *"Nobody Tell Me and I Don't Ask" – The experiences of African/Caribbean Black Muslim women with prenatal HIV testing in Ontario*. Poster session presented at the Ontario HIV Treatment Network Conference in Toronto, Canada.

O'Brien, L.M., Heycock, E.G., Hanna, M., Jones, P.W., & Cox, J.L. (2004). Postnatal depression and faltering growth: A community study. *Pediatrics*, *113*, 1242–1247.

Ogilvie, G.S., Palepu, A., Remple, V.P., Maan, E., Heath, K., MacDonald, G., ... Burdge, D.R. (2007). Fertility intentions of women of reproductive age living with HIV in British Columbia, Canada. *AIDS*, *21*(Suppl. 1), 583–588. doi:10.1097/01.aids.0000255090.51921.60

Parsons, C.E., Young, K.S., Rochat, T.J., Kringelbach, M.L., & Stein, A. (2012). Postnatal depression and its effects on child development: A review of evidence from low- and middle-income countries. *British Medical Bulletin*, *101*, 57–79. doi:10.1093/bmb/ldr047

Prise en charge médicale des personnes vivant avec le VIH – Rapport d'Experts. (2010). Retrieved from http://www.sante/gouv.fr

Ross, R., Sawatphanit, W., & Zeller, R. (2009). Depressive symptoms among HIV-positive pregnant women in Thailand. *Journal of Nursing Scholarship*, *41*, 344–350. doi:10.1111/j.1547-5069.2009.01302.x

Rotheram-Borus, M.J., Lightfoot, M., & Shen, H. (1999). Levels of emotional distress among parents living with AIDS and their adolescent children. *AIDS and Behavior*, *3*, 367–372. doi:10.1023/A:1025497704164

Royal College of Obstetricians and Gynaecologists (RCOG). (2010). *Green-top guideline no. 39: Management of HIV in pregnancy*. Retrieved from http://www.rcog.org.uk/files/rcog-corp/uploaded-files/GtG_no_39_HIV_in_pregnancy_June_2010_v2011.pdf

Rubin, L.H., Cook, J.A., Grey, D.D., Weber, K., Wells, C., Golub, E.T., ... Maki, P.M. (2011). Perinatal depressive symptoms in HIV-infected versus HIV-uninfected women: A prospective study from preconception to postpartum. *Journal of Women's Health*, *20*, 1287–1295. doi:10.1089/jwh.2010.2485

Sherr, L., Clucas, C., Harding, R., Sibley, E., & Catalan, J. (2011). HIV and depression—A systematic review of interventions. *Psychology, Health and Medicine*, *16*, 493–527. doi:10.1080/13548506.2011.579990

Strategies for Management of Antiretroviral Therapy (SMART) Study Group, El-Sadr, W.M., Lundgren, J.D., Neaton, J.D., Gordin, F., Abrams, D., & Rappoport, C. (2006). CD4+ count-guided interruption of antiretroviral treatment. *New England Journal of Medicine*, *355*, 2283–2296

Stratton, P., Tuomala, R.E., Abboud, R., Rodriguez, E., Rich, K., Pitt, J., ... Minkoff, H. (1999). Obstetric and newborn outcomes in a cohort of HIV infected pregnant women: A report of the women and infants transmission study. *Journal of Acquired Immune Deficiency Syndromes & Human Retrovirology*, *20*, 179–186.

Tepper, N.K., Curtis, K.M., Jamieson, D.J., & Marchbanks, P.A. (2012) *Centers for Disease Control and Prevention: Morbidity and Mortality Weekly Report*, *61*(24), 449–452.

The Ethics Committee of the American Society for Reproductive Medicine. (2010) Human immunodeficiency virus and infertility treatment. *Fertility and Sterility*, *94*, 11–15.

Thior, I., Lockman, S., Smeaton, L.M., Shapiro, R.L., Wester, C., Heymann, S.J., ... Mashi Study Team. (2006). Breastfeeding plus infant zidovudine prophylaxis for 6 months vs formula feeding plus infant zidovudine for 1 month to reduce mother-to-child HIV transmission in Botswana: A randomized trial: The Mashi Study. *The Journal of the American Medical Association*, *296*, 794–805. doi:10.1001/jama.296.7.794

Trussell, J. (2007). Contraceptive efficacy. In R.A. Hatcher, J. Trussell, A.L. Nelson, W. Cates, F.H. Stewart, & D. Kowal (Eds.), *Contraceptive technology* (19th ed, pp. 747–756). New York, NY: Ardent Media.

UNAIDS. (2010). *UNAIDS report on the global AIDS epidemic*. Retrieved from http://www.unaids.org/globalreport/documents/20101123_GlobalReport_full_en.pdf

UNICEF. (2009). *Maternal and newborn health*. Retrieved from http://www.unicef.org/health/index_maternalhealth.html

Vernazza, P.L., Graf, I., Sonnenberg-Schwan, U., Geit, M., & Meurer, A. (2011). Preexposure prophylaxis and timed intercourse for HIV-discordant couples willing to conceive a child. *AIDS*, *25*, 2005–2008.

Watts, D.H., Balasubramanian, R., Maupin, R.T., Jr., Delke, I., Dorenbaum, A., Fiore, S., ... PACTG 316 Study Team. (2004). Maternal toxicity and pregnancy complications in human immunodeficiency virus-infected women receiving antiretroviral therapy: PACTG 316. *American Journal of Obstetrics & Gynecology*, *190*, 506–516. doi:10.1016/j.ajog.2003.07.018

Watts, D.H., Lu, M., Thompson, B., Tuomala, R.E., Myer, W.A. 3rd., Mendez, H., ... Mofenson, L.M. (2009). Treatment interruption after pregnancy: Effects on disease progression and laboratory findings. *Infectious Diseases in Obstetrics and Gynecology*, *2009*, 1–8. doi:10.1155/2009/456717

Wimalasundera, R.C., Larbalestier, N., Smith, J.H., de Ruiter, A., McG Thom, S.A., Hughes, A.D., ... Taylor, G.P. (2002). Pre-clampsia, antiretroviral therapy, and immune reconstitution. *Lancet*, *360*, 1152–1154. doi:10.1016/S0140-6736(02)11195-0

World Health Organization (WHO). (2010). *Guidelines on HIV and infant feeding 2010: Principles and recommendations for infant feeding in the context of HIV and a summary of evidence*. Retrieved from: http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf

World Health Organization (WHO). (2012). *Hormonal contraception and HIV*. Retrieved from http://www.who.int/reproductivehealth/topics/family_planning/hc_hiv/en/index.html

Appendix

The database of MEDLINE was searched from 1950 to 2012 using appropriate MeSH headings for each section including "HIV" and "women" and "reproduction" or "pregnancy planning" or "preconception", "contraception" or "family planning", "maternal health", "post-partum depression", "perinatal depression", "breastfeeding", "reproductive health" and "stigma" or "discrimination".