

Sexual and reproductive health of women living with HIV/AIDS

Guidelines on care, treatment and support for women living with HIV/AIDS and their children in resource-constrained settings



Sexual and reproductive health of women living with HIV/AIDS

Guidelines on care, treatment and
support for women living with
HIV/AIDS and their children in
resource-constrained settings



Sexual and reproductive health of women living with HIV/AIDS: guidelines on care, treatment and support for women living with HIV/AIDS and their children in resource-constrained settings.

Co-produced by the UNFPA.

1. HIV infections - therapy. 2. Acquired immunodeficiency syndrome - therapy. 3. Women's health. 4. Family planning services. 5. Prenatal care. 6. Sexually transmitted diseases - therapy. 7. Abortion, Induced. 8. Guidelines. 9. Developing countries. I. World Health Organization. II. United Nations Population Fund. III. Title: Guidelines on care, treatment and support for women living with HIV/AIDS and their children in resource-constrained settings.

ISBN 92 4 159425 X
ISBN 978 92 4 159425 7

(NLM classification: WC 503.2)

© World Health Organization 2006

All rights reserved. Publications of the World Health Organization can be obtained from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int). Requests for permission to reproduce or translate WHO publications – whether for sale or for noncommercial distribution – should be addressed to WHO Press, at the above address (fax: +41 22 791 4806; e-mail: permissions@who.int).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

Printed in France

ACKNOWLEDGEMENTS

These guidelines are part of a series of publications based on the work of a group of experts who participated in several technical consultations on care, treatment and support for women living with HIV/AIDS and their children in resource-constrained settings. The present guidelines could not have been created without the participation of numerous experts.

The World Health Organization (WHO) and the United Nations Population Fund (UNFPA) would like to thank the following people.

Those participating in the writing committee or in peer-reviewing the drafts (or both) include: **Marge Berer, Ward Cates, Anindya Chatterjee, Lynn Collins, Vincent Fauveau, Catherine Hankins, Isabelle Heard, Philippe Lepage, Stanley Luchters, Elizabeth Lule, Chewe Luo, James MacIntyre, Mary-Louise Newell, Elizabeth Preble, Nathan Shaffer, Marleen Temmerman, Eric Van Praag, Beatrice Were.**

The following WHO staff supported the work of the writing committee and reviewed the different drafts of the document: **Catherine d’Arcangues, Nathalie Broutet, Matthew Chersich, Jane Cottingham, Siobhan Crowley, Halima Dao, Luc de Bernis, Isabelle de Zoysa, Peter Fajans, Tim Farley, Claudia Garcia Moreno, Charles Gilks, Carlos Huezo, Sarah Johnson, Manjula Lusti-Narasimhan, Adriane Martin Hilber, Francis Ndowa, Paul Van Look, Peter Weis.** Overall coordination was provided by: **Halima Dao** and **Charlie Gilks** (Department of HIV/AIDS), **Isabelle de Zoysa** (Cluster of Family and Community Health) and **Jane Cottingham** (Department of Reproductive Health and Research), with technical support from **Matthew Chersich** (Department of HIV/AIDS) and **Manjula Lusti-Narasimhan** (Department of Reproductive Health and Research).

The following UNFPA staff provided technical input and support for this publication: **Lynn Collins, France Donnay, Lindsay Edouard, Vincent Fauveau, Helen Jackson, Steve Kraus, Arletty Pinel, Farah Usmani, Faiza Venhadid,** the Technical Support Division, particularly the Publication Review Group, the HIV/AIDS advisers in the UNFPA country technical services teams and the UNFPA Geographical Divisions. Additional thanks go to colleagues at the International Community of Women Living with HIV/AIDS.

CONTENTS

Acknowledgements	III
Abbreviations and acronyms	IV
Executive summary	1
1 Introduction, background and diagnosing HIV infection in women	5
1.1 Introduction – the need for this document	5
1.2 Background	7
1.3 Diagnosing HIV infection among women	8
2 Sexual and reproductive health of women living with HIV/AIDS	11
2.1 Promoting sexual health	11
2.2 Providing high-quality services for family planning	16
2.3 Improving antenatal, intrapartum, postpartum and newborn care	28
2.4 Eliminating unsafe abortion	39
2.5 Combating sexually transmitted infections, reproductive tract infections and cervical cancer	43
3 Sexual and reproductive health of women receiving antiretroviral therapy	55
3.1 Promoting sexual health	57
3.2 Providing high-quality services for family planning	57
3.3 Antiretroviral treatment during pregnancy and childbirth and postpartum	59
3.4 Eliminating unsafe abortion for women receiving antiretroviral therapy	60
3.5 Combating sexually transmitted infections among women receiving antiretroviral therapy	60
References	62

ABBREVIATIONS AND ACRONYMS

AIDS	acquired immunodeficiency syndrome
HIV	human immunodeficiency virus
HPV	human papillomavirus
IUD	intrauterine device
NRTI	nucleoside reverse transcriptase inhibitor
NNRTI	non-nucleoside reverse transcriptase inhibitor
RTI	reproductive tract infection
STI	sexually transmitted infection
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
WHO	World Health Organization

EXECUTIVE SUMMARY

The sexual and reproductive health of women living with HIV/AIDS is fundamental to their well-being and that of their partners and children. This publication addresses the specific sexual and reproductive health needs of women living with HIV/AIDS and contains recommendations for counselling, antiretroviral therapy, care and other interventions.

Improving women's sexual and reproductive health, treating HIV infections and preventing new ones are important factors in reducing poverty and promoting the social and economic development of communities and countries. Sexual and reproductive health services are uniquely positioned to address each of these factors.

EQUITY AND RIGHTS

Gender plays an important role in determining a woman's vulnerability to HIV infection and violence and her ability to access treatment, care and support and to cope when infected or affected. The current scope of HIV interventions and policies needs to be expanded to make gender equity a central component in the fight against HIV.

All women have the same rights concerning their reproduction and sexuality, but women living with HIV/AIDS require additional care and counselling during their reproductive life. HIV infection accelerates the natural history of some reproductive illnesses, increases the severity of others and adversely affects the ability to become pregnant. Moreover, infection with HIV affects the sexual health and well-being of women.

HIV AND SEXUAL HEALTH

HIV testing and counselling is the entry point to HIV-related care and support, including antiretroviral therapy. Knowledge of HIV status is essential for tailoring reproductive health care and counselling according to the HIV status of women and to assist women in making decisions on such issues as the number, spacing and timing of pregnancies, use of contraceptive methods and infant-feeding practices. Further, information and counselling are critical components of all sexual and reproductive health services and support women in making these decisions and carrying them out safely and voluntarily.

Complex factors affect whether women's expression and experience of sexuality lead to sexual health and well-being or place them at risk of ill-health. High-quality programmes and services that address sexuality positively and promote the sexual health of women living with HIV/AIDS are essential for women living with HIV/AIDS to have responsible, safe and satisfying sexual lives, especially in countries severely affected by HIV.

Violence, including sexual violence against women, is strongly correlated with women's risk of becoming infected with HIV. In addition, violence against a woman can interfere with her ability to access treatment and care, maintain adherence to antiretroviral therapy or feed her infant in the way she would like. Health services, including those focusing on HIV treatment, care and prevention, provide an important entry point for identifying and responding to women who experience violence.

FAMILY PLANNING

Family planning services have great potential for leading the way in promoting sexual health and in efforts to prevent and treat HIV/AIDS. Further, helping women living with HIV/AIDS avoid unintended pregnancies is an important component of programmes to prevent HIV among infants. Transmission of HIV and other sexually transmitted infections (STIs) warrants special consideration during family planning counselling. The consistent and correct use of condoms continues to be the most effective contraceptive method that protects against acquiring and transmitting HIV and other STIs. Family planning services must be comprehensive and address HIV prevention including, where appropriate, the benefits of abstinence, the risk associated with unprotected sex with multiple partners as well as the promotion and provision of dual protection.

In addition to medical eligibility criteria, the social, cultural and behavioural context must be considered and specific recommendations of contraceptive methods individualized for each woman based on her stage of disease and treatment as well as lifestyle and personal desires. Women living with HIV/AIDS can safely and effectively use most contraceptive methods. However, several antiretroviral drugs have the potential to either decrease or increase the bioavailability of steroid hormones in hormonal contraceptives.

TERMINATION OF PREGNANCY

About half of all unintended pregnancies are terminated each year, 19 million of them under unsafe conditions. To make an informed decision about whether

to continue with the pregnancy or to terminate it, women living with HIV/AIDS need to know the risks of pregnancy to their own health as well as the risks of transmission of HIV to their infant and the effectiveness, availability and cost of antiretroviral drugs for treating HIV infection and preventing HIV infection among infants as well as the potential toxicity of such drugs. They also need to know where safe, legal abortion is available, about the abortion procedures being provided and the expected side effects and the risks of undergoing unsafe abortions (those performed by unskilled providers and/or in unhygienic conditions). Provision of family planning counselling and services is an essential component of post-abortion care and assists women in avoiding unintended pregnancies in the future, thereby reducing repeat abortions.

PREGNANCY, BIRTH AND POSTPARTUM

Skilled care during pregnancy, childbirth and postpartum includes considering the effects of HIV/AIDS on complications during these events, paying attention to HIV-related treatment and care needs and intervening to reduce HIV transmission to infants. Although pregnancy does not have a major effect on the progression of HIV disease, women living with HIV/AIDS have a greater risk of certain adverse pregnancy outcomes, such as intrauterine growth restriction and preterm delivery. Pregnant women living with HIV/AIDS have an increased risk of developing malaria and its consequences and therefore require additional precautions.

The benefit of elective caesarean section in reducing HIV transmission has to be balanced against the risk of the surgical procedure. Women living with HIV/AIDS have increased risks of postoperative morbidity following caesarean section, especially infective complications.

Comprehensive postpartum follow-up and care for women living with HIV/AIDS and their infants extends beyond the six-week postpartum period and includes assessment of maternal healing after delivery, evaluation for postpartum infectious complications and ongoing infant-feeding counselling and support for the woman's choice of how to feed her baby.

SEXUALLY TRANSMITTED INFECTIONS

The control of STIs has received renewed attention because of the strong correlation between the spread of STIs and HIV transmission. Systematic screening for STIs, consisting of history-taking, clinical examination and laboratory screening for syphilis, is part of the initial clinical evaluation of a woman with HIV. Appropriate

and prompt case management of STIs reduces the risk of transmitting HIV to sexual partners and the reproductive-tract and obstetric complications associated with STIs. Although the presentation and response to treatment of some STIs – in particular genital herpes and chancroid – may be altered in women living with HIV/AIDS, standard treatment protocols are effective.

In many countries, cervical cancer is the most common malignancy among women and the leading cause of women's deaths from cancer. Screening programmes can significantly reduce the number of new cases of cervical cancer and the mortality rates of cervical cancer.

Providing antiretroviral therapy and HIV-related care for women living with HIV/AIDS is essential for reducing maternal mortality, effectively preventing HIV infection among infants and improving the survival of children born to women living with HIV/AIDS. All efforts should be made to ensure that all women who require antiretroviral therapy have access to it.

WOMEN RECEIVING ANTIRETROVIRAL THERAPY

Antiretroviral therapy programmes need to be sensitive to women-specific needs, particularly in relation to their sexual and reproductive health. The selection of an antiretroviral therapy regimen for women should consider the possibility of a planned or unintended pregnancy and that antiretroviral drugs may be taken in the first trimester of pregnancy during the period of fetal organ development and before a pregnancy is recognized. For women receiving antiretroviral therapy, special efforts to support adherence may be needed during pregnancy, childbirth and the early postpartum period.

As the health and well-being of women improve with antiretroviral therapy, women may reconsider previous decisions regarding their sexuality and reproduction. Health care providers should be aware of this and anticipate that women need counselling and support to make these decisions.

1 INTRODUCTION, BACKGROUND AND DIAGNOSING HIV INFECTION IN WOMEN

1.1 INTRODUCTION — THE NEED FOR THIS DOCUMENT

Both men and women are severely affected by HIV/AIDS. Estimates in December 2005 indicate that about 40 million people are living with HIV, of which about 17.5 million are women (1). However, in some regions women now account for more than half the people infected with HIV and represent a growing proportion of the people living with HIV. The reasons for this are both biological – women’s greater likelihood than men of being infected in heterosexual encounters – as well as social. Women, especially young women, may be unable to negotiate condom use and are more likely than men to experience coerced sex (2–4).

Women also bear a greater burden of sexual and reproductive ill-health than men. More than half a million women die annually in pregnancy and childbirth from largely preventable causes, almost all of these deaths occurring in resource-constrained settings (5). Globally, 13% of all maternal deaths are due to the complications of unsafe abortion, resulting from the estimated 19 million unsafe abortions occurring annually (6). More than 340 million new cases of curable sexually transmitted infections (STIs) occur annually, and sexually transmitted human papillomavirus (HPV) infection – closely associated with cervical cancer – is diagnosed in more than 490 000 women and causes 240 000 deaths every year (7).

HIV affects or potentially affects all the dimensions of women’s sexual and reproductive health – pregnancy, childbirth, breastfeeding, abortion, use of contraception, exposure to, diagnosis and treatment of STIs and their exposure to sexual violence. For instance, HIV infection accelerates the natural history of some reproductive illnesses and increases the severity of others. Studies in both resource-constrained and resource-rich settings indicate that HIV adversely affects the ability to become pregnant (8–11). Infection with HIV also affects the sexual health and well-being of women as well as men.

For all these reasons, it is essential that those providing sexual and reproductive health services have the knowledge and skills to address the particular concerns

and problems of women living with HIV. Because of the stigma and discrimination so often attached to HIV, it is particularly important that health service providers be able to protect the reproductive rights of women living with HIV. These rights include having access to sexual and reproductive health services and sexuality education, being able to choose a partner, deciding whether to be sexually active or not and deciding freely and responsibly the number, spacing and timing of their children. Women also have the right to make these decisions free of discrimination, coercion and violence (12).

This publication provides guidance on adapting health services to address the sexual and reproductive health needs of women living with HIV/AIDS and integrating these activities within the health system. Providers of HIV services should also be aware of the sexual and reproductive health needs of the people they serve and integrate these interventions into a broad, comprehensive service delivery package. This publication addresses these specific needs and related interventions. It contains recommendations for counselling, care and other interventions that are based on the available scientific evidence and accumulated programmatic experience and supplemented by expert opinion where evidence is lacking or inconclusive.

This publication primarily targets national-level programme planners and managers responsible for designing HIV programmes and comprehensive sexual and reproductive health services for women. It may also be a useful resource for health care workers involved in efforts to improve the sexual and reproductive health of women and to provide treatment and care for women living with HIV/AIDS. It is part of a series of modules being developed by WHO and its partners comprising guidelines on care, treatment and support for women living with HIV/AIDS and their children in resource-constrained settings. WHO will regularly review the evidence base for these guidelines and issue updated recommendations when warranted by new information.

The sexual and reproductive health of women living with HIV/AIDS is fundamental to their well-being and that of their partners and children. Improving women's sexual and reproductive health, treating HIV infection and preventing new HIV infections are important factors in reducing poverty and promoting the social and economic development of communities and countries. Sexual and reproductive health services are uniquely positioned to address each of these factors.

1.2 BACKGROUND

WHO has identified five core aspects of sexual and reproductive health that are essential in accelerating progress towards meeting internationally agreed targets (7):

- improving antenatal, delivery, postpartum and newborn care;
- providing high-quality services for family planning, including infertility services;
- eliminating unsafe abortion
- combating sexually transmitted infections (STIs), including HIV, reproductive tract infections (RTIs), cervical cancer and other gynaecological morbidities; and
- promoting sexual health.

Although all women have the same rights and similar needs for reproductive health care, women living with HIV/AIDS require additional care and counselling during their reproductive life cycle. The full range of HIV services should be integrated into sexual and reproductive health services (13). Where services cannot be integrated, explicit mechanisms of referral for HIV treatment, care, prevention and support must be established. Similarly, HIV programmes should address the sexual and reproductive health needs of women and encourage two-way referral links. Full integration of HIV-related interventions within sexual and reproductive health services would reduce overlap in service provision and help remove the stigma of stand-alone HIV services (14).

Most of the 17.6 million women living with HIV/AIDS are of childbearing age (1) and face difficult choices concerning their sexuality and childbearing. Women's choices are made in a particular time and context and are complex, multifactorial and subject to change. Moreover, their choices may be limited by direct or indirect social, economic and cultural factors as well as medical factors. Information and counselling are critical components of all sexual and reproductive health services to support women in making these choices and carrying them out safely and voluntarily.

Most women living with HIV/AIDS suffer or fear stigmatization (15). Forms of stigma and discrimination include: perceptions that women living with HIV/AIDS are promiscuous; blame for bringing HIV into a relationship or family; being deemed irresponsible if they desire to have children; and being considered as vectors of HIV transmission to their children. Some health care workers may be hesitant to provide care for women living with HIV/AIDS because of fears

of HIV transmission. Moreover, health workers may have negative attitudes or biases towards women living with HIV/AIDS, particularly regarding their sexual and reproductive health practices. Sex workers and injecting drug users living with HIV/AIDS may face additional stigma. Peer counsellors and support groups involving other women living with HIV/AIDS may be a powerful and positive influence and assist women and their families in coping with HIV and with stigma and discrimination.

Mediated disclosure to partners can be explored if the women concerned are in agreement. Couple counselling can reduce tensions between partners and enable both partners to make sexual and reproductive choices together as partners in a relationship. Counselling and information for men with HIV must include family planning, the risk of transmission of HIV to uninfected partners and to infants, antiretroviral therapy, condom use and dual protection. Involvement of men and the greater community is important in initiatives to counter cultural norms that limit women's ability to control their own sexual and reproductive health and subject women to harmful practices. However, men's involvement in sexual and reproductive health services is generally low, and specific outreach activities may be needed to promote and facilitate the participation of men, both as individuals and as a partner in a relationship.

1.3 DIAGNOSING HIV INFECTION AMONG WOMEN

Knowledge of HIV status plays an essential role in efforts to prevent and treat HIV. In addition, it allows reproductive health care and counselling to be tailored to the HIV status of women and assists women in making decisions on issues such as the number, spacing and timing of pregnancies, contraceptive methods and infant-feeding practices.

Provider-initiated approaches (16), in which health care providers routinely initiate an offer of HIV testing and counselling, are increasingly being promoted, although client-initiated voluntary counselling and testing remains critical to increasing the number of people who know their HIV status. To date, the routine offer of HIV testing and counselling in reproductive health services has largely been confined to antenatal care settings and, in particular, as part of interventions to prevent HIV transmission to infants. In settings in which the provision of, or referral to, effective prevention and treatment services is assured, health care providers should routinely offer HIV testing to everyone being assessed for an STI as well. People retain the right to refuse testing: to opt out of a systematic provider-initiated offer of testing.

Although HIV testing and counselling is considered part of essential care during pregnancy, many women deliver without being offered testing and counselling. Offering HIV testing and counselling around the time of labour or shortly thereafter has been shown to be feasible for the women who have not accessed HIV testing during pregnancy (17–19).

However, given the benefits of knowing one's HIV status, HIV testing and counselling should be made available to women attending all reproductive health services (20). Further, confining HIV testing and counselling to antenatal care and childbirth settings reinforces the perception that the primary objective of identifying HIV infection in women is to prevent transmission to infants rather than for the benefit of the women themselves.

Scaling up HIV testing needs to be accompanied by access to integrated treatment, care and prevention services as well as improved protection from stigma and discrimination. This scaling up must be grounded in an approach that protects human rights and respects ethical principles so that testing is confidential, accompanied by counselling and only conducted with informed consent.

Pretest counselling includes information on the clinical and prevention benefits of testing and the follow-up services that will be provided. Such counselling must also consider the importance of anticipating, in the event of a positive test result, the need to inform anyone at ongoing risk who would otherwise not suspect they were exposed to HIV infection. Counselling is an opportunity to identify barriers to disclosure of HIV status and support women in assessing the safety and feasibility of disclosing to their partners. Further, all women who undergo HIV testing should be offered counselling and support for negotiation of safe and consensual sex, including dual protection options and access to male and/or female condoms. Women who have experienced gender-based violence have low self-esteem or thoughts of suicide require additional counselling and support. Referral to health workers with specific training in these areas may be necessary.

Key recommendations

- Given the benefits of knowing one's HIV status, HIV testing and counselling should be made available to all women attending sexual and reproductive health services.
- Scaling up HIV testing needs to be accompanied by access to integrated treatment, care and prevention services as well as improved protection from stigma and discrimination.
- In settings with high HIV prevalence, health care providers should routinely offer HIV testing during pregnancy to everyone being assessed for an STI and to acutely unwell women presenting for sexual and reproductive health care.
- Men's involvement in sexual and reproductive health services should be promoted, both as an individual and as a partner in a relationship.

2 SEXUAL AND REPRODUCTIVE HEALTH OF WOMEN LIVING WITH HIV/AIDS

2.1 PROMOTING SEXUAL HEALTH

2.1.1 HIV AND SEXUALITY

The HIV pandemic has played a major role in shaping the current understanding of human sexuality and sexual behaviour and has increased willingness to address sexual health in a frank and direct manner. Sexual health, the state of physical, emotional, mental and social well-being in relation to sexuality, is an important and integral aspect of human development and maturation throughout the life cycle. Complex factors influence human sexual behaviour. These factors affect whether women's expression and experience of sexuality leads to sexual health and well-being or places them at risk of ill-health. Unfortunately, rather than women having satisfying and safe sexual experiences, their sexuality is often the cause of distress and characterized by unsafe or harmful sexual practices that lead to adverse health outcomes.

Adult health status is closely linked to experiences during adolescence; adolescent sexuality sets the stage for sexual health in later life and is inseparable from adult sexuality. Specific actions to promote sexual and reproductive health among adolescents and to address their HIV-related vulnerability and risks are needed. These include:

- addressing the particular sexual and reproductive health needs of adolescent girls with HIV;
- ensuring the availability of age-appropriate information and counselling on sexuality and safer sexual practices;
- education on abstinence and the benefits of delaying entry into sexual debut; and
- access to family planning counselling and services that are adolescent-friendly.

Infection with HIV can affect the sexual health of a woman in a number of ways:

- decreased sexual desire or satisfaction;
- feelings of guilt or shame;
- a negative association of sex with HIV;
- resentment towards a sexual partner;
- ill-health or mental stress that may interfere with sexual function;
- potentially increased vulnerability to sexual violence and STIs; and
- infertility.

High-quality programmes and services that positively address sexuality and promote the sexual health of women living with HIV/AIDS are essential for women living with HIV/AIDS to have responsible, safe and satisfying sexual lives, especially in countries severely affected by HIV. Associations of people living with HIV, women's movements and youth networks are especially suited to bring sexual health issues to the public attention in a destigmatizing way and to create powerful partnerships for improving the sexual health and well-being of women living with HIV/AIDS.

Current sexual health programmes largely target the individual behaviour that influences the risk of HIV transmission. They should also recognize the factors affecting vulnerability to HIV: the broader social, economic, institutional and personal factors that increase the vulnerability of individuals to sexual ill-health and place them at higher risk. These factors include poverty, certain occupations, lack of power in sexual relationships, gender-based violence, harmful sexual practices and early marriage (21).

Interventions to address the public health crisis stemming from unsafe sexual behaviour must be based on fundamental values and principles grounded in human rights; incorporate emotional, psychological and cultural factors; and address both the pleasure and safety aspects of sexuality and sexual health. Further, such interventions must be tailored to the specific circumstances within each country.

Health care workers may require further training in human sexuality, to increase their capacity and confidence in addressing sexual health.

Because of difficulties in addressing issues of sexuality with the opposite sex, it may be preferable that female health workers carry out sexual and reproductive health counselling for women.

In recent years, HIV strategies have focused on expanding prevention programmes designed specifically for people with HIV. Although a positive HIV test result typically prompts people to avoid transmitting HIV to others, there are often impediments to implementing and/or sustaining safer sexual behaviour. Initiatives to overcome these impediments include:

- counselling on issues concerning the disclosure of HIV status to sexual partners;
- assistance in identifying and overcoming impediments to safer behaviour;
- regular access to condoms (female and male) and counselling on their correct and consistent use;
- promotion of accessible STI screening and case management; and
- education on the potential for transmitting HIV even while receiving antiretroviral therapy.

Many of the difficulties women living with HIV/AIDS face in adopting safer sexual behaviour stem from gender inequity associated with power imbalances within relationships, gender-based violence or threats of abandonment.

Key recommendations

- High-quality programmes and services that positively address sexuality and promote the sexual health of women living with HIV/AIDS are essential, particularly in countries severely affected by HIV.
- Specific action is needed to promote sexual and reproductive health among adolescents and to address the sexual and reproductive health needs of adolescent women living with HIV/AIDS, an especially vulnerable group.

2.1.2 VIOLENCE AGAINST WOMEN LIVING WITH HIV/AIDS

Violence against women occurs throughout the world and includes sexual violence, physical assault and psychological violence such as intimidation, withholding resources and preventing women from working outside the home. The consequences are extensive and include unwanted pregnancy, unsafe abortion, chronic pain syndromes, infection with HIV and other STIs and disorders of the reproductive system. The impact of violence on mental health can be as serious and long-lasting as physical injuries and include post-traumatic stress disorder and depression (2).

The epidemics of violence and HIV overlap and interact in several complex ways. Violence against women, or the fear of it, may interfere with a woman's ability to negotiate safer sex or refuse unwanted sex. Forced or coercive sexual intercourse can result in transmission of HIV and other STIs. The risk of transmission increases with the degree of trauma and with vaginal lacerations and abrasions that occur when force is used. Further, violence against a woman can interfere with her ability to access treatment and care, maintain adherence to antiretroviral therapy or carry out her infant-feeding choice.

Although discussions about sexual violence tend to focus on rape by strangers, acknowledging that coercive sex also happens within families and intimate relationships is crucial (4). Violence inflicted by an intimate partner and being infected with HIV are strongly associated; women living with HIV/AIDS are more likely to have experienced physical and sexual violence by their partners than women not infected with HIV (22–24).

Further, evidence is growing that the relationship between violence against women and HIV may be indirectly mediated by risk-taking behaviour. Childhood sexual abuse, coerced sexual initiation and current partner violence are linked to increased risk-taking, including having multiple partners, non-primary partners (partnerships outside marriage, union or stable relationship) or engaging in transactional sex (25–27).

Fear of negative outcomes, including fear of violence, is a major barrier to disclosing HIV status. Non-disclosure can hinder a woman's ability to access HIV-related treatment, care and support. Research indicates that between 16% and 86% of women in resource-constrained

settings choose to disclose their HIV status to their partners (28). Most women who disclose their HIV status to partners have a positive outcome, including increased social support, acceptance, decreased anxiety and depression and strengthening of relationships (28). However, for 4–28% of women, disclosing HIV status is associated with negative outcomes, including violence as a reaction to disclosure among 4–15% of women. Studies in sub-Saharan Africa have found higher risks of disclosure-related violence compared with studies in the United States (29). Higher risks were also reported among women living with HIV/AIDS attending antenatal care or in discordant relationships (30).

The current scope of HIV interventions and policies needs to be expanded to make gender inequality, especially violence inflicted by an intimate partner, a central component in the fight against HIV/AIDS. The challenge of integrating gender-sensitive interventions into sexual and reproductive health services and HIV/AIDS programmes, while formidable, can be met. To meet this challenge, health services need to acknowledge and address the gender-specific concerns and needs of women while seeking to transform gender roles and create more equitable relationships.

Several strategies can be used to target the social attitudes, and gender and sexual norms, underlying violence against women. These include educational initiatives and public awareness campaigns to address aspects of HIV/AIDS, sexual and reproductive health, relationships and violence; and life skills for avoiding risky or threatening situations and negotiating safer sexual behaviour. These prevention strategies can be effectively incorporated into various settings in the community, such as schools, youth groups and the workplace.

Health services, including those focusing on HIV treatment, care and prevention, provide an important entry point for identifying and responding to women who experience violence. Providers of care for women living with HIV/AIDS should be sensitive to the increased risk of violence such women may face and ensure that ongoing counselling and support are available to assist with decisions regarding disclosing their HIV status and any other problems they face that may be associated with violence. Ensuring that health providers working in HIV services and in domestic violence are trained in both areas may be an effective strategy to sensitize providers to the dynamic way in which both epidemics intersect.

For women who experience violence, health providers must facilitate:

- counselling, support and follow-up;
- care for their physical injuries;
- treatment for sexual and reproductive health problems, including pregnancy testing and STI prophylaxis and treatment; and
- referrals to services they may need, such as social welfare, legal aid and safe shelters for women as well as mental health services.

Key recommendations

- The current scope of HIV interventions and policies needs to be expanded to make gender inequality, especially violence inflicted by an intimate partner, a central component in the fight against HIV/AIDS.
- Providers of care for women living with HIV/AIDS should be sensitive to the increased risk of violence such women may face and ensure that ongoing counselling and support are available to assist with decisions regarding disclosing their HIV status and any other problems they face that may be associated with violence.

2.2 PROVIDING HIGH-QUALITY SERVICES FOR FAMILY PLANNING

Contraceptive use has increased substantially in many low- and middle-income countries. However, despite these increases, many women who desire to postpone, space or limit pregnancies still have an unmet need for safe and effective contraception, especially in sub-Saharan Africa, where only 27% of women of reproductive age who are married or cohabiting use contraception compared with a world average of 61% (31). When motivation to regulate fertility is strong but effective contraception is inaccessible, many unintended pregnancies occur.

Although the reasons women living with HIV/AIDS seek contraception are mostly the same as those for women not infected with HIV, there are additional

considerations in family planning counselling and for the selection of contraceptive methods by women living with HIV/AIDS. Further, as family planning services are directly concerned with the outcomes of sexual relationships and reach women who are sexually active, they have great potential for leading the way in promoting sexual health and in efforts to prevent and treat HIV.

Helping women living with HIV/AIDS to prevent unintended pregnancies is an important, though often neglected, approach to preventing HIV transmission to infants (see section 2.3.2) (32,33). A study using cost–effectiveness modelling based on data from actual field implementation in eight African countries demonstrated the potential importance of family planning services in reducing HIV infection among infants. Reducing unintended pregnancies among women living with HIV/AIDS by 16% would be estimated to have the equivalent impact in averting HIV infection among infants as antiretroviral prophylaxis using single-dose maternal and infant nevirapine (34).

2.2.1 FAMILY PLANNING COUNSELLING

In HIV services, discussion of family planning should be initiated during pretest and post-test counselling and occur in follow-up information and counselling sessions as well as at regular intervals throughout care. To assist a woman living with HIV/AIDS in considering her reproductive choices and make decisions about pregnancy and contraceptive use, such information and counselling should include:

- information about effective contraceptive methods to prevent pregnancy, including recommending dual protection;
- the effects of progression of HIV disease on the woman’s health and the implications for planning a family;
- the risk of HIV transmission to an uninfected partner while having unprotected intercourse (for instance, when trying to become pregnant);
- the risk of transmission of HIV to the infant and the risks and benefits of antiretroviral prophylaxis in reducing transmission (see section 2.3.2); and
- information on the interactions between HIV and pregnancy, including a possible increase in certain adverse pregnancy outcomes (see sections 2.3.3 and 2.3.4).

2.2.2 CONTRACEPTION AND DUAL PROTECTION

Women living with HIV/AIDS should be assisted in choosing a contraceptive method that is most suited to their situation and needs, including disease stage, treatment situation, lifestyle and personal desires. Each woman is best placed to interpret the risks and benefits of available methods and she must make the final selection of a contraceptive method. However, to make an informed choice of contraceptive method, women require information on:

- the relative effectiveness of the method;
- the mode of action;
- the correct use of the method;
- the risks and benefits of the method;
- common side effects;
- cost and convenience issues;
- the effects on the transmission and acquisition of STIs, including HIV; and
- potential drug interactions with hormonal contraceptives.

According to WHO's *Medical eligibility criteria for contraceptive use* (35), women with asymptomatic HIV infection and women with AIDS can safely and effectively use most methods of contraception. However, transmission of HIV and other STIs warrants special consideration during family planning counselling because preventing such transmission is equally important as preventing pregnancy. As condoms are the only contraceptive method protecting against acquiring and transmitting HIV and other STIs, family planning services should strongly encourage and facilitate women living with HIV/AIDS to use them consistently and correctly, with or without another contraceptive method. This is often referred to as dual protection.

Dual protection refers to simultaneous protection against both unplanned pregnancy and STIs and HIV. It is achieved by using condoms alone or by using condoms together with another effective method of contraception, including emergency contraception. Such protection can also be realized through safe alternatives to penetrative sex. Counselling and support for dual protection should be promoted and provided by all sexual and reproductive health services (36,37)

and services for HIV care, treatment and support. Dual protection is of great importance for women living with HIV/AIDS:

- to protect against unintended pregnancy;
- to prevent other STIs; and
- to prevent reinfection with other HIV strains.

It will also help to reduce their risk of transmitting HIV to their partner. Use of condoms is described below. It is hoped that an alternative to condoms – microbicides – will provide an invaluable additional method of dual protection. Several effectiveness trials of microbicides are currently being conducted. These products are inserted into the vagina before sexual intercourse to prevent the transmission of HIV and other STIs, and the woman would control them. Although some microbicides aim to provide simultaneous protection against unintended pregnancies and STIs, others are intended for preventing HIV and other STIs only.

2.2.2.1 CONDOMS

When used consistently and correctly, both male and female condoms are highly effective in protecting against pregnancy and against STIs. In studies of contraceptive effectiveness with perfect use, male condoms are 98% effective and female condoms are 95% effective in preventing pregnancy (38). When not used consistently and correctly (typical use), effectiveness is lowered but still comparable to other contraceptive methods: 85% and 79%, respectively. Male latex condoms protect against both female-to-male and male-to-female transmission of HIV, as shown in studies of discordant couples (39). Further, condoms offer protection against reinfection with HIV: limited evidence suggests that infection with more than one strain of HIV may accelerate the progression of HIV disease (40). Male condoms also protect against other STIs, although the level of protection has not been quantified for each specific STI. There is no published scientific evidence that nonoxynol-9-lubricated condoms provide any additional protection against pregnancy or STIs compared with condoms lubricated with other products. Since adverse effects due to the addition of nonoxynol-9 to condoms cannot be excluded, such condoms should no longer be promoted. However, using nonoxynol-9-lubricated condoms is better than using no condoms (41).

Available data indicate that the female condom, when used consistently and correctly, also provides protection against STIs, including HIV (42–44). Although it may be slightly less effective in preventing pregnancy than the male condom, the female condom does offer several advantages, including insertion prior to sexual intercourse, not having to be removed immediately after ejaculation and greater female control, although some degree of negotiation and male cooperation is required. To date, use of the female condom has been limited by cost, lack of widespread availability or familiarity and under-resourced promotion.

Major barriers to increased condom use remain in areas with high HIV prevalence, including negative attitudes towards condoms, irregular supplies, high costs (for the female condom) and the fact that family planning services and policy-makers perceive that condoms are not effective. Low rates of condom use have been reported, even following disclosure of HIV status to sexual partners (45). Because condoms have a relatively higher failure rate with typical use, women who are very apprehensive about becoming pregnant are often offered other methods of contraception. When other contraceptive methods are used, consistent use of condoms may be less likely (46–48). Further, both providers and potential users may underemphasize the use of condoms in situations where preventing pregnancy is not a concern, such as in marriage or stable relationships, in cases of infertility, after sterilization or among older or postmenopausal women (49). Every effort must be made to encourage women living with HIV/AIDS to understand the need for dual protection and the need for using condoms, and all family planning services should offer them routinely.

2.2.2.2 INTRAUTERINE DEVICE

For women who use an intrauterine device (IUD), limited evidence shows no increased risk of infection or IUD-related complications among those living with HIV/AIDS versus those not infected with HIV (50,51). Further, in a cohort study in Kenya, no increase in cervical HIV shedding was detected four months after the IUD was inserted (52). IUD use among women living with HIV/AIDS was not associated with an increased risk of HIV transmission to sexual partners in the study.

Consequently, WHO recommends that women living with HIV/AIDS who are asymptomatic and women with AIDS who are receiving

antiretroviral therapy and clinically well can safely use an IUD (35). However, the IUD is not usually recommended for women with AIDS who are not receiving antiretroviral therapy, if more appropriate contraceptive methods are available and acceptable. Women who develop AIDS while using an IUD can generally continue using the IUD with close monitoring for pelvic infection.

The IUD is not usually recommended for women living with HIV/AIDS, who have very high individual likelihood of exposure to gonorrhoea or *Chlamydia* infection, based on concerns about pelvic inflammatory disease. Using an algorithm to classify STI risk status among IUD users, one study reported that 11% of women with a high risk of STIs experienced IUD-related complications compared with 5% of those not classified as having high risk (53). Other studies have also reported an increased risk of pelvic inflammatory disease among IUD users at high risk of acquiring STIs (54). Further, a study in Indonesia found an association between IUD use and bacterial vaginosis, a risk factor for pelvic inflammatory disease (55). However, pelvic inflammatory disease among IUD users is most strongly related to the insertion process, and pelvic inflammatory disease is infrequent beyond the first 20 days after insertion (56). If a woman has current pelvic inflammatory disease, purulent cervicitis, *Chlamydia* infection or gonorrhoea, the IUD should not be inserted. However, if she develops these while using the IUD, she may continue to use it while being treated.

2.2.2.3 HORMONAL METHODS

Limited evidence suggests no association between the use of combined oral contraceptives and changes in plasma viral load levels or CD4 cell counts among women living with HIV/AIDS (57). Further, limited evidence shows no association between the use of combined oral contraceptives and female-to-male transmission of HIV (58). Studies show inconsistent results regarding changes in HIV and herpes simplex virus shedding among women living with HIV/AIDS using hormonal contraception (59–64). There are no data concerning progestogen-only pills and HIV transmission. Women living with HIV/AIDS have no restrictions on the use of steroid hormonal contraceptives, including combined oral contraceptives, progestogen-only pills, combined injectable contraceptives, depot medroxyprogesterone acetate, combined patch and combined vaginal ring (35). However, if a woman is receiving antiretroviral therapy, potential drug interactions need to be considered (see sections 2.2.2.8 and 3.2).

There are concerns that women may have a greater risk of acquiring other STIs when using hormonal contraceptives. Evidence from several cross-sectional and prospective studies suggests that combined oral contraceptive users may be at a moderately elevated risk of acquiring *Chlamydia* infection (65). Many of these studies, however, have several methodological concerns. As these studies did not directly measure STI exposure, assessing whether the results are due to differential STI exposure among the contraceptive groups is difficult. Given the inability to randomize women to contraceptive method groups, self-selection of contraceptive method may be associated with other STI risk factors, many of which are difficult to measure or control for.

Evidence from two cross-sectional and two prospective studies suggests an increased risk of *Chlamydia* infection among depot medroxyprogesterone acetate users (65,66). However, as with combined oral contraceptives, without a direct measure of STI exposure, being certain that the results of these studies are not due to differential STI exposure among the contraceptive method groups is difficult. For other STIs, there is either evidence of no association between depot medroxyprogesterone acetate use and acquiring STIs or insufficient evidence to draw any conclusions. WHO recommends no restrictions for the use of combined oral contraceptives, combined injectable contraceptives, progestogen-only pills, or depot medroxyprogesterone acetate among women at high risk of STIs (35).

2.2.2.4 LACTATIONAL AMENORRHOEA METHOD

In circumstances in which a woman with HIV decides to breastfeed, she can use the lactational amenorrhoea method for family planning purposes. For adequate protection from an unplanned pregnancy, women must be exclusively or nearly exclusively breastfeeding, have amenorrhoea and be less than six months postpartum (67). However, before selecting this contraceptive method, a woman with HIV/AIDS should receive counselling that includes information about the risks and benefits of various infant-feeding options based on a local assessment, guidance in selecting the most suitable infant-feeding option for her situation and support for her choice (see section 2.3.5).

2.2.2.5 SPERMICIDES

Women living with HIV/AIDS should not use spermicides alone or with other barrier methods (41). This recommendation is based on the findings of a systematic review and meta-analysis of randomized controlled trials (68) showing that the spermicide nonoxynol-9 may be associated with higher rates of genital ulceration and HIV acquisition compared with placebo. A similar analysis (69) concluded that nonoxynol-9 offers no protection against STIs such as *Neisseria gonorrhoeae* and *Chlamydia* infection. The safety concerns with nonoxynol-9 also apply to other spermicide products marketed for contraception. The WHO recommendation that women living with HIV/AIDS and women at high risk of HIV not use spermicides also extends to diaphragms and cervical caps used with spermicides.

2.2.2.6 STERILIZATION

Given that sterilization is a surgical procedure that is intended to be permanent, special care must be taken to ensure that every woman makes a voluntary informed choice of method. Particular attention is needed for young women or women with mental health problems, including depressive conditions. Health care workers should ensure that women are not pressured or coerced to undergo the procedure and that the decision is not made in a moment of crisis. All women, irrespective of HIV status, must understand the permanence of sterilization and be informed of alternative contraceptive methods. Male and female sterilization does not protect against acquiring STI or transmitting HIV. Women need to be reminded of the importance of using condoms in preventing STIs, including HIV, particularly as sterilization has been associated with a decrease in condom use (70). The decision process must consider the national laws and existing norms for sterilization procedures. The presence of an AIDS-related illness may require that the procedure be delayed.

2.2.2.7 EMERGENCY CONTRACEPTION

Emergency contraception can prevent pregnancy when a contraceptive method fails, no method was used or sex was forced on a woman not protected by a reliable method of contraception. Emergency contraceptive pills can be used by women within five days of unprotected intercourse, although they are more effective

if taken sooner (71). Based on the findings of a multicentre randomized trial (72), the preferred oral emergency contraceptive regimen consists of 1.50 mg of levonorgestrel in a single dose. This regimen is effective, has few side effects and is easier to use than other regimens.

2.2.2.8 CONTRACEPTION AND DRUG INTERACTIONS

For women receiving antituberculosis therapy, potential drug interactions with rifampicin and certain hormonal contraceptives need to be considered. Although the interaction is not harmful to women, it is likely to reduce the effectiveness of hormonal contraception. Therefore, low-dose estrogen ($\leq 35 \mu\text{g}$) combined oral contraceptive is usually not recommended among women receiving rifampicin if other more appropriate methods are available and acceptable. Depot medroxyprogesterone acetate can generally be used with rifampicin, and the effectiveness of a levonorgestrel-releasing IUD is unlikely to be reduced. Alternatively, a non-hormonal method of contraception may be used throughout rifampicin treatment and for at least one month thereafter.

Several antiretroviral drugs have the potential to either decrease or increase the bioavailability of steroid hormones in hormonal contraceptives. Section 3.2 further discusses these potential drug interactions and additional considerations regarding family planning and contraceptive use among women receiving antiretroviral therapy.

2.2.3 COUNSELLING FOR WOMEN LIVING WITH HIV/AIDS WHO ARE PLANNING A PREGNANCY

Pregnancy may carry additional risks for an HIV-positive woman, both for her own health and the infant's health (see section 2.3). Women living with HIV/AIDS should be aware of these risks when considering whether to have children and planning a family. Special counselling and support should therefore be provided to HIV-positive women living with HIV/AIDS planning a pregnancy, whether their partner is HIV-positive (seroconcordant) or HIV-negative (serodiscordant). Section 3.2 provides further information on planning pregnancy when receiving antiretroviral therapy.

2.2.3.1 HIV AND FERTILITY

Studies from Africa as well as high-income countries suggest that HIV may adversely affect fertility (73–75). Several factors may affect the ability of women living with HIV/AIDS to become pregnant. Reduced fertility levels may be caused by decreased sexual activity for several reasons, including less desire for sexual intercourse and the clinical symptoms associated with the HIV infection. They may also be caused by previous STI infection and associated pelvic inflammatory disease. Infertility caused by pelvic inflammatory disease is common in areas with high HIV prevalence. Studies have also found that women living with HIV/AIDS infection have more severe clinical presentations of pelvic inflammatory disease and more tubo-ovarian abscesses and may require more surgical intervention (74). A reduction in fertility caused by the HIV infection itself also cannot be ruled out (76). A woman's inability to get pregnant may also be caused by infertility in a male partner living with HIV/AIDS. Studies have shown that men living with HIV/AIDS may more frequently experience hypogonadism, with an increase in sex hormone-binding globulin levels independent of CD4 counts and a decrease in serum testosterone levels. Evidence also shows that HIV, in particular with more advanced disease, reduces sperm motility, sperm concentration and total sperm count, and increases abnormal sperm forms. Antiretroviral therapy can improve semen quality and reduce white blood cell numbers in semen (74).

Therefore, as a consequence of either her own reduced fertility or that of her partner, women living with HIV/AIDS may be more likely to have difficulty in getting pregnant and to request assistance. These women should be given full support and counselling and advised of their options, including adoption (see below) and assisted reproduction, if available.

2.2.3.2 CONCEPTION IN SEROCONCORDANT COUPLES

Seroconcordant couples should be counselled to use condoms to prevent reinfection with another strain of the virus. When planning a pregnancy, they should be advised to attempt conception at fertile times of the menstrual cycle to limit exposure.

2.2.3.3 CONCEPTION IN SERODISCORDANT COUPLES

Serodiscordant couples in which a sexually active woman living with HIV/AIDS has an HIV-negative male partner must engage in protected sex using a condom to ensure that the male partner remains uninfected. For those desiring children, various options should be discussed, including the possibility of adoption. Guidelines from the Office of the United Nations High Commissioner on Human Rights and UNAIDS state that “The HIV status of a parent or child should not be treated any differently from any other analogous medical condition in making decisions regarding custody, fostering or adoption” (77).

Artificial reproduction techniques can significantly influence the prevention of HIV transmission among discordant couples. To prevent female-to-male infection, artificial insemination can be used. Simple techniques to introduce sperm into the woman’s vagina using a syringe or other clean receptacle during the fertile time of the menstrual cycle can provide a means to conceive that prevents the male sexual partner from becoming infected.

Preventing male-to-female transmission is more complex since there is no risk-free method to ensure safe conception. Ways to help reduce risk of transmission include lowering the seminal plasma viral load to undetectable levels with antiretroviral therapy; timing conception at the fertile time of the menstrual cycle to limit exposure; and using postexposure prophylaxis for the woman (74). Experience with these techniques in resource-constrained settings is inadequate for making recommendations.

Key recommendations

- Family planning counselling should be integrated into all phases of HIV care and treatment, including pretest and post-test counselling and follow-up care.
- Women living with HIV/AIDS should be assisted in choosing a contraceptive method that is most suited to their situation and needs, including disease stage and treatment situation as well as lifestyle and personal desires. Whatever method is chosen, transmission of HIV and other STIs warrants special consideration during family planning counselling and dual protection. Either the use of condoms alone or condoms with another method should be promoted for all women living with HIV/AIDS.
 - Programmes should make available guidance on the correct medical eligibility criteria for contraceptive use among women living with HIV/AIDS, including the following key recommendations:
 - Women living with HIV/AIDS who are asymptomatic and women with AIDS who are receiving antiretroviral therapy and clinically well can safely use an IUD, although the IUD is not usually recommended for women with AIDS who are not receiving antiretroviral therapy.
 - There are no restrictions on the use of steroid hormonal contraceptives, including combined oral contraceptives, progestogen-only pills, combined injectable contraceptives, depot medroxyprogesterone acetate, combined patch and combined vaginal ring. However, potential drug interactions need to be considered if a woman is receiving antiretroviral therapy.
 - Women who decide to breastfeed can use the lactational amenorrhoea method for family planning purposes.
 - Women living with HIV/AIDS should not use spermicides alone or with other barrier methods.

2.3 IMPROVING ANTENATAL, INTRAPARTUM, POSTPARTUM AND NEWBORN CARE

In most countries, antenatal, childbirth and postpartum services form the backbone of primary health care and offer a key opportunity to reach women living with HIV/AIDS and provide them with skilled care during pregnancy, childbirth and postpartum, family planning and other sexual and reproductive health services as well as HIV-related treatment, prevention and care (78,79).

Skilled care has been proven to make a critical contribution to preventing maternal and newborn deaths and disability (80). The skilled attendant is at the centre of a successful continuum of care throughout pregnancy and after delivery, which also requires a well-functioning health care system. In addition to the components of care provided for all women, skilled care for women living with HIV/AIDS includes considering the effects of HIV/AIDS on complications during pregnancy, childbirth and postpartum; paying attention to their HIV-related treatment and care needs; and intervening to reduce HIV transmission to infants.

In severely affected countries, HIV infection has become a leading cause of death among pregnant or recently delivering women (81). In many of these countries, despite improvements in obstetric services, maternal mortality has increased over the past two decades; these increases have been attributed to HIV (82,83). Initiatives to expand access to antiretroviral therapy and HIV-related care for women may contribute to reducing maternal mortality in these settings. In general, HIV is regarded as an indirect cause of maternal death, especially in resource-constrained settings (84). The HIV epidemic is also responsible for the emergence of tuberculosis and pneumonia as major causes of maternal death, as reported by studies in South Africa and Zambia (83,85,86).

In addition to the inherent tragedy of any maternal death, in many settings a mother's death can seriously compromise the survival of her children. HIV-related ill-health or death among mothers is likely to undermine gains in children's survival achieved by antiretroviral prophylaxis for preventing the mother-to-child transmission of HIV (87). Data from several African countries indicate an increase in children's mortality in the year before and after a mother's death (88). A pooled analysis of seven mother-to-child transmission intervention trials in Africa showed that children's mortality is associated with maternal deaths, irrespective of whether the child is infected with HIV (89). Among children not infected with HIV, mortality was five times higher among those whose mother had died compared with children whose mother was alive. This finding is consistent with a study in rural Uganda in which the death or terminal illness

of a mother independently predicted mortality among children (90). Providing antiretroviral therapy and HIV-related care for women living with HIV/AIDS is essential for reducing mortality among mothers, effectively preventing HIV infection among infants and improving the survival of children born to women living with HIV/AIDS.

2.3.1 COUNSELLING DURING PREGNANCY, CHILDBIRTH AND THE POSTPARTUM PERIOD

Throughout pregnancy, childbirth and the postpartum period, care should be provided in a sensitive and confidential manner, considering the stigma and discrimination often associated with HIV. Women living with HIV/AIDS may fear that pregnancy will affect disease progression and that the infant will be infected with HIV. Accurate information and compassionate counselling may alleviate these fears.

Many women experience violence during pregnancy (between 4% and 20% of pregnant women), with consequences both for them and/or their babies, such as spontaneous abortion, preterm labour and low birth weight. Health care workers must be aware of this and ensure that women receive the counselling, support, care and referrals they may require.

Counselling and health education during pregnancy for a woman with HIV should cover:

- information on the interactions between HIV and pregnancy, including a possible increase in certain adverse pregnancy outcomes;
- the effects of the progression of HIV disease on the woman's health and the effectiveness, availability and cost of antiretroviral therapy (91);
- the importance of delivering with a skilled attendant;
- the risk of transmitting HIV to her infant and the risks and benefits of antiretroviral prophylaxis and safer labour and delivery practices in reducing transmission;
- the risks and benefits of various infant-feeding options and support for her choice; and
- future fertility plans, including postpartum contraception and the importance of condoms.

Women should be encouraged to use condoms during pregnancy to prevent the acquisition of other STIs and transmission of HIV and other STIs to uninfected sexual partners. Further, unprotected sex during pregnancy among women already infected has been associated with an increase in HIV transmission to infants (92,93).

The HIV status of women should be kept confidential and their medical records available only to health workers with a direct role in their care or care for their infants. Emotional support during childbirth is important. Whenever possible, women should be allowed to have a companion of their choice present during this time. It is unnecessary for women living with HIV/AIDS to be isolated or separated from other women during childbirth.

In the postpartum period, women living with HIV/AIDS require infant-feeding counselling and support for their infant-feeding choice. In addition, counselling on future fertility choices, effective postpartum contraceptive methods and dual protection should be provided.

2.3.2 PREVENTING HIV INFECTION AMONG INFANTS

In recent years, considerable efforts have been made to introduce and expand programmes to prevent the mother-to-child transmission of HIV. Successful programmes to prevent mother-to-child transmission are complex interventions, of which the antiretroviral regimen is but one component. Interventions to prevent mother-to-child transmission should be part of an integrated continuum of HIV treatment, care and prevention to avoid disjointed services and failed follow-up. Efforts to reduce HIV infection among infants may fail if they focus narrowly on women and their biological role in passing along the illness. Moreover, programmes to prevent mother-to-child transmission that consider women only as the bearers of children and not as individuals requiring care and treatment risk both violating women's human rights and failing to attract many participants. The United Nations has adopted a comprehensive strategic approach to preventing HIV infection among infants (36). This approach consists of four components:

- primary prevention of HIV infection, especially among women of childbearing age and their partners;
- prevention of unintended pregnancies among women living with HIV/AIDS;

- prevention of HIV transmission from women living with HIV/AIDS to their children; and
- provision of treatment, care and support for women living with HIV/AIDS, their children and families.

Most children with HIV acquire the infection in the womb, during birth or from breastfeeding. In the absence of any intervention, the risk of mother-to-child transmission of HIV is 15–30% in non-breastfeeding populations; breastfeeding by a woman with HIV increases the risk by 5–20% to a total of 20–45% (94). Long and short courses of single, dual or triple antiretroviral prophylaxis have been shown to reduce HIV transmission to infants. Short courses of antiretroviral drugs started in late pregnancy or during labour reduce the risk of in utero and peripartum HIV transmission two- to three-fold and are used in many resource-constrained settings (95–98). In Brazil, Europe and the United States, triple-antiretroviral combinations are given during pregnancy and labour and have reduced mother-to-child transmission rates to below 2% among women avoiding breastfeeding (99–101).

When antiretroviral drugs are used during pregnancy for preventing mother-to-child transmission, the potential risks to a woman must be weighed against the benefit of reducing the risk of mother-to-child transmission. Information on the safety of various antiretroviral regimens shows that short-course regimens used for a limited period of time in pregnancy are, in general, well tolerated, with only mild and transient adverse effects. Therefore, it is recommended that women who do not have indications for antiretroviral therapy or do not have access to treatment be offered antiretroviral prophylaxis to prevent mother-to-child transmission. The WHO guidelines on antiretroviral drugs for treating pregnant women and preventing HIV infection among infants provide further details on the safety of short-term exposure to antiretroviral drugs to prevent mother-to-child transmission and the issue of viral resistance and its potential implications for subsequent antiretroviral therapy (102).

Various obstetric factors influence the risk of mother-to-child transmission. Several studies have shown that elective caesarean section performed before the onset of labour and before rupture of membranes reduces the risk of mother-to-child transmission. In a randomized trial in Europe, elective caesarean section reduced the risk of mother-to-child transmission by more than half (103). A meta-analysis of more than 8500 mother-infant pairs in the United

States reported similar findings (104). For the women in the study who received long-course zidovudine during pregnancy, the risk of mother-to-child transmission following an elective caesarean section was reduced from 7.3% to 2.0%. Section 2.3.4 discusses the impact of caesarean section on the woman's health.

Rupture of membranes for longer than four hours has been associated with an increased risk of mother-to-child transmission (105–107). Several other factors such as chorioamnionitis, preterm labour, episiotomy, intrapartum haemorrhage and invasive fetal monitoring have been implicated in some studies but not in others (108–111).

2.3.3 SKILLED CARE DURING PREGNANCY

Women living with HIV/AIDS require the same antenatal care as women not infected with HIV, but certain additional components should be strengthened or modified. Care of women living with HIV/AIDS during pregnancy also involves assessing HIV-related signs and symptoms, including evidence of opportunistic infections. In particular, clinical staging and, where feasible, immunological staging of women living with HIV/AIDS are important for assessing prognosis and determining eligibility for antiretroviral therapy.

An estimated 15% of pregnant women experience a life-threatening complication during pregnancy or childbirth. In addition to these risks, women living with HIV/AIDS have a greater risk of certain adverse pregnancy outcomes. A meta-analysis of 31 studies conducted in low-, middle- and high-income countries found that intrauterine growth restriction, preterm delivery and low birth weight were more common among infants born to women living with HIV/AIDS than those born to women not infected (112). Although data are limited, several studies have suggested that women living with HIV/AIDS have an increased risk of spontaneous abortion and stillbirth. The effects of HIV infection on pregnancy outcomes are likely to be more pronounced among women with symptomatic HIV infection (113).

Evidence, mostly from industrialized countries, indicates that pregnancy does not have a major effect on the progression of HIV disease or mortality (114–118). Further, pregnancy does not appear to alter the risk of opportunistic infections. A pregnant woman with HIV has the same risk of opportunistic infections as a non-pregnant woman with HIV who has the same immune status. However, a pregnant woman

with HIV is at an increased risk of malaria, and additional precautions are necessary (119).

Pregnant women living with HIV/AIDS are more likely to develop clinical malaria and malarial infection of the placenta, more often have detectable malaria parasitaemia and have higher malaria parasite densities than pregnant women not infected with HIV (120). In settings with a high prevalence of malaria, pregnant women should always be protected by insecticide-treated nets and receive intermittent preventive treatment with sulfadoxine-pyrimethamine (at least two doses). However, women living with HIV/AIDS who are receiving daily co-trimoxazole prophylaxis do not require intermittent preventive treatment in addition to daily co-trimoxazole prophylaxis (119).

There are also concerns regarding the risk of mother-to-child transmission of syphilis, gonococcal and *Chlamydia* infection. All pregnant women require screening for syphilis at the first antenatal visit, as early in pregnancy as possible. Repeat screening in the third trimester or around childbirth may be considered to detect syphilis infection acquired during pregnancy. Women who deliver without having a syphilis test should be screened as soon as possible after delivery. Screening for gonorrhoea and *Chlamydia* infection can be considered where resources permit.

Genital herpes, bacterial vaginosis and trichomoniasis have also been implicated in adverse pregnancy outcomes. Trichomoniasis and bacterial vaginosis have been associated with pre-labour rupture of membranes, preterm labour and low birth weight. Women with a history of previous preterm labour or pregnancy loss require screening for trichomoniasis and bacterial vaginosis, even if they are asymptomatic for such infections.

During pregnancy and lactation, women are at increased risk of malnutrition, especially in resource-constrained settings where poor nutrition and food insecurity are endemic. Women living with HIV/AIDS may be at even greater risk because of reductions in dietary intake, nutrient malabsorption, increased energy requirements and other metabolic alterations associated with HIV infection (121). Anaemia during pregnancy is more common and often more severe among women living with HIV/AIDS than among other women (122–124). Wasting during pregnancy also occurs more frequently. Studies conducted in Africa (125,126) indicate that the nutritional status of

women living with HIV/AIDS, measured by body mass index, mid-upper arm circumference and weight loss, is an important predictor of adverse pregnancy outcomes and mortality during the postnatal period. Nutrition counselling, care and support encompasses (121):

- the importance of an adequate diet to support pregnancy and lactation;
- a baseline nutrition and dietary assessment, including measurement of body weight and haemoglobin;
- prevention and management of anaemia; and
- direct food assistance, including micronutrients, if required.

In some areas, the number of women who give birth with the help of a skilled attendant remains low. Women who give birth cared for only by a family member or a traditional birth attendant have high risks of maternal mortality and morbidity. Further, these women are unlikely to receive adequate intrapartum antiretroviral prophylaxis, and obtaining postpartum care for themselves and their children may be difficult. This hinders adherence to antiretroviral prophylaxis and the follow-up and care of women living with HIV/AIDS and their infants. Women living with HIV/AIDS should be advised to deliver with a skilled attendant, preferably in a health facility that can provide antiretroviral drugs for prophylaxis of mother-to-child transmission. Pregnant women and their families should be assisted in making a plan for birth: where the delivery will take place, who will be present and, in case of a complication, how timely referral will be arranged.

2.3.4 SKILLED CARE DURING CHILDBIRTH

Universal precautions to reduce the risk of transmission of bloodborne pathogens through exposure to blood or body fluids among patients and health care workers are essential in all settings, not only for women living with HIV/AIDS. Further, HIV is not the only bloodborne infection from which patients and staff are at risk. The safe and appropriate disposal of all sharps, the placenta and other blood-soaked articles is especially important.

Care during childbirth needs to be modified to reduce the risk of mother-to-child transmission. The membranes should be left intact for as long as possible and artificial rupture of membranes reserved for cases of fetal distress or delay in progress of labour. Vaginal cleansing

with a chlorhexidine solution has not been shown to be effective in reducing the risk of mother-to-child transmission. However, limited evidence suggests that this procedure may reduce the risk of transmission when the membranes have been ruptured for more than four hours and may have other benefits, including reducing neonatal and puerperal sepsis (127–129). Currently, available evidence does not justify routine vaginal cleansing as a means of reducing HIV transmission.

There is no evidence that shaving the pubic area before or during labour benefits women, and it may increase the risk of transmitting HIV or hepatitis virus. Invasive fetal monitoring such as the use of penetrating fetal scalp electrodes, fetal scalp blood sampling or other procedures that break the infant's skin must be avoided as far as possible.

Among women not infected with HIV, episiotomy must be reserved for cases with a clear obstetric indication (130). If possible, assisted delivery with vacuum extractor or forceps should be avoided among women living with HIV/AIDS, unless required in cases of fetal distress or significant maternal fatigue to shorten labour or the duration of ruptured membranes; soft vacuum cups may be preferable to metal cups or forceps. Avoid suctioning the newborn with a nasogastric tube unless there is meconium staining of the liquor.

ELECTIVE CAESAREAN SECTION

Although elective caesarean section performed before the onset of labour and before the membranes rupture has been shown to reduce the risk of transmission of HIV to infants (see section 2.3.2), this benefit has to be balanced against the risk to the woman of the surgical procedure. Maternal mortality and morbidity are greater after caesarean section than after vaginal delivery (131,132). This is mainly due to anaesthetic complications and increases in postoperative infection. Further, available evidence indicates that women living with HIV/AIDS have higher risks of postoperative morbidity following caesarean section, especially infective complications, and that women with advanced HIV disease are at greatest risk (133–135).

Elective caesarean section is seldom available in resource-constrained settings (136). In countries with a high HIV prevalence, routine caesarean section for preventing mother-to-child transmission would

tax already stretched health-care resources. However, the procedure may be considered in some cases, such as pregnancies in which labour is likely to be prolonged or in which obstetric complications may be associated with an increased risk of mother-to-child transmission.

When caesarean section is performed to reduce mother-to-child transmission, some guidelines recommend that it be scheduled for 38 weeks of pregnancy to minimize the likelihood of labour or membrane rupture occurring before the procedure (137,138). A caesarean section performed after labour has begun or membranes have ruptured does not reduce the risk of mother-to-child transmission. However, this is one week earlier than generally recommended for elective caesarean section and may increase the risk of iatrogenic prematurity, as accurately determining the duration of pregnancy is often difficult, even in settings with ultrasound facilities.

With a caesarean section, either elective or emergency, prophylactic antibiotics are preferably given when the cord is clamped, after the baby is delivered. For caesarean section and other obstetric procedures, one dose of prophylactic antibiotics is sufficient and is no less effective in preventing infection than three doses or 24 hours of antibiotics (130).

2.3.5 SKILLED CARE DURING THE POSTPARTUM PERIOD

Comprehensive postpartum follow-up and care for women living with HIV/AIDS and their infants extend beyond the traditional six-week postpartum period and are increasingly important in expanding access to treatment and care for HIV. The postpartum period is part of the continuum of chronic care and support for women living with HIV/AIDS. HIV-exposed infants require antiretroviral prophylaxis according to WHO guidelines. Children born to women living with HIV/AIDS have specific follow-up and care needs in addition to routine care and immunizations (139).

Postpartum care includes assessing maternal healing after delivery and evaluating for postpartum infectious complications, which may be more common among women living with HIV/AIDS (140). Women should be advised to give particular attention to the safe disposal of sanitary pads or similar materials.

Several reports suggest that postpartum family planning counselling and services are not yet routinely included or provided in programmes for preventing mother-to-child transmission, with many postpartum women having an unmet need for contraception (141,142). It is extremely important that such services be fully integrated into maternal health care for women living with HIV/AIDS. Women who do not want to conceive postpartum need information and counselling on appropriate contraceptive methods, including condoms, and several factors are likely to affect their choice, including the physiological processes of the puerperium, the return of ovulation and fertility, infant-feeding practices and the women's resumption of sexual activity. Women wanting to have more children are advised to wait at least two to three years between pregnancies (130).

Care includes ongoing infant-feeding counselling and support for the woman's infant-feeding choice. Women who choose not to breastfeed have a shorter duration of amenorrhoea and may require protection from an unplanned pregnancy soon after delivery. Women should be informed that women who do not breastfeed may ovulate as soon as four weeks after delivery.

HIV transmission during breastfeeding reduces the overall effectiveness of efforts to prevent mother-to-child transmission. However, preventing transmission during this period remains a challenge for women who cannot refrain from breastfeeding for whatever reasons. The current United Nations recommendations on HIV and infant feeding are that women living with HIV/AIDS should avoid all breastfeeding when replacement feeding is acceptable, feasible, affordable, sustainable and safe. Otherwise, exclusive breastfeeding is recommended during the first months of life and should be discontinued as soon as feasible (143).

Key recommendations

- Skilled care includes considering the effects of HIV/AIDS on complications during pregnancy, childbirth and postpartum; paying attention to HIV-related treatment and care needs; and intervening to reduce HIV transmission to infants.
- Universal precautions to reduce the risk of transmission of all bloodborne pathogens are essential in all health care settings.

- Women should be advised to deliver with a skilled attendant, preferably in a health facility that can provide antiretroviral drugs for preventing mother-to-child transmission.
- Care during childbirth needs to be modified to reduce the risk of mother-to-child transmission.
 - The membranes should be left intact as long as possible and artificial rupture of membranes reserved for cases of fetal distress or delay in progress of labour.
 - Assisted delivery with vacuum extractor or forceps should be avoided among women living with HIV/AIDS, unless required in cases of fetal distress or significant maternal fatigue to shorten labour or the duration of ruptured membranes.
- Episiotomy should never be performed routinely but reserved for cases with a clear obstetric indication.
- Elective caesarean section performed before the onset of labour and before the membranes rupture can reduce the risk of mother-to-child transmission, but this benefit must be balanced against the risk of the surgical procedure to the woman.
- Suctioning the newborn with a nasogastric tube should be avoided unless there is meconium staining of the liquor.
- Postpartum follow-up and care extends beyond the six-week postpartum period and includes:
 - assessment of maternal healing after delivery and evaluation for postpartum infectious complications; and
 - counselling and information on fertility choices and effective postpartum contraceptive methods as well as condom promotion and provision.
- Infant-feeding counselling and support for the woman's feeding choice should be provided.
- Women who choose not to breastfeed may require protection from an unplanned pregnancy soon after delivery.

2.4 ELIMINATING UNSAFE ABORTION

Even where contraceptive services are available, unintended pregnancies still happen for a variety of reasons. Contraceptives may fail, partners may oppose women's use of contraception, people may not use contraceptives for fear of side effects or sex may be coerced or forced; many women will seek to terminate these pregnancies. Countries with a high HIV burden are often those with a large unmet need for contraception. Where access to safe abortion is restricted, there is a high incidence of unsafe abortion, performed by unskilled providers and/or under unhygienic conditions (144,145). Women living with HIV/AIDS are prone to septicaemia and may be particularly at risk of complications, so that preventing unintended pregnancies and unsafe abortion is essential for improving the health of these women. Induced abortion is a safe surgical procedure when performed by qualified people using correct techniques and in sanitary conditions. Ensuring that safe abortion is available and accessible to the full extent allowed by law to women living with HIV/AIDS who do not want to carry a pregnancy to term is essential to preserving their reproductive health.

2.4.1 ABORTION COUNSELLING

Counselling about the option of terminating pregnancy to the extent allowed by law should be provided by a trained person and be non-directive, nonjudgemental and confidential. Women living with HIV/AIDS have reported that concerns about negative effects of pregnancy and childbearing on their own health and about HIV transmission to their infant influenced their decision to terminate pregnancy (146). To make an informed decision about whether to continue with the pregnancy or have an abortion, women living with HIV/AIDS need to know the risks of pregnancy to their own health, the risks of transmission of HIV to their infant and the effectiveness and the availability and cost of antiretroviral drugs for treating HIV infection and for preventing HIV infection among infants as well as the potential toxicity of such drugs. They also need to know the side effects and risks of the abortion procedures available.

The woman should make the final decision to terminate a pregnancy. In some circumstances, a woman with HIV, especially an adolescent with HIV, may be under pressure from her partner, other family members or health care providers to have an abortion. If health workers suspect coercion, they should talk with the woman alone or refer her for additional counselling, in an endeavour to ensure

fully informed and free decision-making. Being pressured or coerced to undergo an abortion is a violation of human rights. All women, regardless of HIV status, who undergo abortion should be treated with respectful and nonjudgemental attitudes and should have access to appropriate care and referral.

2.4.2 SURGICAL AND MEDICAL METHODS OF ABORTION

Both surgical and medical (using pharmaceuticals) methods of abortion are safe and, if they are provided according to international standards, complications are very rare (144). Nevertheless, since women living with HIV/AIDS are more likely to have anaemia, making them less able to resist infections or to survive haemorrhage, particular care must be exercised to eliminate any potential complications with surgical abortion. For this reason, in pregnancies up to 12 weeks of gestation, vacuum aspiration should be used in preference to dilatation and curettage since it is safer and less painful and does not require general anaesthesia (144). From 12 completed weeks of pregnancy, dilatation and evacuation is the safest and most effective surgical technique if skilled and experienced providers are available (144). Antibiotics at the time of surgical abortion reduce the post-procedural risk of infection, and they should be provided (147). Further research is needed to establish whether side effects and complication rates differ among women living with HIV/AIDS versus those who are HIV-negative.

For up to nine weeks of pregnancy, a combination of mifepristone administered orally and misoprostol administered vaginally (medical method of abortion) is safe and effective. After 12 weeks of pregnancy, a combination of oral mifepristone followed by repeated doses of misoprostol or gemeprost is considered safe and highly effective (144). However, no data currently exist on the effectiveness, acceptability and possible side effects and complications of medical abortion among women living with HIV/AIDS versus HIV-negative women nor on the interactions between drugs for medical abortion and antiretroviral medication. It is essential that women be able to return to health facilities following administration of a medical method of abortion to confirm the complete expulsion of products of conception.

2.4.3 POST-ABORTION CARE AND FAMILY PLANNING

Post-abortion care for a woman with HIV consists of: evaluation and care of complications; provision of family planning counselling and services; and referral for ongoing treatment, care and support. After a surgical abortion, women may experience light menstrual-like bleeding or spotting for several days. Women should be informed that bleeding similar to or heavier than a menstrual period might be expected with medical methods of abortion. To avoid delays in recognition and management of post-abortion complications, women should be advised to seek prompt health care in the event of excessive bleeding, pelvic pain, fever lasting more than one day or other symptoms of infection.

Providing contraceptive services can help women avoid unintended pregnancies in the future and reduce repeat abortions (148). Family planning counselling needs to take place either before or soon after the abortion, since ovulation typically occurs within two to four weeks of terminating pregnancy. Most contraceptive methods can be started immediately post-abortion, and the use of condoms for protecting against both further unintended pregnancy and STIs must be emphasized. Section 2.2 outlines further recommendations for women living with HIV/AIDS on choosing and using contraceptive methods safely and effectively. The third edition of *Medical eligibility criteria for contraceptive use* (35) provides additional guidance on the contraceptive use of post-abortion women.

In settings where HIV and abortion are stigmatized, women living with HIV/AIDS who undergo abortion may be subjected to high levels of stigma. This may result in social exclusion, marginalization or discrimination. Therefore, aside from links with HIV-related treatment and care services, additional counselling and referral to psychosocial support structures are key components of post-abortion care.

Key recommendations

- Women living with HIV/AIDS may be at greater risk of developing serious complications, including septicaemia, following unsafe abortion.
- Ensuring that safe termination of pregnancy is available and accessible, to the full extent allowed by law, to women living with HIV/AIDS who do not want to carry a pregnancy to term is essential to preserving their health.
- Counselling about the option of terminating pregnancy to the extent allowed by law should be provided by a trained person and be non-directive, nonjudgemental and confidential.
- To make an informed decision about whether to continue with the pregnancy or terminate it, women living with HIV/AIDS need to know the risks of pregnancy to their own health, the risks of transmission of HIV to their infant and the effectiveness, availability and cost of antiretroviral drugs for treating HIV infection and for preventing HIV infection among infants as well as potential toxicity.
- The woman should make the final decision to terminate pregnancy; being pressured or coerced to undergo an abortion is a violation of human rights.
- Both surgical and medical (using pharmaceuticals) methods of abortion are safe and effective. Manual or electric vacuum aspiration should be used in preference to dilatation and curettage for pregnancies up to 12 weeks and dilatation and evacuation after 12 weeks. A sequential combination of mifepristone and misoprostol (medical method) is safe and effective up to 9 weeks of pregnancy and after 12 weeks. Special attention must be paid to preventing potential side effects or complications.
- Providing family planning counselling and services is an essential component of post-abortion care and assists women in avoiding unintended pregnancies in the future, reducing repeat abortions and preventing STIs.

2.5 COMBATING SEXUALLY TRANSMITTED INFECTIONS, REPRODUCTIVE TRACT INFECTIONS AND CERVICAL CANCER

2.5.1 SEXUALLY TRANSMITTED INFECTIONS AND REPRODUCTIVE TRACT INFECTIONS

Despite the availability of effective prevention and treatment, STIs remain a major public health problem in most parts of the world and are responsible for serious complications and long-term consequences for women, including infertility. In addition to consequences for women's physical and mental health, STIs and RTIs can cause serious complications for the fetus and newborn baby, including stillbirth, preterm labour, low birth weight, congenital syphilis, blindness and pneumonia. Any contact with sexual and reproductive health services, as well as other primary health care services, represents an opportunity for women to be informed, screened and treated, when necessary, for STI and RTIs. In general, men access STI services more than other sexual and reproductive health services; thus, STI services present a vital opportunity for increasing their involvement in sexual and reproductive health.

Services for preventing, diagnosing and treating STIs offer many opportunities for synergy with HIV prevention, care and treatment efforts (149). Over the past two decades, the control of STIs has received renewed attention because of the strong correlation between STIs (both ulcerative and non-ulcerative) and HIV transmission. In countries severely affected by HIV, controlling and managing STIs as a strategy for preventing HIV transmission should be a high priority in primary health care facilities, sexual and reproductive health services, private clinics and other health services.

Strategies for controlling and managing STIs and RTIs include systematic screening for STIs, especially during pregnancy, and providing comprehensive case-management for people with STIs. Further, careful attention to infection control procedures can prevent iatrogenic RTIs from occurring during procedures such as abortion or IUD insertion. Successfully controlling and managing STIs requires that health care workers be respectful and nonjudgemental towards people with STIs.

Women living with HIV/AIDS require counselling and information on STIs, which should cover:

- the importance of preventing STIs (including promoting and providing condoms) and early case management;
- the signs and symptoms of STIs;
- information that STIs are often asymptomatic, especially among women; and
- the risks of STIs and RTIs in pregnancy.

2.5.1.1 SCREENING FOR SEXUALLY TRANSMITTED INFECTIONS

Systematic screening for STIs is considered part of the initial clinical evaluation of a woman with HIV and should include:

- enquiring about unsafe sexual practices and symptoms of STIs or RTIs among the woman or her sexual partner;
- physical examination to detect signs of STIs or RTIs, including a careful genital examination for evidence of discharge, ulcerations, or other lesions; a speculum examination (where feasible) to identify mucopurulent cervicitis or other signs of cervical and/or vaginal infection; and a bimanual examination to detect signs of pelvic inflammatory disease such as uterine, adnexal or cervical motion tenderness; and
- laboratory screening for syphilis and, where resources permit, *Neisseria gonorrhoeae* and *Chlamydia trachomatis* infection.

At each subsequent visit, careful attention should be paid to symptoms or examination findings suggesting a new or recurrent STI or RTI. Six-monthly serological screening for syphilis may be considered in areas with high syphilis prevalence.

2.5.1.2 COMPREHENSIVE CASE MANAGEMENT

Appropriately and promptly treating STIs at the first contact between women living with HIV/AIDS and health care workers reduces their risk of transmitting HIV to sexual partners, can prevent the reproductive-tract and obstetric complications associated with STIs and offers a unique opportunity to reach women with comprehensive care and counselling to improve their sexual and reproductive health and well-being.

For women with an STI-related syndrome or a positive test for an STI, comprehensive case management includes:

- history-taking;
- clinical examination;
- classifying the syndrome or identifying the infective agent;
- early and effective treatment;
- counselling on sexual health and preventing future infections, including the importance of dual protection;
- notifying and managing partners; and
- clinical follow-up if necessary.

Promptly and effectively notifying and managing partners are essential elements of STI control programmes. Either the person with the STI or the health care provider can inform the partner or partners. These actions, however, must be carried out with sensitivity and considering social and cultural factors to reduce the risk of violent or stigmatizing reactions following partner notification, especially against women.

A woman whose sexual partner has an STI should be offered treatment even if the woman is asymptomatic. Women may well be asymptomatic – at least 70% of women with an STI have no symptoms. Notifying the female partners of men with STI therefore offers an important opportunity to identify and treat women who otherwise would not receive treatment.

A syndrome-based approach enables health care workers to provide immediate, highly effective and cost-effective treatment for people with symptoms of STIs. Diagnosing the causes of STIs, the alternative to syndromic management, often requires sophisticated laboratory facilities, adds to the cost of treatment, may require people with STIs to make extra visits to the health facility and almost always delays treatment. Given these considerations and the lack of trained personnel and diagnostic equipment in many resource-constrained settings, a syndrome-based approach to managing people with STIs has been widely adopted. This approach is based on identifying consistent groups of symptoms and easily recognizable signs and on providing treatment that will deal with most of, or the most serious, organisms responsible for each syndrome. WHO has developed simplified tools based on flowcharts to guide health care providers in using this

approach (150). After they are adapted to local epidemiological and antimicrobial sensitivity patterns, countries can use these tools as standardized treatment protocols.

Although women living with HIV/AIDS may differ in the presentation and response to treatment of some STIs and RTIs – especially genital herpes and chancroid – standard treatment protocols are effective. Differences in the natural history and response to the treatment of some STIs and additional considerations for case management among women living with HIV/AIDS are discussed below. WHO's *Sexually transmitted and other reproductive tract infections: a guide to essential practice* (151) provides further detailed recommendations for preventing, detecting and managing STIs and RTIs based on available clinical and epidemiological data.

2.5.1.3 VAGINAL INFECTION AND TREATMENT

Vaginal infection (bacterial vaginosis, trichomoniasis or candidiasis) is the main cause of abnormal vaginal discharge. Vaginal discharge algorithms are not designed to detect the more serious but usually asymptomatic cervical infections caused by *Neisseria gonorrhoeae* or *Chlamydia trachomatis*. For some women with vaginal discharge, treatment for cervical infection should be added to treatment for vaginitis: for example, if the female partner of the person with an STI has a urethral discharge or if mucopurulent cervical discharge or easy bleeding is seen on speculum examination.

Bacterial vaginosis is more common among women living with HIV/AIDS, who also have more frequent relapses of vulvovaginal candidiasis, especially with more advanced HIV disease (152–154).

Women living with HIV/AIDS who have vaginal discharge require the same treatment as women not infected with HIV. There is no evidence that standard antibiotic treatment for *Trichomonas vaginalis*, *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infection is less effective among women living with HIV/AIDS. However, prolonged treatment of candidiasis is generally required, and chronic suppressive or intermittent prophylactic therapy may be necessary (155). Some reports suggest that women living with HIV/AIDS respond more poorly to the treatment of bacterial vaginosis (156).

As endogenous infection (infection with organisms normally present in the reproductive tract) is the most likely cause of vaginal discharge, the partner does not need to be treated unless relapses occur.

2.5.1.4 GENITAL ULCER DISEASE AND TREATMENT

Several studies have shown that syndromic algorithms for genital ulcer disease are effective and practical. Genital ulcers facilitate the spread of HIV more than other STIs, and controlling these infections is especially important for preventing HIV transmission. Genital ulcer disease patterns vary in different parts of the world, although genital herpes, syphilis and chancroid remain the most common causes. Genital herpes causes an increasing proportion of the cases of genital ulcer disease, especially in areas with high HIV prevalence (157).

HIV infection can alter the clinical manifestations of genital ulcers: lesions of primary or secondary syphilis may be atypical; herpes simplex virus lesions may present as persistent multiple ulcers; and chancroid lesions may be more extensive, accompanied by fevers and chills, or be rapidly aggressive. Mixed genital ulcer disease, often including infection with herpes simplex virus, is more common among women living with HIV/AIDS. The frequency and severity of episodes of genital herpes ulcers correlate with the level of immunosuppression. Women with advanced immunosuppression may have severe mucocutaneous ulcerations involving large areas of the perineum.

Evidence indicates that central nervous system involvement with early syphilis does not occur more frequently among people living with HIV/AIDS versus those not infected with HIV (158,159). Nevertheless, neurosyphilis should be considered in the differential diagnosis of diseases of the nervous system among women living with HIV/AIDS.

Recommended treatment, adapted to the local prevalence of causative organisms, is the same for women with suspected syphilis or chancroid infection, irrespective of HIV status. Early treatment is essential, especially since genital ulcer disease may be more extensive or aggressive among women living with HIV/AIDS. Routine cerebrospinal fluid examination is not indicated for people with early syphilis unless there are nervous system or ocular symptoms.

Although there is no cure, treating genital herpes with antiviral agents, such as acyclovir, can shorten the duration of active disease

and may help reduce the transmission of genital herpes (160). Most lesions of herpes simplex virus respond to acyclovir, but prolonged treatment may be needed. In places with limited drug supplies, treatment should be reserved for persistent or recurrent genital herpes or herpes zoster infection, both of which are often associated with HIV infection. Adequate information and counselling are needed to explain the nature and purpose of treatment and to avoid false expectations of cure.

Several strategies are being evaluated for the effective treatment of women living with HIV/AIDS who have frequent episodes of herpes simplex virus-2. These strategies aim to reduce the symptoms associated with recurrence and to reduce the transmission of HIV and herpes simplex virus-2. Evidence indicates that chronic suppressive therapy decreases the number of recurrences and lowers the risk of HIV transmission to uninfected partners (161). However, women who receive chronic therapy may develop thymidine kinase-deficient mutants of herpes simplex virus for which standard therapy is ineffective. Surveillance systems for viral resistance are important in programmes using chronic therapy.

Some reports (162,163) indicate that infection with HIV may increase the rates of failure of chancroid treatment, especially for single-dose therapies. More research is needed to confirm these observations. For treatment of granuloma inguinale, adding a parenteral aminoglycoside such as gentamicin to the standard treatment regimens could be considered.

Women living with HIV/AIDS require a follow-up visit one week after starting treatment for genital ulcer disease or sooner if the clinical condition worsens. Treatment should be continued if symptoms have improved but still persist. As genital ulcers are very likely to be caused by an STI, sexual partners should receive treatment.

2.5.1.5 LOWER ABDOMINAL PAIN AND TREATMENT FOR PELVIC INFLAMMATORY DISEASE

Lower abdominal pain is often due to pelvic inflammatory disease, but other genitourinary, gastrointestinal or reproductive-tract causes such as urinary tract infection and appendicitis are possible. The syndromic approach to lower abdominal pain is designed to offer effective treatment to women with symptoms suggesting pelvic inflammatory disease. Although some women managed with this algorithm may

not actually have pelvic inflammatory disease, treatment is justified because of the severe consequences – including infertility and ectopic pregnancy – that often follow when pelvic inflammatory disease is untreated or treatment is delayed.

In general, all women with pelvic inflammatory disease have similar microbiological findings, although higher rates of *Mycoplasma hominis* and *Streptococcus species* have been reported among women living with HIV/AIDS (164). Severe pelvic inflammatory disease is more common among women living with HIV/AIDS, including tubo-ovarian abscesses (50,165).

Treatment should be started as soon as the presumptive diagnosis is made, because long-term complications are more successfully prevented if appropriate antibiotics are administered immediately. Women living with HIV/AIDS respond equally well to standard oral and parenteral antibiotic regimens compared with women not infected with HIV (166,167). However, whether more aggressive interventions, including hospitalization and parenteral antibiotics, are more beneficial for managing women with advanced HIV disease and pelvic inflammatory disease is not known.

Special care is required in notifying the partners of women who are treated for pelvic inflammatory disease. Because of the serious potential complications of pelvic inflammatory disease, partners should be treated for urethral discharge to prevent possible reinfection. The diagnosis of pelvic inflammatory disease on clinical grounds is imprecise, and the couple requires counselling about this uncertainty.

2.5.2 CERVICAL CANCER

Since 1993, cervical cancer has been considered an AIDS-defining illness among women living with HIV/AIDS. Cervical cancer is an important public health priority because of the burden of disease and the potential for effective prevention via screening. In many countries, it is the most common malignancy among women and the leading cause of cancer deaths among women (6). The primary underlying cause of cervical cancer is infection with one or more high-risk types of HPV.

Cervical screening is currently the most effective approach for cervical cancer control. Experience in several countries has shown that a well-

organized screening programme with high coverage can significantly reduce the number of new cases of cervical cancer and cervical cancer mortality rates. Lack of screening is a major risk factor for the disease. Currently, most women in resource-constrained settings do not have access to effective screening programmes.

Evidence indicates that women living with HIV/AIDS have an increased risk of developing cervical cancer (168–170). One study from South Africa found that people with cell counts below 200 cells per μl are significantly more likely to have advanced-stage disease at initial diagnosis than people who are HIV-negative (169).

No woman should be denied treatment for precancer or invasive cancer because she has HIV infection.

2.5.2.1 HUMAN PAPILLOMAVIRUS INFECTION

HPV, the primary underlying cause of cervical cancer, is the most common sexually transmitted organism worldwide. The key determinants for HPV infection, related to the sexual behaviour of both men and women, include young age at sexual initiation, lifetime number of sexual partners and having multiple partners. HPV is thus highly correlated with HIV as well as with cervical cancer. A high risk of HPV infection is most common among young women, with a peak prevalence as high as 25–30% among women younger than 25 years of age. At most sites, prevalence decreases sharply with age.

The primary cause of squamous cervical cancer is persistent or chronic infection with one or more of the so-called high-risk or oncogenic types of HPV. These high-risk types of HPV cause abnormal Pap tests and may lead to cancer of the cervix, vulva, vagina, anus or penis. The types most commonly causing cervical cancer are 16 and 18, found in 70% of cervical cancer cases reported worldwide. Other oncogenic types (such as 45, 31, 33, and 58) are less common and may differ in prevalence in different geographical areas. Genital warts, on the other hand, are caused by low-risk HPV types 6 and 11 not associated with cancer.

Although infection with a high-risk HPV is the cause for the development of cervical cancer, most women infected with high-risk HPV do not develop cancer. Most cervical HPV infections, regardless of type, are asymptomatic and short-lived, with only a small number

persisting and fewer yet progressing to precancerous lesions or to invasive cancer. The conditions leading to persistence of HPV infection and later progression to cancer are not well understood, but they are probably associated with the presence of other factors (co-factors) that include, in addition to the types of HPV, coinfection with HIV and other sexually transmitted agents such as herpes simplex 2, *Chlamydia trachomatis* and *Neisseria gonorrhoeae*.

Most cross-sectional studies indicate that the prevalence of cervical HPV DNA is higher among HIV-seropositive women than HIV-seronegative women, even after controlling for potential confounding factors such as age and sexual behaviour (171,172). Although data are limited, they generally show that HIV-seropositive women have a higher risk of developing persistent HPV infections than HIV-seronegative women (173,174).

Given the generally limited range of HPV primer sets used and small sample sizes in these studies, further data are needed to determine whether the distribution of HPV viral types statistically differs among HIV-seropositive and HIV-seronegative women. Some studies have found that the proportion of high- versus low-risk HPV types is similar among HIV-seropositive and HIV-seronegative women (171,175,176).

Relatively few data are available on the effect of HIV infection on the viral load of HPV infection. The intensity of HPV infection was markedly higher in self-collected samples from HIV-seropositive than HIV-seronegative women in a study in Uganda (177).

Further data are needed to determine whether HPV viral loads are higher among HIV-seropositive than HIV-seronegative women, and if so, whether a higher viral load of HPV may possibly explain the higher risk of cervical squamous intraepithelial lesions among women living with HIV/AIDS (178–180). Differences appear to be most marked among women with advanced HIV disease (181–184).

Most HPV infections resolve on their own. However, if the infections become chronic or persistent they may lead to the development of precancer and/or cancer. HPV infection can also manifest as genital warts, which are benign epithelial tumours occurring on the genital cutaneous and mucosal surfaces. Women living with HIV/AIDS have a higher incidence and prevalence of genital warts (185,186), especially women with advanced HIV disease, who may also have a poorer response to treatment and frequent recurrences.

Treatment for HPV is generally not recommended, because most warts and HPV abnormalities eventually go away on their own, even if not treated. Choice of treatment for women, whether or not living with HIV/AIDS, depends on the preference of the woman, available resources and the experience of the health care provider. The treatment, when indicated, is directed to the changes in the skin or mucous membrane caused by the infection, such as the warts or the pre-cancerous changes. Biopsy of genital warts is recommended when the diagnosis is uncertain. The treatment may worsen the lesions, or the warts may appear atypical (such as pigmented, indurated, fixed or ulcerated).

2.5.2.2 CERVICAL SCREENING

The presence of abnormal cells on cervical screening is correlated with the presence of HPV infection and is more common among women living with HIV/AIDS. Women living with HIV/AIDS have a two- to six-fold increased risk of precancer with rates of abnormal cells, ranging from 20% to 40% and even higher among women with advanced HIV disease (183,187–190). Among women living with HIV/AIDS, dysplasia is more likely to involve other sites in the lower genital tract, including the vagina, vulva and perianal region (191,192).

Cytology screening is as effective among women living with HIV/AIDS as among uninfected women, and cervical screening should be encouraged where such services are available (193). Based on available evidence, women living with HIV/AIDS should be offered screening at the same frequency and with the same screening test as women not infected with HIV. Whether screening should begin at a younger age among women living with HIV/AIDS is unclear and requires study. Further, screening for cervical cancer should not be linked to or depend on HIV testing, to avoid stigma (194).

Additional details concerning cytological screening are contained within WHO guidelines on cervical cancer screening in developing countries (195).

2.5.2.3 TREATING PRECANCEROUS LESIONS

The benefit of treating women living with HIV/AIDS for low-grade lesions has not been demonstrated, and such treatment may be

associated with increased HIV shedding during healing (196). Treating women living with HIV/AIDS for high-grade lesions has been associated with a high rate of persistence and recurrence of disease with all treatment modalities (194,197). Recurrence of dysplasia is strongly associated with the degree of immunosuppression, occurring among about 90% of women with CD4 cell counts below 200 cells per μl (198). More frequent follow-up is recommended (every six months). However, there is no evidence that women living with HIV/AIDS benefit from more aggressive treatment. Women who receive treatment for cervical dysplasia should be informed of the need for follow-up visits and possible re-treatment as well as the potential for increased HIV shedding during healing (196).

2.5.2.4 MANAGING INVASIVE CANCER

Data indicate that women living with HIV/AIDS present with invasive cervical cancer up to 10 years earlier than average, have more advanced disease and have a poorer prognosis (169,170,199). For women with a CD4 count below 200 cells per μl , surgery is the preferable option, when appropriate, or treatment with radiation or chemotherapy. Women with advanced HIV disease have a poor prognosis with all treatment modalities and may succumb to other HIV-related opportunistic infections before invasive cervical cancer develops (180).

Comprehensive palliative care programmes are essential for improving the quality of life of women with cervical cancer.

Key recommendations

- In countries severely affected by HIV/AIDS, controlling and managing STIs should be a high priority in primary health care facilities, sexual and reproductive health services, private clinics and other health services.
- Systematic screening for STIs, consisting of history taking, clinical examination and laboratory tests for syphilis, is part of the initial clinical evaluation of women living with HIV/AIDS.
- Although women living with HIV/AIDS may differ in the presentation and response to the treatment of some STIs and RTIs, standard treatment protocols are effective.
- Women living with HIV/AIDS should be offered cervical cancer screening at the same frequency and with the same screening test as women not infected with HIV.

3 SEXUAL AND REPRODUCTIVE HEALTH OF WOMEN RECEIVING ANTIRETROVIRAL THERAPY

For equity and for humanitarian and moral reasons, women must have access to antiretroviral therapy when required, and all efforts should be made to ensure that all women, men and children who require such treatment have equal access to it. Reproductive health programmes, especially comprehensive programmes to prevent mother-to-child transmission, provide a key opportunity for reaching women who could benefit from antiretroviral therapy either immediately or later. These services should provide antiretroviral therapy to women or have explicit mechanisms of referral for this. In addition, making antiretroviral therapy available to their partners and children will help ensure that women do not share their drugs with other family members.

Antiretroviral therapy programmes need to be sensitive to women-specific needs, especially in relation to their sexual and reproductive health. The 2003 WHO guidelines for scaling up antiretroviral therapy in resource-constrained settings (200) contain the WHO recommendations for initiating and monitoring antiretroviral therapy among children, adolescents and adults living with HIV. These guidelines will be revised and updated in 2006 and will pay particular attention to issues concerning antiretroviral therapy for women.

WHO recommends offering antiretroviral therapy to adolescents and adults with: WHO Stage IV HIV disease irrespective of CD4 cell count, WHO Stage III disease with consideration of using CD4 cell counts of less than 350 cells per μl to assist decision-making and WHO Stages I and II disease in the presence of a CD4 cell count of less than 200 cells per μl . If CD4 testing is unavailable, WHO recommends offering antiretroviral therapy to adolescents and adults with WHO Stages III and IV disease irrespective of total lymphocyte count or WHO Stage II disease with a total lymphocyte count of less than 1200 cells per μl .

The WHO-recommended first-line antiretroviral regimens for adolescents and adults consist of a five-drug formulary, with a triple combination of zidovudine + lamivudine + nevirapine or stavudine + lamivudine + nevirapine or zidovudine + lamivudine + efavirenz or stavudine + lamivudine + efavirenz. First-line therapy consists of combining nucleoside and non-nucleoside reverse-

transcriptase inhibitor (NRTI and NNRTI) classes of antiretroviral drugs. These regimens were chosen following consideration of potency, side effect profile, potential for maintenance of future treatment options, anticipated adherence, availability of fixed-dose combinations, coexistent health conditions (such as tuberculosis, hepatitis B virus or hepatitis C virus infections) and pregnancy or potential thereof.

The selection of antiretroviral therapy regimen for women should consider the possibility of a planned or unintended pregnancy and that antiretroviral drugs may be taken in the first trimester of pregnancy during the period of fetal organ development and before a pregnancy is recognized. Similarly, the possibility of a future pregnancy should be considered in selecting an antiretroviral therapy regimen for pregnant women. The WHO guidelines on antiretroviral drugs for treating pregnant women and preventing HIV infection among infants also contain recommendations for antiretroviral therapy for women of childbearing age and pregnant women (102). They also provide recommendations for treating tuberculosis among women receiving antiretroviral therapy, which poses particular problems for women. As zidovudine can cause toxic effects to the blood and blood-forming organs such as anaemia, more frequent laboratory assessment of haemoglobin levels may be required among women receiving zidovudine-containing antiretroviral therapy regimens, especially during pregnancy.

It may be necessary to change antiretroviral therapy because of either toxicity (substitution of one drug for another in the same class) or treatment failure (switching from first-line to second-line therapy). When drug toxicity is related to an identifiable drug in the regimen, the offending drug can be replaced by another drug that does not have the same side effects, such as substituting stavudine for zidovudine in cases of anaemia.

Treatment failure can be defined clinically as assessed by disease progression or immunologically using CD4 cell counts. Clinical disease progression should be differentiated from immune reconstitution syndrome (an inflammatory response to previously subclinical opportunistic infections), which can occur a few weeks after starting antiretroviral therapy. In the event of treatment failure, the recommended triple-drug second-line regimen is tenofovir disoproxil fumarate or abacavir, plus didanosine and either lopinavir with a low-dose ritonavir boost or saquinavir with a low-dose ritonavir boost or nelfinavir. Protease inhibitor drugs are reserved for second-line therapy and are used with NRTIs. Nelfinavir is the preferred protease inhibitor drug in settings that do not have a secure cold chain. These second-line regimens remain relatively expensive, and there is limited experience with their use in resource-constrained settings.

In addition to HIV-related care, support and prevention services, women receiving antiretroviral therapy also require access to programmes that promote sexual health, family planning counselling and services for preventing, diagnosing and treating STIs. Further, women should be encouraged to attend cervical screening services where available. Current guidelines for screening for and treating cervical cancer do not need to be modified for women receiving antiretroviral therapy. It is unknown whether antiretroviral therapy substantially affects the natural history of precancerous cervical lesions, and the role of antiretroviral therapy in managing cervical disease is unclear; some studies have seen a beneficial effect on cervical lesions but not others (201–203).

3.1 PROMOTING SEXUAL HEALTH

Women who start antiretroviral therapy may find that, with their return to health, they become more sexually active. For those whose fertility had been compromised by HIV, this can be accompanied by return to fertility. As the health and well-being of women improves with antiretroviral therapy, women may reconsider previous decisions regarding their sexuality and reproduction. Some women may wish to “replace” children who have died from HIV/AIDS (204).

Health-care providers should anticipate that women receiving antiretroviral therapy may require counselling and support to make choices regarding their sexuality and childbearing and should assist them in adopting safe sexual behaviour. Interventions to promote sexual health among women receiving antiretroviral therapy include:

- assisting in identifying and overcoming impediments to safer sexual behaviour to prevent the transmission of HIV to other people;
- educating on the potential for transmitting HIV to an uninfected partner even when receiving antiretroviral therapy; and
- providing information and counselling on preventing STIs, including the importance of using condoms correctly and consistently.

3.2 PROVIDING HIGH-QUALITY SERVICES FOR FAMILY PLANNING

To assist women receiving antiretroviral therapy in making decisions on childbearing, they require information and counselling on:

- effective contraceptive methods to prevent pregnancy, if so desired, including potential drug interactions with hormonal contraceptives;

- the risk of HIV transmission when trying to become pregnant and available interventions to reduce this risk;
- interactions between HIV and pregnancy, including a possible increase in certain adverse pregnancy outcomes;
- the safety of antiretroviral drugs during pregnancy;
- the risk of birth defects should they become pregnant while receiving antiretroviral therapy; and
- the risk of transmission to their infant and the effectiveness of antiretroviral therapy in reducing transmission.

The limited data available suggest that several antiretroviral drugs, especially some NNRTIs and protease inhibitors, have the potential to either decrease or increase the bioavailability of steroid hormones in hormonal contraceptives (35). These drug interactions may alter the safety and effectiveness of both the hormonal contraceptives and the antiretroviral drugs. However, no clinical outcome studies have been conducted, and the clinical significance of such interactions is unknown. It is also not known whether the contraceptive effectiveness of progestogen-only injectable contraceptives (such as depot medroxyprogesterone acetate and norethisterone enantate) would be compromised – these methods provide higher blood hormone levels than other progestogen-only hormonal contraceptives and than combined oral contraceptives. Thus, if a woman receiving antiretroviral therapy decides to initiate or continue hormonal contraceptive use, the consistent use of condoms is recommended for preventing the transmission of STIs, including HIV, and as compensation for any possible reduction in the effectiveness of the hormonal contraceptive. There is no known drug interaction between antiretroviral drugs and the copper or levonorgestrel-releasing IUD.

Efavirenz (an NNRTI drug) is considered potentially teratogenic and should be avoided among women trying to conceive or not using effective contraception. It is recommended that women have a pregnancy test prior to initiating treatment with efavirenz. For women using effective contraception, it remains a viable option for the NNRTI component of an antiretroviral therapy regimen. Barrier methods, fertility awareness–based and coitus interruptus methods of contraception used alone may not be the ideal choice for women receiving efavirenz-containing regimens, because of relatively higher typical-use failure rates.

Women may need to take several pills each day for antiretroviral therapy, prophylaxis or treatment of opportunistic infections, symptomatic relief or concurrent illnesses. In addition to potential drug interactions, the impact of pill burdens on adherence to contraception and HIV-related therapies should be

considered. A hormonal contraceptive method that requires daily administration would increase the pill burden; this may compromise adherence to the contraceptive method or HIV-related medication. Women need to be aware of these considerations when they select a contraceptive method.

3.3 ANTIRETROVIRAL TREATMENT DURING PREGNANCY AND CHILDBIRTH AND POSTPARTUM

The overarching consideration for pregnant women is that therapeutic decisions relating to antiretroviral therapy should be based on their need and eligibility for such treatment. Antiretroviral therapy during pregnancy reduces maternal morbidity and mortality and decreases the risk of HIV transmission to the infant. The benefits of antiretroviral therapy need to be balanced with the known and theoretical adverse effects of such treatment on the fetus. Although no distinct pattern has been identified of long-term toxicity to antiretroviral therapy among infants, potential toxic effects include premature birth, manifestations of mitochondrial toxicity, and the potential for cancer or malformation. Long-term studies of children exposed to antiretroviral drugs in utero need to be completed (205).

For women receiving antiretroviral therapy, special efforts to support adherence may be needed during pregnancy, childbirth and the early postpartum period. Nausea or vomiting associated with pregnancy may affect a woman's ability to adhere to antiretroviral therapy. Every effort should be made to encourage women to continue treatment, and drugs should only be withdrawn under specialist advice. After childbirth, women may require additional adherence support due to the physical changes of the postpartum period, the demands of caring for the baby and possible postpartum depression. Women receiving antiretroviral therapy who are breastfeeding must be advised to continue their antiretroviral regimen while breastfeeding if other infant-feeding options are not acceptable, feasible, affordable, sustainable and safe (see section 2.3.5).

Pregnancy does not alter the indications for initiating antiretroviral therapy, but pregnancy, childbirth and breastfeeding raise additional safety concerns for the woman and her child. An evaluation of outcomes of prospectively followed pregnancies found no increase in birth defects following first-trimester exposure to lamivudine, nelfinavir, nevirapine, stavudine and zidovudine (206). There is concern that exposure to efavirenz during the first trimester of pregnancy may lead to central nervous system birth defects. Further, there are theoretical risks to the fetal brain in later pregnancy, and hence efavirenz should only be used in pregnancy when the potential benefits to the pregnant woman outweigh the potential risks to the fetus.

There is also concern that in utero exposure to tenofovir disoproxil fumarate, a nucleotide analogue drug, may potentially result in abnormal fetal bone development, although there is still very limited experience with using tenofovir disoproxil fumarate in pregnancy. However, for women receiving a regimen containing tenofovir disoproxil fumarate, the benefits of continuing treatment during pregnancy are likely to exceed the risks to the fetus. On this basis, women receiving tenofovir disoproxil fumarate are recommended to continue the regimen during pregnancy.

Long-term use of protease inhibitors has been associated with hyperglycaemia. Using protease inhibitors during pregnancy could increase the risk of pregnancy-associated hyperglycaemia, as pregnancy itself is a risk factor for glucose intolerance (207,208). In addition, in industrialized countries, the use of protease inhibitors for antiretroviral therapy has raised concerns regarding the effect of such exposure on pregnancy outcome, especially exposure during the early weeks of pregnancy. Several European studies (209–211) have observed an association between antiretroviral therapy and preterm delivery. However, a meta-analysis from the United States did not report an increased incidence of prematurity (212). The reason for the reported differences between these studies is unclear.

Providing antiretroviral therapy to women living with HIV/AIDS reduces their mortality, effectively prevents HIV infection among infants and, by improving maternal health, is likely to increase the survival of children born to women living with HIV/AIDS. Providing antiretroviral therapy for women is an essential component of initiatives to reduce maternal mortality, prevent mother-to-child transmission of HIV and secure the health and sexual well-being of women living with HIV/AIDS (36,213).

3.4 ELIMINATING UNSAFE ABORTION FOR WOMEN RECEIVING ANTIRETROVIRAL THERAPY

Current evidence does not suggest different strategies or interventions from those described for women not receiving antiretroviral therapy (see section 2.4).

3.5 COMBATING SEXUALLY TRANSMITTED INFECTIONS AMONG WOMEN RECEIVING ANTIRETROVIRAL THERAPY

Current evidence does not suggest different strategies or interventions from those described for women not receiving antiretroviral therapy (see section 2.5).

Key recommendations

- Antiretroviral therapy for women is an essential component of initiatives to reduce maternal mortality, prevent the mother-to-child transmission of HIV and secure the health and sexual well-being of women living with HIV/AIDS.
- Antiretroviral therapy programmes need to be sensitive to women-specific needs, especially in relation to their sexual and reproductive health.
- Health care providers should anticipate that women receiving antiretroviral therapy may require additional counselling and support to make choices regarding their sexuality and childbearing.
- The possibility of a planned or unintended pregnancy must be considered when selecting an antiretroviral therapy regimen for women.
- If a woman receiving antiretroviral therapy decides to initiate or continue hormonal contraceptive use, the consistent use of condoms is recommended for preventing the transmission of STIs, including HIV, and to compensate for any possible reduction in the effectiveness of the hormonal contraceptive due to drug interactions.
- Special efforts to support adherence may be needed during pregnancy, childbirth and the early postpartum period.
- Ensuring that safe termination of pregnancy is available and accessible, to the full extent allowed by law, to women receiving antiretroviral therapy who do not want to carry a pregnancy to term is essential to preserving their health.
- Although women living with HIV/AIDS may differ in the presentation and response to treatment, standard treatment protocols are effective for women receiving antiretroviral therapy.

REFERENCES

1. *AIDS epidemic update: December 2005*. Geneva, UNAIDS and World Health Organization, 2005 (<http://www.who.int/hiv/epiupdate2005/en/index.html>, accessed 31 March 2006).
2. Krug EG et al., eds. *World report on violence and health*. Geneva, World Health Organization, 2002 (http://www.who.int/violence_injury_prevention/violence/world_report/en, accessed 31 March 2006).
3. Heise LL, Ellsberg M, Gottemoeller M. *Ending violence against women*. Baltimore, MD, John Hopkins University School of Public Health, Center for Communications Programs, 1999.
4. Garcia-Moreno C, Watts C. Violence against women: its importance for HIV/AIDS. *AIDS*, 2000, 14(Suppl 3):S253–S265.
5. *Maternal mortality in 2000: estimates developed by WHO, UNICEF and UNFPA*. Geneva and New York, World Health Organization, United Nations Children's Fund and United Nations Population Fund, 2004 (http://www.who.int/reproductive-health/publications/maternal_mortality_2000/index.html, accessed 31 March 2006).
6. *Unsafe abortion – global and regional estimates of the incidence of unsafe abortion and associated mortality in 2000*. 4th ed. Geneva, World Health Organization, 2004 (http://www.who.int/reproductive-health/publications/unsafe_abortion_estimates_04/index.html, accessed 31 March 2006).
7. *Reproductive health strategy to accelerate progress towards the attainment of international development goals and targets*. Geneva, World Health Organization, 2004 (<http://www.who.int/reproductive-health/strategy.html>, accessed 31 March 2006).
8. Massad LS et al. Pregnancy rates and predictors of conception, miscarriage and abortion in US women with HIV. *AIDS*, 2004, 18:281–286.
9. Ross A et al. HIV-1 disease progression and fertility: the incidence of recognised pregnancy and pregnancy outcome in Uganda. *AIDS*, 2004, 18:799–804.
10. Gray RH et al. Population-based study of fertility in women with HIV-1 infection in Uganda. *Lancet*, 1998, 351:98–103.
11. Hunter SC et al. The association between HIV and fertility in a cohort study in rural Tanzania. *Journal of Biosocial Sciences*, 2003, 35:189–199.
12. *Programme of Action of the International Conference on Population and Development*. Paragraphs 7.2 and 7.3. New York, United Nations, 1994 (<http://www.un.org/popin/icpd2.htm>, accessed 31 March 2006).
13. *The New York Call to Commitment: Linking HIV/AIDS and Sexual and Reproductive Health*. New York, United Nations Population Fund, 2004 (http://www.unfpa.org/upload/lib_pub_file/321_filename_New%20York%20Call%20to%20Commitment.pdf, accessed 31 March 2006).
14. Askew I, Berer M. The contribution of sexual and reproductive health services to the fight against HIV/AIDS: a review. *Reproductive Health Matters*, 2003, 11(22):51–73.
15. *HIV-infected women and their families: psychosocial support and related issues. A literature review*. Geneva, World Health Organization, 2003 (http://www.who.int/reproductive-health/publications/rhr_03_07/index.html, accessed 31 March 2006).

16. UNAIDS/WHO policy statement on HIV testing. Geneva, UNAIDS and World Health Organization, 2004 (<http://www.who.int/hiv/pub/vct/statement/en>, accessed 31 March 2006).
17. Bulterys M et al. Rapid HIV-1 testing during labor: a multicenter study. *JAMA*, 2004, 292:219–223.
18. Chersich MF et al. Initiating early postpartum voluntary counselling and testing in a resource-constrained setting. *14th International Conference on AIDS, 7–12 July 2002, Barcelona, Spain* (abstract TuPeF5398; <http://www.aegis.com/conferences/iac/2002/TuPeF5398.html>, accessed 31 March 2006).
19. Taha TE et al. Short post-exposure prophylaxis in newborn babies to reduce mother-to-child transmission of HIV-1: NVAZ randomised clinical trial. *Lancet*, 2003, 362:1171–1177.
20. *Integrating HIV voluntary counselling and testing services into reproductive health settings. Stepwise guidelines for programme planners, managers and service providers*. New York, United Nations Population Fund and International Planned Parenthood Federation, 2004 (<http://www.unfpa.org/publications/detail.cfm?ID=164&filterListType=>, accessed 31 March 2006).
21. *HIV positive women, poverty and gender inequality*. London, International Community of Women Living with HIV/AIDS, 2004 (ICW vision paper 3; http://www.icw.org/tiki-download_file.php?fileId=62, accessed 31 March 2006).
22. Maman S et al. HIV-positive women report more lifetime partner violence: findings from a voluntary counseling and testing clinic in Dar es Salaam, Tanzania. *American Journal of Public Health*, 2002, 92:1331–1337.
23. van der Straten A et al. Sexual coercion, physical violence, and HIV infection among women in steady relationships in Kigali, Rwanda. *AIDS and Behavior*, 1998, 2:61–73.
24. Dunkle KL et al. Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. *Lancet*, 2004, 363:1415–1421.
25. Olsson A et al. Sexual abuse during childhood and adolescence among Nicaraguan men and women: a population-based anonymous survey. *Child Abuse and Neglect*, 2000, 24:1579–1589.
26. Dunkle KL et al. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Social Science and Medicine*, 2004, 59:1581–1592.
27. Maman S et al. The intersections of HIV and violence: directions for future research and interventions. *Social Science and Medicine*, 2000, 50:459–478.
28. Medley A et al. Rates, barriers and outcomes of HIV serostatus disclosure among women in developing countries: implications for prevention of mother-to-child transmission programmes. *Bulletin of the World Health Organization*, 2004, 82:299–307.
29. *Gender dimensions of HIV status disclosure to sexual partners: rates, barriers and outcomes*. Geneva, World Health Organization, 2003 (<http://www.who.int/gender/documents/en/genderdimensions.pdf>, accessed 31 March 2006).
30. *HIV status disclosure to sexual partners: rates, barriers and outcomes for women*. Geneva, World Health Organization, 2004 (http://www.who.int/gender/documents/en/VCTinformationsheet_%5b92%20KB%5d.pdf, accessed 31 March 2006).

31. *World contraceptive use 2003*. New York, United Nations Department of Economic and Social Affairs Population Division, 2004 (<http://www.un.org/esa/population/publications/contraceptive2003/wcu2003.htm>, accessed 31 March 2006).
32. *The Glion call to action on family planning and HIV/AIDS in women and children, 3–5 May 2004*. New York, United Nations Population Fund, 2004 (<http://www.unfpa.org/publications/detail.cfm?ID=199&filterListType=>, accessed 31 March 2006).
33. *Strategic approaches to the prevention of HIV infection in infants: report of a WHO meeting, Morges, Switzerland, 20–22 March 2002*. Geneva, World Health Organization, 2002 (<http://www.who.int/hiv/pub/mtct/pub35/en>, accessed 31 March 2006).
34. Sweat MD et al. Cost-effectiveness of nevirapine to prevent mother-to-child HIV transmission in eight African countries. *AIDS*, 2004, 18:1661–1671.
35. *Medical eligibility criteria for contraceptive use*. 3rd ed. Geneva, World Health Organization, 2004 (<http://www.who.int/reproductive-health/publications/mec/index.htm>, accessed 31 March 2006).
36. *Position statement on condoms and HIV prevention*. Geneva and New York, World Health Organization, UNAIDS and United Nations Population Fund, 2004 (http://www.who.int/hiv/pub/prev_care/statement/en/index.html, accessed 31 March 2006).
37. *Rapid needs assessment tool for condom programming*. New York, United Nations Population Fund and Population Council, 2003 (http://www.unfpa.org/upload/lib_pub_file/260_filename_CONDOM_RNAT.pdf, accessed 31 March 2006).
38. Trussell J. Contraceptive efficacy. In: Hatcher RA et al., eds. *Contraceptive technology*. 18th revised edition. New York, Ardent Media, 2004.
39. Weller S, Davis K. Condom effectiveness in reducing heterosexual HIV transmission. *Cochrane Database of Systematic Reviews*, 2002, (1): CD003255.
40. Gottlieb GS et al. Dual HIV-1 infection associated with rapid disease progression. *Lancet*, 2004, 363:619–622.
41. *WHO/CONRAD Technical Consultation on nonoxynol-9. WHO, Geneva, 9–10 October 2001. Summary report*. Geneva, World Health Organization, 2003 (<http://www.who.int/reproductive-health/stis/nonoxynol9.html>, accessed 31 March 2006).
42. French PP et al. Use-effectiveness of the female versus male condom in preventing sexually transmitted disease in women. *Sexually Transmitted Diseases*, 2003, 30:433–439.
43. Fontanet AL et al. Protection against sexually transmitted diseases by granting sex workers in Thailand the choice of using the male or female condom: results from a randomized controlled trial. *AIDS*, 1998, 12:1851–1859.
44. Drew WL et al. Evaluation of the virus permeability of a new condom for women. *Sexually Transmitted Diseases*, 1990, 17:110–112.
45. Norman LR. Predictors of consistent condom use: a hierarchical analysis of adults from Kenya, Tanzania and Trinidad. *International Journal of STD and AIDS*, 2003, 14:584–590.
46. *Levels and trends of contraceptive use as assessed in 2000*. New York, United Nations, 2002.
47. Cushman LF et al. Condom use among women choosing long-term hormonal contraception. *Family Planning Perspectives*, 1998, 30:240–243.

48. Critelli JW, Suire DM. Obstacles to condom use: the combination of other forms of birth control and short-term monogamy. *Journal of American College Health*, 1998, 46:215–219.
49. Barbosa RM, Villela WV. Sterilisation and sexual behaviour among women in São Paulo, Brazil. *Reproductive Health Matters*, 1995, 3:37–46.
50. Cohen CR et al. Effect of human immunodeficiency virus type 1 infection upon acute salpingitis: a laparoscopic study. *Journal of Infectious Diseases*, 1998, 178:1352–1358.
51. Morrison CS et al. Is the intrauterine device appropriate contraception for HIV-1-infected women? *British Journal of Obstetrics and Gynaecology*, 2001, 108:784–790.
52. Richardson BA et al. Effect of intrauterine device use on cervical shedding of HIV-1 DNA. *AIDS*, 1999, 13:2091–2097.
53. Morrison CS et al. Use of sexually transmitted disease risk assessment algorithms for selection of intrauterine device candidates. *Contraception*, 1999, 59:97–106.
54. Steen R, Shapiro K. Intrauterine contraceptive devices and risk of pelvic inflammatory disease: standard of care in high STI prevalence settings. *Reproductive Health Matters*, 2004, 12:136–143.
55. Joesoef MR et al. High rate of bacterial vaginosis among women with intrauterine devices in Manado, Indonesia. *Contraception*, 2001, 64:169–172.
56. Farley TM et al. Intrauterine devices and pelvic inflammatory disease: an international perspective. *Lancet*, 1992, 339:785–788.
57. Cejtin HE et al. Effect of hormonal contraceptive use on plasma HIV-1-RNA levels among HIV-infected women. *AIDS*, 2003, 17:1702–1704.
58. Comparison of female to male and male to female transmission of HIV in 563 stable couples. European Study Group on Heterosexual Transmission of HIV. *BMJ*, 1992, 304:809–813.
59. Clemetson DB et al. Detection of HIV DNA in cervical and vaginal secretions. Prevalence and correlates among women in Nairobi, Kenya. *JAMA*, 1993, 269:2860–2864.
60. Kreiss J et al. Association between cervical inflammation and cervical shedding of human immunodeficiency virus DNA. *Journal of Infectious Diseases*, 1994, 170:1597–1601.
61. McClelland RS et al. A prospective study of hormonal contraceptive use and cervical shedding of herpes simplex virus in human immunodeficiency virus type 1-seropositive women. *Journal of Infectious Diseases*, 2002, 185:1822–1825.
62. Mostad SB et al. Cervical shedding of herpes simplex virus in human immunodeficiency virus-infected women: effects of hormonal contraception, pregnancy, and vitamin A deficiency. *Journal of Infectious Diseases*, 2000, 181:58–63.
63. Mostad SB et al. Hormonal contraception, vitamin A deficiency, and other risk factors for shedding of HIV-1 infected cells from the cervix and vagina. *Lancet*, 1997, 350:922–927.
64. Wang CC et al. The effect of hormonal contraception on genital tract shedding of HIV-1. *AIDS*, 2004, 18:205–209.
65. Lavreys L et al. Hormonal contraception and risk of cervical infections among HIV-1-seropositive Kenyan women. *AIDS*, 2004, 18:2179–2184.

66. Morrison CS et al. Hormonal contraceptive use, cervical ectopy, and the acquisition of cervical infections. *Sexually Transmitted Diseases*, 2004, 31:561–567.
67. Breastfeeding as a family planning method. *Lancet*, 1988, 2:1204–1205.
68. Wilkinson D et al. Nonoxynol-9 for preventing vaginal acquisition of HIV infection by women from men. *Cochrane Database of Systematic Reviews*, 2002, (4):CD003936.
69. Wilkinson D et al. Nonoxynol-9 for preventing vaginal acquisition of sexually transmitted infections by women from men. *Cochrane Database of Systematic Reviews*, 2002, (4):CD003939.
70. United States Centers for Disease Control and Prevention. Surgical sterilization among women and use of condoms – Baltimore, 1989–1990. *MMWR Morbidity and Mortality Weekly Report*, 1992, 41:568–569, 575.
71. *Selected practice recommendations for contraceptive use*. 2nd ed. Geneva, World Health Organization, 2004 (<http://www.who.int/reproductive-health/publications/spr/index.htm>, accessed 31 March 2006).
72. von Hertzen H et al. Low dose mifepristone and two regimens of levonorgestrel for emergency contraception: a WHO multicentre randomised trial. *Lancet*, 2002, 360:1803–1810.
73. Glynn JR et al. Decreased fertility among HIV-1 infected women attending antenatal clinics in three African cities. *Journal of AIDS*, 2000, 25:345–352.
74. Lyerly AD, Anderson J. Human immunodeficiency virus and assisted reproduction: reconsidering evidence, reframing ethics. *Fertility and Sterility*, 2001, 75:843–858.
75. Zaba B, Gregson S. Measuring the impact of HIV on fertility in Africa. *AIDS*, 1998, 12(suppl 1):341–350.
76. Carpenter LM et al. Estimates of the impact of HIV infection on fertility in a rural Ugandan population cohort. *Health Transition Review*, 1997, 7(suppl 2):113–126.
77. *HIV/AIDS and human rights, international guidelines. Second International Consultation on HIV/AIDS and Human Rights, Geneva, 23–25 September 1996*. Geneva, Office of the United Nations High Commissioner on Human Rights and UNAIDS, 1998 (<http://www.ohchr.org/english/issues/hiv/guidelines.htm>, accessed 31 March 2006).
78. *HIV prevention in maternal health services: programming guide*. New York, United Nations Population Fund and EngenderHealth, 2004 (<http://www.unfpa.org/publications/detail.cfm?ID=193>, accessed 31 March 2006).
79. *HIV prevention in maternal health services: training guide*. New York, United Nations Population Fund and EngenderHealth, 2004 (<http://www.unfpa.org/publications/detail.cfm?ID=194&filterListType=>, accessed 31 March 2006).
80. World Health Organization (WHO), International Confederation of Midwives (ICM) and the International Federation of Gynaecologists and Obstetricians (FIGO). *Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO*. Geneva, World Health Organization, 2004 (http://www.who.int/reproductive-health/global_monitoring/skilled_attendant.html, accessed 31 March 2006).
81. McIntyre J. Mothers infected with HIV. *British Medical Bulletin*, 2003, 67:127–135.

82. Bicego G, Boerma JT, Ronsmans C. The effect of AIDS on maternal mortality in Malawi and Zimbabwe. *AIDS*, 2002, 16:1078–1081.
83. Ahmed Y et al. A study of maternal mortality at the University Teaching Hospital, Lusaka, Zambia: the emergence of tuberculosis as a major non-obstetric cause of maternal death. *International Journal of Tuberculosis and Lung Diseases*, 1999, 3:675–680.
84. *Beyond the numbers: reviewing maternal deaths and complications to make pregnancy safer*. Geneva, World Health Organization, 2004 (<http://www.who.int/reproductive-health/publications/btn>, accessed 31 March 2006).
85. Kruger AM, Bhagwanjee S. HIV/AIDS: Impact on maternal mortality at the Johannesburg Hospital, South Africa, 1995–2001. *International Journal of Obstetrics and Anesthesiology*, 2003, 12:164–168.
86. Khan M et al. Maternal mortality associated with tuberculosis-HIV-1 co-infection in Durban, South Africa. *AIDS*, 2001, 15:1857–1863.
87. Ng'weshemi J et al. HIV impact on mother and child mortality in rural Tanzania. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 2003, 33:393–404.
88. Newell ML, Brahmbhatt H, Ghys PD. Child mortality and HIV infection in Africa: a review. *AIDS*, 2004, 18 (suppl 2): S27–S34.
89. Newell ML et al. Mortality of infected and uninfected infants born to HIV-infected mothers in Africa: a pooled analysis. *Lancet*, 2004, 364:1236–1243.
90. Nakiyingi JS et al. Child survival in relation to mother's HIV infection and survival: evidence from a Ugandan cohort study. *AIDS*, 2003, 17:1827–1834.
91. French R, Brocklehurst P. The effect of pregnancy on survival in women infected with HIV: a systemic review of the literature and meta-analysis. *British Journal of Obstetrics and Gynaecology*, 1998, 105:827–835.
92. Matheson PB et al. Heterosexual behavior during pregnancy and perinatal transmission of HIV-1. New York City Perinatal HIV Transmission Collaborative Study Group. *AIDS*, 1996, 10:1249–1256.
93. Bulterys M et al. Sexual behavior and injection drug use during pregnancy and vertical transmission of HIV-1. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 1997, 15:76–82.
94. De Cock KM et al. Prevention of mother-to-child HIV transmission in resource-poor countries: translating research into policy and practice. *JAMA*, 2000, 283:1175–1182.
95. Guay LA et al. Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial. *Lancet*, 1999, 354:795–802.
96. Shaffer N et al. Short-course zidovudine for perinatal HIV-1 transmission in Bangkok, Thailand: a randomised controlled trial. Bangkok Collaborative Perinatal HIV Transmission Study Group. *Lancet*, 1999, 353:773–780.
97. Dabis F et al. 6-month efficacy, tolerance, and acceptability of a short regimen of oral zidovudine to reduce vertical transmission of HIV in breastfed children in Côte d'Ivoire and Burkina Faso: a double-blind placebo-controlled multicentre trial. DITRAME Study Group. Diminution de la Transmission Mère-Enfant. *Lancet*, 1999, 353:786–792.

98. Wiktorski SZ et al. Short-course oral zidovudine for prevention of mother-to-child transmission of HIV-1 in Abidjan, Côte d'Ivoire: a randomised trial. *Lancet*, 1999, 353:781–785.
99. Dorenbaum A et al. Two-dose intrapartum/newborn nevirapine and standard antiretroviral therapy to reduce perinatal HIV transmission: a randomized trial. *JAMA*, 2002, 288:189–198.
100. Cooper ER et al. Combination antiretroviral strategies for the treatment of pregnant HIV-1-infected women and prevention of perinatal HIV-1 transmission. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 2002, 29:484–494.
101. Thorne C, Newell ML. Are girls more at risk of intrauterine-acquired HIV infection than boys? *AIDS*, 2004, 18:344–347.
102. *Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: guidelines on care, treatment and support for women living with HIV/AIDS and their children in resource-constrained settings*. Geneva, World Health Organization, 2004:35 (<http://www.who.int/hiv/pub/mtct/guidelines/en>, accessed 31 March 2006).
103. Elective caesarean-section versus vaginal delivery in prevention of vertical HIV-1 transmission: a randomised clinical trial. The European Mode of Delivery Collaboration. *Lancet*, 1999, 353:1035–1039.
104. The mode of delivery and the risk of vertical transmission of human immunodeficiency virus type 1 – a meta-analysis of 15 prospective cohort studies. The International Perinatal HIV Group. *New England Journal of Medicine*, 1999, 340:977–987.
105. Minkoff H et al. The relationship of the duration of ruptured membranes to vertical transmission of human immunodeficiency virus. *American Journal of Obstetrics and Gynecology*, 1995, 173:585–589.
106. Landesman SH et al. Obstetrical factors and the transmission of human immunodeficiency virus type 1 from mother to child. The Women and Infants Transmission Study. *New England Journal of Medicine*, 1996, 334:1617–1623.
107. Burns DN et al. Influence of other maternal variables on the relationship between maternal virus load and mother-to-infant transmission of human immunodeficiency virus type 1. *Journal of Infectious Diseases*, 1997, 175:1206–1210.
108. Shapiro DE et al. Risk factors for perinatal human immunodeficiency virus transmission in patients receiving zidovudine prophylaxis. Pediatric AIDS Clinical Trials Group protocol 076 Study Group. *Obstetrics and Gynecology*, 1999, 94:897–908.
109. Mandelbrot L et al. Obstetric factors and mother-to-child transmission of human immunodeficiency virus type 1: the French perinatal cohorts. SEROGEST French Pediatric HIV Infection Study Group. *American Journal of Obstetrics and Gynecology*, 1996, 175(3 Pt 1):661–667.
110. Mofenson LM et al. Risk factors for perinatal transmission of human immunodeficiency virus type 1 in women treated with zidovudine. Pediatric AIDS Clinical Trials Group Study 185 Team. *New England Journal of Medicine*, 1999, 341:385–393.
111. Boyer PJ et al. Factors predictive of maternal-fetal transmission of HIV-1. Preliminary analysis of zidovudine given during pregnancy and/or delivery. *JAMA*, 1994, 271:1925–1930.

112. Brocklehurst P, French R. The association between maternal HIV infection and perinatal outcome: a systematic review of the literature and meta-analysis. *British Journal of Obstetrics and Gynaecology*, 1998, 105:836–848.
113. Coley JL et al. The association between maternal HIV-1 infection and pregnancy outcomes in Dar es Salaam, Tanzania. *British Journal of Obstetrics and Gynaecology*, 2001, 108:1125–1133.
114. Saada M et al. Pregnancy and progression to AIDS: results of the French prospective cohorts. SEROGEST and SEROCO Study Groups. *AIDS*, 2000, 14:2355–2360.
115. Weisser M et al. Does pregnancy influence the course of HIV infection? Evidence from two large Swiss cohort studies. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 1998, 17:404–410.
116. Vimercati A et al. Immunological markers in HIV-infected pregnant and non-pregnant women. *European Journal of Obstetrics, Gynecology and Reproductive Biology*, 2000, 90:37–41.
117. van Benthem BH et al. The impact of pregnancy and menopause on CD4 lymphocyte counts in HIV-infected women. *AIDS*, 2002, 16:919–924.
118. Minkoff H et al. The relationship of pregnancy to human immunodeficiency virus disease progression. *American Journal of Obstetrics and Gynecology*, 2003, 189:552–559.
119. *Malaria and HIV/AIDS interactions and their implications for public health policy*. Geneva, World Health Organization, 2004 (http://www.who.int/hiv/pub/prev_care/malaria/en/index.html, accessed 31 March 2006).
120. ter Kuile FO et al. The burden of co-infection with human immunodeficiency virus type 1 and malaria in pregnant women in sub-Saharan Africa. *American Journal of Tropical Medicine and Hygiene*, 2004, 71(2 Suppl):41–54.
121. *Nutrition counselling, care and support for HIV-infected women. Guidelines on HIV-related care, treatment and support for HIV-infected women and their children in resource-constrained settings*. Geneva, World Health Organization, 2004 (http://www.who.int/hiv/pub/prev_care/nutrition/en, accessed 31 March 2006).
122. van den Broek NR, White SA, Neilson JP. The relationship between asymptomatic human immunodeficiency virus infection and the prevalence and severity of anaemia in pregnant Malawian women. *American Journal of Tropical Medicine and Hygiene*, 1998, 59:1004–1007.
123. Ramon R et al. Haematological characteristics and HIV status of pregnant women in Abidjan, Côte d'Ivoire, 1995–96. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1999, 93:419–422.
124. Meda N et al. Anaemia during pregnancy in Burkina Faso, west Africa, 1995–96: prevalence and associated factors. DITRAME Study Group. *Bulletin of the World Health Organization*, 1999, 77:916–922.
125. Nduati R et al. Effect of breastfeeding on mortality among HIV-1 infected women: a randomised trial. *Lancet*, 2001, 357:1651–1655.
126. Villamor E et al. Weight loss during pregnancy is associated with adverse pregnancy outcomes among HIV-1 infected women. *Journal of Nutrition*, 2004, 134:1424–1431.

127. Gaillard P et al. Vaginal lavage with chlorhexidine during labour to reduce mother-to-child HIV transmission: clinical trial in Mombasa, Kenya. *AIDS*, 2001, 15:389–396.
128. Biggar RJ et al. Perinatal intervention trial in Africa: effect of a birth canal cleansing intervention to prevent HIV transmission. *Lancet*, 1996, 347:1647–1650.
129. Taha TE et al. Effect of cleansing the birth canal with antiseptic solution on maternal and newborn morbidity and mortality in Malawi: clinical trial. *BMJ*, 1997, 315:216–219.
130. *Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice*. Geneva, World Health Organization, 2003 (<http://www.who.int/reproductive-health/publications/pcpnc/pcpnc.pdf>, accessed 31 March 2006).
131. Marcollet A et al. Differences in postpartum morbidity in women who are infected with the human immunodeficiency virus after elective caesarean delivery, emergency caesarean delivery, or vaginal delivery. *American Journal of Obstetrics and Gynecology*, 2002, 186:784–789.
132. Watts DH et al. Complications according to mode of delivery among human immunodeficiency virus–infected women with CD4 lymphocyte counts of $\leq 500/\mu\text{L}$. *American Journal of Obstetrics and Gynecology*, 2000, 183:100–107.
133. Urbani G et al. Complications associated with caesarean section in HIV-infected patients. *International Journal of Gynaecology and Obstetrics*, 2001, 74:9–15.
134. Rodriguez EJ et al. Postoperative morbidity associated with caesarean delivery among human immunodeficiency virus–seropositive women. *American Journal of Obstetrics and Gynecology*, 2001, 184:1108–1111.
135. Grubert TA et al. Rates of postoperative complications among human immunodeficiency virus–infected women who have undergone obstetric and gynecologic surgical procedures. *Clinical and Infectious Diseases*, 2002, 34:822–830.
136. Buekens P, Curtis S, Alayon S. Demographic and health surveys: caesarean section rates in sub-Saharan Africa. *BMJ*, 2003, 326:136.
137. Newell M, Rogers M. Pregnancy and HIV infection: a European consensus on management. *AIDS*, 2002, 15(suppl 2): S1–S18.
138. *Recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV-1 transmission in the United States*. Washington, DC, United States Public Health Service Task Force, 2005 (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hstat2.chapter.11570>, accessed 31 March 2006).
139. Bastin N et al. HIV disease and pregnancy. 3. Postpartum care of the HIV-positive woman and her newborn. *Journal of Obstetric, Gynecologic and Neonatal Nursing*, 1992, 21:105–111.
140. Fiore S, Newell ML, Thorne C. European HIV in Obstetrics Group. Higher rates of post-partum complications in HIV-infected than in uninfected women irrespective of mode of delivery. *AIDS*, 2004, 18:933–938.
141. Desgrees-Du-Lou A et al. Contraceptive use, protected sexual intercourse and incidence of pregnancies among African HIV-infected women. DITRAME ANRS 049 Project, Abidjan 1995–2000. *International Journal of STD and AIDS*, 2002, 13:462–468.

142. Rutenberg N et al. *Family planning and PMTCT: examining interrelationships, strengthening linkages*. Washington, DC, Population Council, 2003 (<http://www.popcouncil.org/horizons/ressum/pmtctfp/pmtctfp.html>, accessed 31 March 2006).
143. *New data on the prevention of mother-to-child transmission of HIV and their policy implications. WHO Technical Consultation on Behalf of the UNFPA/UNICEF/WHO/UNAIDS Inter-Agency Task Team on Mother-to-Child Transmission of HIV, Geneva, Switzerland, 11–13 October 2000*. Geneva, World Health Organization, 2001 (http://www.who.int/reproductive-health/publications/new_data_prevention_mtct_hiv/index.html, accessed 31 March 2006).
144. *Safe abortion: technical and policy guidance for health systems*. Geneva, World Health Organization, 2003 (http://www.who.int/reproductive-health/publications/safe_abortion/safe_abortion.html, accessed 31 March 2006).
145. Berer M. National laws and unsafe abortion: the parameters of change. *Reproductive Health Matters*, 2004, 12(suppl):1–8.
146. de Bruyn M. Safe abortion for HIV-positive women with unwanted pregnancy: a reproductive right. *Reproductive Health Matters*, 2003, 11:152–161.
147. Sawaya GF et al. Antibiotics at the time of induced abortion: the case for universal prophylaxis based on a meta-analysis. *Obstetrics and Gynecology*, 1996, 87(5 Pt 2):884–890.
148. Rasch V et al. Acceptance of contraceptives among women who had an unsafe abortion in Dar es Salaam. *Tropical Medicine and International Health*, 2004, 9:399–405.
149. *Sexually transmitted infections: breaking the cycle of transmission*. New York, United Nations Population Fund, 2004 (http://www.unfpa.org/upload/lib_public_file/362_filename_sti_complete.pdf, accessed 31 March 2006).
150. *Training modules for the syndromic management of sexually transmitted infections*. 2nd ed. Geneva, World Health Organization, not dated (<http://www.who.int/reproductive-health/stis/training.htm>, accessed 31 March 2006).
151. *Sexually transmitted and other reproductive tract infections: a guide to essential practice*. Geneva, World Health Organization, 2005 (http://www.who.int/reproductive-health/publications/rtis_gpe/rtis_gpe.pdf, accessed 31 March 2006).
152. Ohmit SE et al. Longitudinal study of mucosal *Candida* species colonization and candidiasis among human immunodeficiency virus (HIV)–seropositive and at-risk HIV-seronegative women. *Journal of Infectious Diseases*, 2003, 188:118–127.
153. Duerr A et al. Incident and persistent vulvovaginal candidiasis among human immunodeficiency virus–infected women: risk factors and severity. *Obstetrics and Gynecology*, 2003, 101:548–556.
154. Jamieson DJ et al. Longitudinal analysis of bacterial vaginosis: findings from the HIV epidemiology research study. *Obstetrics and Gynecology*, 2001, 98:656–663.
155. Sobel JD. Vulvovaginal candidiasis: a comparison of HIV-positive and -negative women. *International Journal of STD and AIDS*, 2002, 13:358–362.
156. Moodley P et al. Influence of HIV-1 coinfection on effective management of abnormal vaginal discharge. *Sexually Transmitted Diseases*, 2003, 30:1–5.

157. Herpes simplex virus type 2: programmatic and research priorities in developing countries. Report of a WHO/UNAIDS/LSHTM Workshop (London 14–16 February 2001). Geneva, World Health Organization and UNAIDS, 2001 (http://www.who.int/docstore/hiv/herpes_meeting, accessed 31 March 2006).
158. Rolfs RT et al. A randomized trial of enhanced therapy for early syphilis in patients with and without human immunodeficiency virus infection. The Syphilis and HIV Study Group. *New England Journal of Medicine*, 1997, 337:307–314.
159. Lukehart SA et al. Invasion of the central nervous system by *Treponema pallidum*: implications for diagnosis and treatment. *Annals of Internal Medicine*, 1988, 109:855–862.
160. Tyring SK et al. A randomized, placebo-controlled comparison of oral valacyclovir and acyclovir in immunocompetent patients with recurrent genital herpes infections. The Valaciclovir International Study Group. *Archives of Dermatology*, 1998, 134:185–191.
161. Celum C et al. Genital herpes and human immunodeficiency virus: double trouble. *Bulletin of the World Health Organization*, 2004, 82:447–453.
162. MacDonald KS et al. Evaluation of fleroxacin (RO 23-6240) as single-oral-dose therapy of culture-proven chancroid in Nairobi, Kenya. *Antimicrobial Agents and Chemotherapy*, 1989, 33:612–614.
163. Tyndall M et al. Ceftriaxone no longer predictably cures chancroid in Kenya. *Journal of Infectious Diseases*, 1993, 167:469–471.
164. Irwin KL et al. Influence of human immunodeficiency virus infection on pelvic inflammatory disease. *Obstetrics and Gynecology*, 2000, 95:525–534.
165. Kamenga MC et al. The impact of human immunodeficiency virus infection on pelvic inflammatory disease: a case-control study in Abidjan, Ivory Coast. *American Journal of Obstetrics and Gynecology*, 1995, 172:919–25.
166. Barbosa C et al. Pelvic inflammatory disease and human immunodeficiency virus infection. *Obstetrics and Gynecology*, 1997, 89:65–70.
167. Bukusi EA et al. Effects of human immunodeficiency virus 1 infection on microbial origins of pelvic inflammatory disease and on efficacy of ambulatory oral therapy. *American Journal of Obstetrics and Gynecology*, 1999, 181:1374–1381.
168. Ferenczy A et al. Human papillomavirus and HIV coinfection and the risk of neoplasias of the lower genital tract: a review of recent developments. *Canadian Medical Association Journal*, 2003, 169:431–434.
169. Lomalisa P, Smith T, Guidozzi F. Human immunodeficiency virus infection and invasive cervical cancer in South Africa. *Gynecology and Oncology*, 2000, 77:460–463.
170. Gichangi P et al. HIV and cervical cancer in Kenya. *International Journal of Gynaecology and Obstetrics*, 2002, 76:55–63.
171. Sun XW et al. Human papillomavirus infection in human immunodeficiency virus-seropositive women. *Obstetrics and Gynecology*, 1995, 85:680–686.
172. Temmerman M et al. Risk factors for human papillomavirus and cervical precancerous lesions, and the role of concurrent HIV-1 infection. *International Journal of Gynaecology and Obstetrics*, 1999, 65:171–181.

173. Sun XW et al. Human papillomavirus infection in women infected with the human immunodeficiency virus. *New England Journal of Medicine*, 1997, 337:1343–1349.
174. Ahdieh L et al. Cervical neoplasia and repeated positivity of human papillomavirus infection in human immunodeficiency virus–seropositive and –seronegative women. *American Journal of Epidemiology*, 2000, 151:1148–1157.
175. Minkoff H et al. A longitudinal study of human papillomavirus carriage in human immunodeficiency virus–infected and human immunodeficiency virus–uninfected women. *American Journal of Obstetrics and Gynecology*, 1998, 178:982–986.
176. Jamieson DJ et al. Characterization of genital human papillomavirus infection in women who have or who are at risk of having HIV infection. *American Journal of Obstetrics and Gynecology*, 2002, 186:21–27.
177. Serwadda D et al. Use of a hybrid capture assay of self-collected vaginal swabs in rural Uganda for detection of human papillomavirus. *Journal of Infectious Diseases*, 1999, 180:1316–1319.
178. Delmas MC et al. Cervical squamous intraepithelial lesions in HIV-infected women: prevalence, incidence and regression. European Study Group on Natural History of HIV Infection in Women. *AIDS*, 2000, 14:1775–1784.
179. Duerr A, Kieke B, Warren D et al. Human papillomavirus–associated cervical cytologic abnormalities among women with or at risk of infection with human immunodeficiency virus. *American Journal of Obstetrics and Gynecology*, 2001, 184:584–590.
180. Chirenje ZM. Association of cervical SIL and HIV-1 infection among Zimbabwean women in an HIV/STI prevention study. *International Journal of STD and AIDS*, 2002, 13:765–768.
181. Wright TC Jr et al. Cervical intraepithelial neoplasia in women infected with human immunodeficiency virus: prevalence, risk factors, and validity of Papanicolaou smears. New York Cervical Disease Study. *Obstetrics and Gynecology*, 1994, 84:591–597.
182. Palefsky JM et al. Cervicovaginal human papillomavirus infection in human immunodeficiency virus-1 (HIV)–positive and high-risk HIV-negative women. *Journal of the National Cancer Institute*, 1999, 91:226–236.
183. Hawes SE et al. Increased risk of high-grade cervical squamous intraepithelial lesions and invasive cervical cancer among African women with human immunodeficiency virus type 1 and 2 infections. *Journal of Infectious Diseases*, 2003, 188:555–563.
184. Schafer A et al. The increased frequency of cervical dysplasia-neoplasia in women infected with the human immunodeficiency virus is related to the degree of immunosuppression. *American Journal of Obstetrics and Gynecology*, 1991, 164:593–599.
185. Silverberg MJ et al. The impact of HIV infection and immunodeficiency on human papillomavirus type 6 or 11 infection and on genital warts. *Sexually Transmitted Diseases*, 2002, 29:427–435.
186. Conley LJ et al. HIV-1 infection and risk of vulvovaginal and perianal condylomata acuminata and intraepithelial neoplasia: a prospective cohort study. *Lancet*, 2002, 359:108–113.

187. Womack SD et al. HPV-based cervical cancer screening in a population at high risk for HIV infection. *International Journal of Cancer*, 2000, 85:206–210.
188. Ellerbrock TV et al. Incidence of cervical squamous intraepithelial lesions in HIV-infected women. *JAMA*, 2000, 283:1031–1037.
189. Sun XW et al. Human papillomavirus infection in human immunodeficiency virus-seropositive women. *Obstetrics and Gynecology*, 1995, 85(5 Pt 1):680–686.
190. Temmerman M et al. Risk factors for human papillomavirus and cervical precancerous lesions, and the role of concurrent HIV-1 infection. *International Journal of Gynaecology and Obstetrics*, 1999, 65:171–181.
191. Palefsky JM et al. Prevalence and risk factors for anal human papillomavirus infection in human immunodeficiency virus (HIV)-positive and high-risk HIV-negative women. *Journal of Infectious Diseases*, 2001, 183:383–391.
192. Holly EA et al. Prevalence and risk factors for anal squamous intraepithelial lesions in women. *Journal of the National Cancer Institute*, 2001, 93:843–849.
193. Maiman M et al. Prevalence, risk factors, and accuracy of cytologic screening for cervical intraepithelial neoplasia in women with the human immunodeficiency virus. *Gynecology and Oncology*, 1998, 68:233–239.
194. *Cervix cancer screening*. Lyon, International Agency for Research on Cancer, 2005 (IARC Handbooks of Cancer Prevention, Vol. 10).
195. *Cervical cancer screening in developing countries. Report of a WHO consultation*. Geneva, World Health Organization, 2002 (<http://www.who.int/reproductive-health/cancers/cervical.html>, accessed 31 March 2006).
196. Wright TJ et al. Human immunodeficiency virus 1 expression in the female genital tract in association with cervical inflammation and ulceration. *American Journal of Obstetrics and Gynecology*, 2001, 184:279–285.
197. Tate DR, Anderson RJ. Recrudescence of cervical dysplasia among women who are infected with the human immunodeficiency virus: a case-control analysis. *American Journal of Obstetrics and Gynecology*, 2002, 186:880–882.
198. Fruchter RG et al. Multiple recurrences of cervical intraepithelial neoplasia in women with the human immunodeficiency virus. *Obstetrics and Gynecology*, 1996, 87:338–344.
199. Gichangi PB et al. Impact of HIV infection on invasive cervical cancer in Kenyan women. *AIDS*, 2003, 17:1963–1968.
200. *Scaling up antiretroviral therapy in resource-constrained settings: treatment guidelines for a public health approach*. Geneva, World Health Organization, 2003 (http://www.who.int/3by5/publications/guidelines/en/arv_guidelines.pdf, accessed 31 March 2006).
201. Xi LF, Kiviat NB. Cervical neoplasia and highly active antiretroviral therapy. *Journal of the National Cancer Institute*, 2004, 96:1051–1053.
202. Minkoff H et al. The effect of highly active antiretroviral therapy on cervical cytologic changes associated with oncogenic HPV among HIV-infected women. *AIDS*, 2001, 15:2157–2164.
203. Lillo FB et al. Human papillomavirus infection and associated cervical disease in human immunodeficiency virus-infected women: effect of highly active antiretroviral therapy. *Journal of Infectious Diseases*, 2001, 184:547–551.

204. van Eijk AM et al. Pregnancy interval and delivery outcome among HIV-seropositive and HIV-seronegative women in Kisumu, Kenya. *Tropical Medicine and International Health*, 2004, 9:15–24.
205. Prevention of perinatal HIV transmission: *HIV guidelines. V. Possible adverse effects in infants*. Albany, New York State Department of Health AIDS Institute, 2002 (http://www.hivguidelines.org/public_html/center/clinical-guidelines/perinatal_hiv_transmission/perinatal_2002.htm, accessed 31 March 2006).
206. Watts DH et al. Assessing the risk of birth defects associated with antiretroviral exposure during pregnancy. *American Journal of Obstetrics and Gynecology*, 2004, 191:985–992.
207. Watts DH et al. Maternal toxicity and pregnancy complications in human immunodeficiency virus–infected women receiving antiretroviral therapy: PACTG 316. *American Journal of Obstetrics and Gynecology*, 2004, 190:506–516.
208. Chmait R et al. Protease inhibitors and decreased birth weight in HIV-infected pregnant women with impaired glucose tolerance. *Journal of Perinatology*, 2002, 22:370–373.
209. European Collaborative Study. Exposure to antiretroviral therapy in utero or early life: the health of uninfected children born to HIV-infected women. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 2003, 32:380–387.
210. Thorne C, Newell M. Pregnancy outcome in ART-treated HIV-infected women in Europe. *11th Conference on Retroviruses and Opportunistic Infections, 8–11 February 2004, San Francisco, California, USA* (abstract 98; <http://www.aegis.com/conferences/croi/2004/98.html>, accessed 31 March 2006).
211. Thorne C, Patel D, Newell ML. Increased risk of adverse pregnancy outcomes in HIV-infected women treated with highly active antiretroviral therapy in Europe. *AIDS*, 2004, 18:2337–2339.
212. Tuomala RE et al. Antiretroviral therapy during pregnancy and the risk of an adverse outcome. *New England Journal of Medicine*, 2002, 346:1863–1870.
213. *Saving mothers, saving families: the MTCT-Plus Initiative*. Geneva, World Health Organization, 2003 (http://www.who.int/hiv/pub/prev_care/pub40/en/index.html, accessed 31 March 2006).

WORLD HEALTH ORGANIZATION
Department of HIV/AIDS and
Department of Reproductive
Health and Research
20, avenue Appia
CH-1211 Geneva 27
Switzerland
E-mail: hiv-aids@who.int
<http://www.who.int/hiv/en>

ISBN 92 4 159425 X

