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MASTERS' THESIS

Title of Study:

SEXUAL RISK BEHAVIOUR AMONG HETEROSEXUAL HIV-INFECTED INDIVIDUALS IN THE HAART ERA: SAFER SEX REVISITED

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DECLARATION

This thesis, *"Sexual Risk Behaviour among Heterosexual HIV-Infected Individuals in the HAART Era: Safer Sex Revisited,"* is the result of my independent investigation of the existing literature. Where my work is indebted to the work of others, I have made appropriate acknowledgements.

I declare that this study has not already been accepted for any other degree nor is it currently being submitted in candidature for any other degree.

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1. ABSTRACT

Sexual Risk Behaviour among Heterosexual HIV-Infected Individuals in the HAART Era: Safer Sex Revisited

By **Girum E. Mekonnen**

Background: There is a dire need to understand the impact of highly-active antiretroviral treatment (HAART) on the sexual risk behaviour (SRB) of HIV-positive individuals in heterosexual settings.

Objectives: To assess SRB of heterosexual HIV-positive individuals in the HAART era.

Methods: A thorough search of electronic databases, hand searches of articles, book sections, cross-references and personal contacts with authors were made use of to collect pertinent primary studies, which were systematically abstracted and analysed.

Results: The fifteen primary studies reviewed herein were composed slightly of more women (median: 58%) and Black participants. About two-thirds of the participants in the studies were sexually active. ART-naïve and ART-experienced patients had similar levels of sexual activity. About a median 43% HIV-positive patients had unprotected sex in the reference periods. The studies predominantly showed that ART-treated patients were less likely to engage in unsafe sex and report multiple sexual partners but more likely to disclose to partners. Most unsafe sexual acts occurred in marriages or long-term stable relationships. Regardless of own HIV status, holding inappropriate beliefs about HAART was associated with practicing safe sex less regularly. A large proportion of HIV-positive adults desired to bear a child and receipt of HAART augmented such wishes.

Conclusions: Health workers need to address the special reproductive needs of HIV-positive women. Married people emerge as a new key population at a special risk and interventions should focus on this neglected group. Prevention programmes against unrealistic beliefs stemming from benefits of HAART are urgently needed. Future HIV behavioural surveys need to incorporate questions on HIV transmission concerns and beliefs of the general population in light of HAART. Contribution of HAART to protective sexual behaviour must be used to design synergistic responses that are mutually complementary with HIV prevention activities.

2. INTRODUCTION

With an estimated 25 million deaths since its identification in the early eighties and over 40 million already infected at present, the HIV/AIDS pandemic remains the world's leading public health problem (1). Sub-Saharan Africa, the most terribly afflicted region, accounts for 64% of the global HIV/AIDS burden (1). In 2005, the region contributed to 77% of all HIV/AIDS related deaths and the pandemic showed an upward tendency from a 2003 baseline (1). Poor access to and weak health services (2), incomprehensive knowledge and information about HIV/AIDS and its transmission (3), grossly low literacy rates, not knowing one's serostatus (1), lack of empowerment of women (4, 5) and high fertility (6), among other reasons, could be incriminated as contributing factors for the overall high prevalence and spiralling of HIV infections in the region.

The development of potent antiretroviral treatment (ART) has brought about expectations of continued asymptomatic existence (7). Since its introduction in mid-1990, the combination ART referred to as highly active antiretroviral treatment (HAART) has been linked to a dramatic overall decline in HIV-associated morbidity and mortality (8-11). In a study on heterosexual couples in Madrid, Spain, Castilla et al (2005) have also shown that widespread use of HAART was associated with an 80% decrease in the heterosexual spread of HIV infection (12). This combination therapy, once considered too expensive and impractical, has now been introduced to many resource-poor settings through the unswerving commitment and support of the global community and institution of various price-lowering mechanisms.

Antiretroviral therapy could result in near-complete reductions in plasma HIV RNA levels (13). However, this is not a lasting alteration of the patient's viral load and depends on a variety of factors including strict adherence and virologic and immunologic parameters (14, 15). Despite the fact that plasma HIV level is a good indicator of genital viral shedding, suppression of plasma viral load below the detection limit of currently available tests may not necessarily be followed by similar reductions in reproductive secretions. Zhang et al (1998) found that among seven HIV-1-positive men taking HAART and with long-term undetectable viral loads, two had potent viruses in their seminal cells with features indicating their capacity to replicate and transmit sexually (16). Similarly, in a study on female genital secretions, Kovacs et al (2001) have demonstrated that more than one in three women with negative plasma viral levels and cultures released the virus in their reproductive secretions (17). A related work by Fiore et al (2003) has as well shown that 25% of HIV-1 infected women with suppressed plasma viral levels excreted the virus in their cervicovaginal secretions (18).

Adherence, a term that "encompasses numerous health-related behaviours that extend beyond taking prescribed pharmaceuticals" (19), is a mounting problem in connection with the advent of modern HIV treatments. Authorities recommend that patients on antiretroviral (ARV) regimens should maintain a high level of (greater than 95%) adherence for optimal suppression of the viral load and resistance (15). Low antiretroviral adherence levels in many developing countries (20) coupled with inconstant availability and access to treatment (21) are cause for concern due to the potential selection of viral resistance to available ARVs and the subsequent need to switch to second-line regimens that are often more

expensive and unavailable (15). Increasing rates of primary drug resistance among antiretroviral-naïve patients is also indicative of the fact that patients who are on HAART regimens could still shed resistant HIV strains (22, 23).

On the other hand, having an undetectable viral load as a result of receiving antiretroviral therapy may be construed as being entirely non-infectious. These changes in perceptions or beliefs about treatment gains have been compellingly documented in many high-risk groups (7, 24-26). Oblivious of the threats of transmitting the virus, people living with HIV (PLHIV) holding such beliefs and perceptions tend to be lulled into a false sense of security and more willing to take risks with HIV infection (27, 28). Crepaz et al (2004) have recently shown that individuals, regardless of their own HIV serostatus, who held the belief that HAART might decrease infectivity of HIV-infected patients, were more likely to engage in unprotected intercourse (29).

Most HIV prevention initiatives have traditionally been tailored to mainly encompass people who are single and populations at higher-risk of exposure to HIV such as men who have sex with men (MSM), injecting drug users (IDU) and sex workers. The “B” of “ABC” HIV prevention strategy (ABC standing for *a*bstinence, *b*eing faithful and correct and consistent *c*ondom use) could also be erroneously interpreted as if being in a steady relationship could confer full protection against HIV infection. A Zambian study on pregnant women in Lusaka showed that condom use was lower but HIV prevalence was not considerably lesser among women faithful to their partners as compared to women with extramarital partners (30).

Maintaining protective sexual behaviour during all sexual acts could be a challenge in long-term relationships (30, 31). Marriage has mistakenly been considered as a safe haven when it comes to HIV/AIDS. However, researches now indicate that marriage could even be a significant risk factor as most unsafe sexual activities are reported to take place in steady relationships (32). Using DNA sequencing techniques, Allen et al (2003) showed among Zambian married women that “87% of new HIV infections were acquired from a spouse” (31).

Another closely intertwined issue is that of the neglected subject of fertility in HIV-positive individuals. HIV-discordant couple intending to bear a child may engage themselves in unprotected sex. With the introduction of ART and prevention of parent-to-child transmission (pPTCT) programmes, HIV-infected adults also exhibit burgeoning desires for parenthood (33). Researches indicate that childbearing desires and intentions of HIV-positive patients are sufficiently high to warrant due attention (34). A study in Nigeria found that almost two in three of HIV-infected patients desired to have children, even though a little more than one-half already had more than one child (6).

HIV-positive individuals often have worries about transmitting the disease and the consequences of disclosing their status. The HIV-positive partner’s communication of serostatus in an open manner could serve as a driving force for an HIV-discordant couple to opt for more diligent condom use. Nevertheless, important social consequences such as abandonment, loss of support, stigma and discrimination make disclosure of serostatus all too difficult for HIV-positive individuals (35). This could, in effect, create tremendous pressure on these

people to exercise protective sexual behaviour. Some attempt to cope by avoiding sex or resorting to uncommitted relationships (36). On the other hand, notifying a partner does not always ascertain a more protective behaviour. Marks and Crepaz (2001), in their study of HIV-positive men with discordant or unknown-serostatus partners, showed that nearly one in four of the respondents who had disclosed his HIV status engaged in unprotected sex (37). In a similar manner, this study showed that nondisclosure also did not necessarily lead to unsafe behaviour.

In the face of unwavering global efforts to contain the HIV pandemic with wide-ranging prevention strategies to raise public knowledge and create awareness, unsafe sexual practices continue to be a pervasive challenge. Recent large-scale HIV behavioural surveys from Ethiopia (38) and South Africa (39) indicated that the level of consistent condom use among respondents drawn from the general population was very low. In addition, other field studies from the region also show that unwanted pregnancies (40) and the prevalence of sexually-transmitted infections (STIs) (41, 42) are alarmingly high among heterosexual HIV-positive people in this era of potent HIV treatment. Therefore, evaluation of the contribution of the modern anti-HIV treatments to risky sexual behaviours among heterosexual PLHIV remains of paramount importance.

Researches on HIV risk behaviour have largely focused on populations with higher-risk of exposure to HIV such as MSM and IDU which are not main forms of HIV acquisition in most resource-constrained settings like sub-Saharan Africa. In Africa, heterosexual transmission is the predominant form of HIV infection. In

Ethiopia, for instance, heterosexual contact accounts for close to 90% of all new HIV infections (43). There is also a great deal of inconsistency among the available publications on HIV risk sexual behaviour of heterosexual HIV-positive individuals in the context of HAART in different settings. These all call for reviewing the available data on heterosexual HIV transmission settings and indicating the tendency of the overwhelming evidence that provides a springboard for the development of evidence-based public health responses to reduce HIV risk behaviour in low and middle-income countries that target HIV-positive individuals and the general public.

3. OBJECTIVES

The overarching goal of this systematic review was to assess risky sexual behaviour among heterosexual HIV-infected individuals in the HAART era, with a view to elucidating information relevant to low and middle-income sub-Saharan African countries. The specific objectives were to evaluate, among heterosexual PLHIV in the context of HAART, (the):

- Condom use and safer sex practices
- Prevalence of sexually-transmitted infections
- Concerns and perceptions of ART-naïve and experienced PLHIV about their infectivity and the influence of HAART on their sexual behaviour
- Relationship between disclosure of positive HIV serostatus to a partner and consistent use of condoms
- Relationship between parenthood desires/intentions and risky sexual behaviour

4. METHODS

A thorough search of different databases and virtual libraries was done and appropriate inclusion and exclusion criteria were applied on the collections. A systematic review of the collected works was performed because the heterogeneity of the designs, settings, and focuses of the studies could not permit a meta-analysis.

4.1. SEARCH STRATEGY

Bibliographic databases such as MEDLINE/PubMed, AIDSLINE, PsycINFO, Google, Google Scholar, etc., were searched thoroughly using various combinations of key words and medical subject heading (MeSH) terms. Combinations of the following key words were used for the electronic search: *HIV, AIDS, HIV-infected, HIV-positive, heterosexual, condom use, disclosure, risk perception, sexual behaviour, risk behaviour, sexual risk-taking, infectivity, transmission concerns, unprotected sex, unsafe sex, viral load, antiretroviral treatment, multiple sexual partners, sexually transmitted infection, fertility desires.*

In addition, hand searches of journals, sections on books, reference lists of articles, and contacts with researchers were carried out. Requests for information (RFIs) were posted on listservs and e-discussion forums dedicated to HIV/AIDS prevention and control in the developing world (such as Afro-nets, AIDS-Africa, AF-AIDS, etc). This evoked a great deal of interest among members who sent articles, links and on-going research activities on the subject. Attempts to include the “grey” literature (i.e., conference papers, ongoing researches, dissertation

abstracts, and other unpublished, difficult-to-find literature, etc) were not successful as the materials did not fulfil the selection criteria.

In the event that publications from the same source study population were collected, the most pertinent and latest one was taken. For instance, Wilson TE et al had four relevant articles published between 1999 and 2004 all from HIV-positive women enrolled in the Women's Interagency HIV Study (WIHS) (44-47).Therefore, only the latest article was included in this review, though the older versions as well individually fulfilled the inclusion criteria.

4.2. INCLUSION CRITERIA

The search included English-language studies published after the introduction of HAART (between January 1996 and April 2006) reporting on adult heterosexual HIV-positive patients. Studies on HIV risk behaviour which reported exclusively on MSM, bisexuals and/or IDU were excluded. In the case of studies involving participants with different sexual orientations, only the results on the heterosexual men and women group were extracted for inclusion to this review on condition that the heterosexual group contributed to no less than one-third of the sample size in the studies. Where different numbers of ARVs had been used, papers with triple antiretroviral therapy as the median value were selected. Articles with mono- or dual (antiretroviral) therapies were left out.

4.3. DATA EXTRACTION AND METHOD OF DATA SYNTHESIS

Data extraction forms (adapted from Hedin A et al, 2004) detailing the study design, sample size, non-response or attrition rate, intervention, setting,

environment, outcome measures, validity and results were used to abstract relevant information from the publications included in this systematic review (Annex B) (48). Data synthesis tables were used to blend the results to make comparison among studies possible and tabulate the included studies to carry out a narrative synthesis owing to the anticipated heterogeneity. The bibliographic software *EndNote* (version 9.0) was used for proper management of reference materials included in this review work.

4.4. DEFINITIONS

a) *Unprotected sex*: vaginal or anal sexual activity without use of a condom
b) *Multiple sexual partners*: more than one sexual partner during reference period
c) *Consistent condom use*: 100% use of condoms in all sexual acts in a reference period
d) *Inconsistent condom use*: less-than 100% condom use during sexual activity in a reference period
e) *'At-risk' sexual partners:* sexual partners of HIV-positive individuals who are either HIV-negative or of unknown status.
f) *Sexual risk behaviour (SRB)*: all those arrays of manners and activities that sexually-active individuals exhibit, which could be expressed in the form of having unprotected sex with 'at-risk' partners, multiple sexual partners and/or inconsistent use of condoms
g) *Risk perception about infectivity*: a complex mental image or construct emanating from HIV-related knowledge, beliefs and experiences of HIV-

infected individuals aware of their serostatus leading to discerning in a particular way the risk of transmitting HIV infection to uninfected individuals.

h) *HIV transmission (infectivity) concerns*: A theme closely related to perception of risk, indicating degree of worries of sexually-active individuals about transmitting or acquiring HIV infection through unprotected sex.

i) *Highly-active antiretroviral therapy (HAART)*: combination treatment with 3 antiretroviral (ARV) drugs which include 2 nucleoside reverse transcriptase inhibitors (NsRTIs) *plus* one non-nucleoside reverse transcriptase inhibitor (NNRTI) or a protease inhibitor (PI), as well as other potent combination ARV regimens recommended by the World Health Organization (WHO) or other relevant authorities.

5. RESULTS

Searches with various combinations of selected key words came up with 207 hits (Fig. 1). Fifteen studies reporting on the sexual risk behaviour of HIV-positive individuals gleaned for this systematic review fulfilled the selection criteria for inclusion; five from sub-Saharan Africa, six from the United States and four from Europe. Quality scoring was performed and revealed a high quality in nine, medium in five and low in one. The studies were conducted between 1996 and 2002 and published between 2000 and 2006.

The majority of the studies were conducted within health institutions and involved slightly more women (median: 58%). The median age was 38.5 years. Three papers were women-only studies. Most non-couple studies reported high proportions of married or cohabiting participants. None of the studied variables

were significant by gender comparisons. With the exception of the study from France, all studies reporting on ethnicity of participants were composed largely of Black participants. Table 1 illustrates main findings with regard to settings and demographic features of the studies. Only statistically-significant results were presented in a tabular form for the three geographic regions and arranged based on the start dates of enrolments into the studies (Table 2).

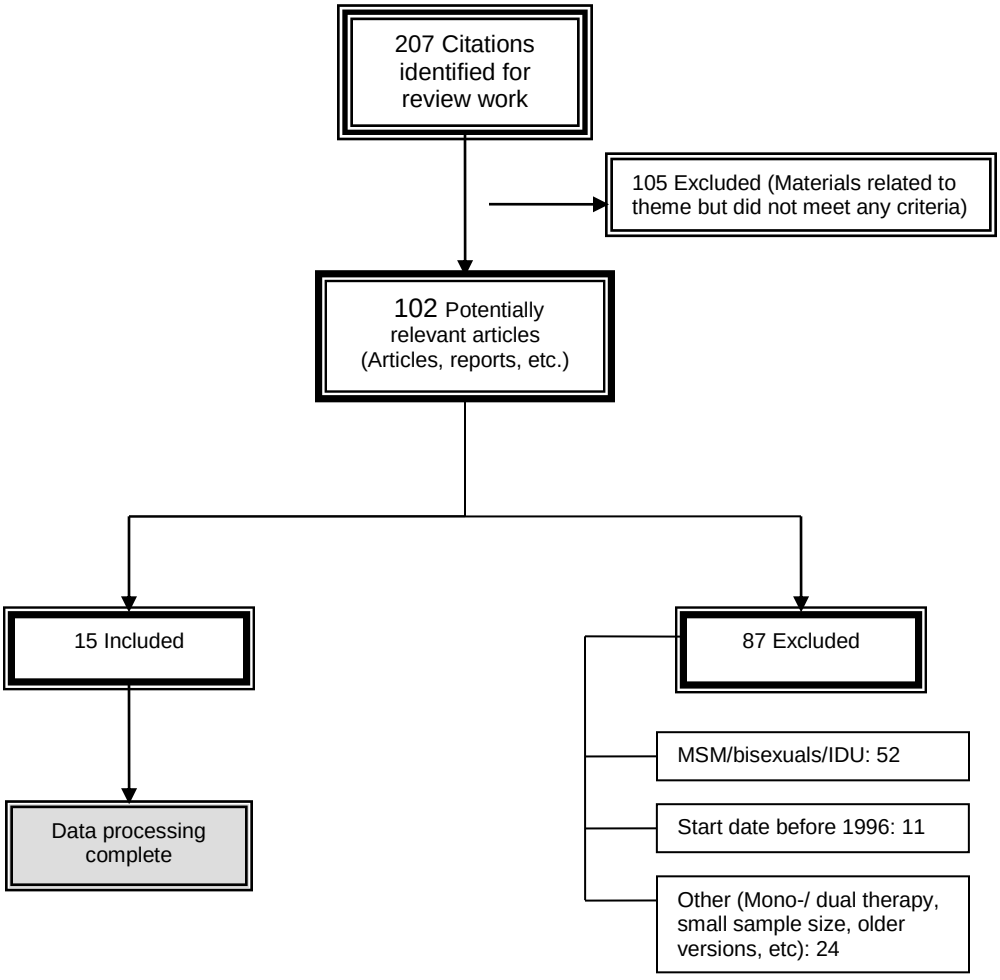

Fig. 1: Flow chart indicating the selection process of articles for the review work

5.1. SEXUAL RISK BEHAVIOUR IN THE CONTEXT OF HAART

The studies evaluated sexual risk behaviour (SRB) before and after initiation of anti-HIV treatment in the pre- and post-HAART eras: ["*before-and-after"* comparisons]; or assessed SRB among HIV-positive individuals in the post-HAART era based on whether patients were receiving HAART (ART-experienced) or not (ART-naïve): [*"with-and-without"* comparisons].

5.1.1. Overall Sexual Activity

All studies reported on the sexual activity and/or abstinence of HIV-infected adults within reference periods that ranged from one to 12 months. The median value for the level of sexual activity was 66%. There were slight differences in the median level of sexual activity reported in the papers by geographic region, viz., 47% for the African, 74% for the American and 63% for the European studies. One study (49) indicated a similar level of sexual activity among both seroconcordant and discordant couple (70 and 65% respectively). Four studies, all from Africa, compared the sexual activities of ART-experienced and ART-naive patients in general (32, 41, 42, 49). The papers consistently showed that the two groups had similar levels of sexual activity.

Desgrées-du-Loû et al (2002) reported a mean abstinence level of 12 months in HIV-positive women in Côte d'Ivoire who were followed postpartum. In a cross-sectional study, Moatti et al (2003), again from Côte d'Ivoire, described that more than 85% of HIV-positive people not involved in steady partnerships were abstinent. The UK study, in a sample of predominantly 'black African' HIV-

positive women, also found that 28% of the participants were still abstinent 68 months after learning their HIV-positivity (50).

5.1.2. Unprotected Sex and Condom Use

All studies provided data on rates of unsafe sexual activities (or inconsistent condom use) among HIV-positive individuals. Remarkably, 16 to 87% of HIV-positive patients (median 43%) engaged in unprotected anal or vaginal sex during the preceding one to 12 months before the studies were carried out. Notably, Kozal et al (2004) found that nearly one-quarter (24%) of patients engaging in unprotected sex had HIV virus strains at least resistant to one class of ARV drugs. Strikingly, in a Ugandan study, Bunnell et al (2006) revealed that over 85% risky sexual events both before and after initiation of antiretroviral regimens occurred within steady relationships. Likewise, Sarna et al showed that couples were three times more likely to report engagement in unprotected sex.

There was no positive or negative association evidenced from the papers with regard to the relationship between viral load and unprotected sex, as both studies reporting on this (27, 51) showed that those patients with undetectable viral loads were as likely as those with detectable loads to practice unsafe sex. All four studies from Africa comparing unprotected sex and HAART consistently demonstrated that patients on antiretroviral treatment were 2 to 4 times less likely to have had unprotected sex or used condoms erratically (32, 41, 42, 49). In a similar fashion, these papers also showed correspondingly higher rates of condom use at the most recent sexual event among those patients receiving HAART. The study from France depicted a non-significant reduction in

unprotected sexual activities of the patients taking HAART with ‘at-risk’ partners (52). Among three US samples that related unprotected sex with ART use (27, 44, 53), the work by van der Straten et al (2000) also showed that HAART recipients were 2 to 3 times less likely to practice unsafe sex. However, the other two showed slightly higher likelihood (1.2 and 1.8 times) of engaging in risky sexual acts with ‘at-risk’ partners among HAART-treated patients.

5.1.3. Number of Sexual Partners

The four (three African and one US) papers which examined promiscuity among HIV-infected adults (41, 42, 44, 49) showed that 13 to 35% of study participants had multiple sexual partners. Sarna et al (2005) found that a smaller proportion of patients taking HAART reported having multiple partners (1% vs. 13%). Similarly, Wilson et al (2004) have shown that ART-treated patients were 1.3 times less likely to report having more than one sexual partner during the post-HAART visits. Bateganya et al (2005), however, did not demonstrate any difference among ART-treated and untreated patients with regard to number of partners.

5.1.4. Sexually Transmitted Infections (STIs)

The three studies that looked into sexually transmitted infections in HIV-positive heterosexual adults (41, 42, 53) showed a remarkable 25% to 27% STI history in the reference period. The work by Bateganya and co-workers (2005) also showed that, among 755 HIV-positive out-patient attendees, HAART-treated patients were 2 to 4 times more likely to have had STIs as compared to HAART-naïve patients.

5.2. INFECTIVITY CONCERNS OF HIV-POSITIVE INDIVIDUALS

Only two papers, both from the United States, focussing on heterosexuals that qualified for this review examined the HIV transmission concerns of sexually active HIV-positive adults or their partners. van der Straten et al (2000) found that 33% HIV-infected and 40% HIV-uninfected individuals with serodiscordant spouses had reduced worries regarding HIV transmission as a result of HIV treatment advances. In a predominantly HAART-experienced sample, Demmer (28) also demonstrated that approximately a third of the HIV-positive men and women who filled out the self-administered questionnaire indicated their lessened concerns about their HIV-seropositivity. And, nearly one in four of the respondents were engaged in protected sex less regularly.

5.3. SEROSTATUS DISCLOSURE AND SEXUAL RISK BEHAVIOUR

The median level of disclosure of HIV seropositivity to partners among the four studies that looked into the theme was 63% (40, 41, 50, 54). Weinhardt et al (2004) found that HIV-positive patients notified both positive and ‘at-risk’ partners in similar proportions. Interestingly, Desgrées-du-Loû et al (2002) demonstrated that the proportion of HIV-positive patients reporting consistent use of condoms nearly quadrupled when these individuals notified their partners about their HIV serostatus. The report from a largely rural Ugandan sample (41) revealed that HAART-treated patients were 1.6 times more likely to disclose.

5.4. FERTILITY DESIRES/INTENTIONS AND SEXUAL RISK BEHAVIOUR

Only three studies examined issues related to childbearing in HIV-infected adults (33, 40, 50). Among 149 HIV-positive women followed postpartum in an Ivorian

study (40), more than half had unwanted pregnancies. Panozzo et al (2003) revealed that 44% of HIV-positive patients who had a serodiscordant partner expressed their future desire to have a child. This Swiss study also showed that those patients whose health status improved from taking HAART were more likely to wish to have a child. On the other hand, the study on HIV-positive women from the UK also indicated that a substantial minority (7%) of women avoided using condoms because of their desire for motherhood (50).

Table 1: Settings, locations and summaries of basic demographic descriptions of studies on HIV risk perception and sexual behaviour

Citation	Data Collection Setting	Location	Demographic Variables				
			Ethnicity [a] / Residence	Sex	Age (yrs)	% Married / Cohabiting	Education
Desgrées-du-Loû et al, 2002 (40)	HIV research project (DITRAME ANRS 049)	Abidjan, Côte d'Ivoire	NR	100% women	58% of SA women are ≥25	85% of SA non-pregnant women	21% of SA women had secondary education or more
Moatti et al, 2003 (49)	8 health centres in charge of HIV care	Abidjan and Bouaké, Côte d'Ivoire	NR	49% women	53.9% <35	64% (73% men, 55% women)	28% more than secondary school
Bateganya et al, 2005 (41)	Urban HIV care clinic	Urban and rural Kampala, Uganda	77% rural	59% women	37 (mean)	55%	35% tertiary or university-level education
Sarna et al, 2005 (42)	4 HIV clinics in Mombasa	Mombasa, Kenya	NR	60% female	37 (mean)	47%	40% had up to 12 yrs of schooling
Bunnell et al, 2006 (32)	Home-based ART programme	Tororo, Uganda	NR	75% women	Median: 41 (men), 37 (women)	35% (68% men, 24% women)	5.3% tertiary education
Wilson et al, 2004 (44)	A multi-site cohort (WIHS) to study the natural history of HIV infection in women	Washington, DC; San Francisco Bay Area and Los Angeles and New York; USA	52% Black, 27% Hispanic	100% women	38.5 (median) at initiation of ART	NR	36% less than a high school education
van der Straten et al, 2000 (27)	Intervention trial of HIV serodiscordant couples	California, USA	40% Black, 35% White	Couple study	92% above 32	100%	86% high school education or more
McGowan et al, 2004 (53)	Infectious diseases clinic	Bronx, New York, USA	62% Black, 35% Hispanic	49% women	40 (median)	NR	45% high school graduate
Demmer, 2002 (28)	AIDS Service Organizations	New York, USA	46% Black, 37% Latino	28% women	42.4 (mean)	NR	73% high school diploma or less
Kozal et al, 2004 (51)	Options Project Study in 2 HIV clinics	Connecticut, USA	40% African American, 33% Latino	46% women	NR	NR	Those with resistant virus had higher average level of education (1.22 vs. 0.73; 1 = a high school education)
Weinhardt et al, 2004 (54)	Multi-city study in research offices, community-based organisations and HIV clinics	Los Angeles, Milwaukee, New York City and San Francisco; USA	60% Black/ African American	54% women	Mean of 41.5 (women) and 43.9 (men)	11%	69% high school graduate or less
Girardi et al, 2001 (55)	Multi-site heterosexual HIV study in hospitals	67 study sites throughout Italy	NR	53% women	NR	NR	NR
Miller et al, 2000 (52)	Multi-centre study (SEROCO Study Group)	Different sites in France	91% White	58% women	38.5 (mean)	60%	NR
Panozzo et al, 2003 (33)	Infectious Diseases Clinics	St. Gallen, Basel, Zürich; Switserland	NR	60% women	71% ≤ 40	100%	NR
Lambert et al, 2005 (50)	HIV clinics and voluntary organizations	London and Manchester, UK	75% 'black African'	100% women	37.9 (mean)	NR (59% had regular male partners)	More than three-quarters attended college or university

[a] Ethnicity for the African studies is presumed to be 100% Black.
NR, Not Reported; *SA*, sexually active; *UAB*, University of Alabama at Birmingham

Table 2: Methodology and main results of studies on HIV risk perception and sexual behaviour in heterosexual-transmission settings

Citation (and Quality Score)	Study Time Period	Study Design	Data Collection Method	Sample [a]	ARV Treatment Status	Method of Data Analysis	Statistically-*significant* Results on Sexual Risk Behaviour [b]
Sub-Saharan Africa							
Desgrées-du-Loû et al, 2002 (40) (H)	Apr. 1999 – Mar. 2000	Prospective cohort	Interviews	149 HIV-positive women knowing their serostatus followed PP in a project	All women took a short zidovudine regimen at the end of pregnancy or during delivery; current ART status NR	Univariate analysis	PP abstinence 12 mo (SD: 8.8) PP abstinence longer if pt: Unmarried (1.9 times) Disclosed to partner (1.2 times) 72% SA at time of survey 45% SA women disclosed their HIV-positivity to their partners 13% CCU among SA women; 48% if disclosed to partner Pregnancy incidence of 16.5/100 woman-yrs at risk 51% pregnancies unwanted
Moatti et al, 2003 (49) (H)	Dec. 1999 – Feb. 2000	Cross-sectional	Interviews	711 HIV-infected pts consulting for HIV care	23% on ART (71% for 1 yr or less)	Univariate and multivariate analyses	47% SA over past 6 mo Similar level of sexual activity among seroconcordant (70%) and discordant (65%) couple Over 85% of those not in stable relationships abstinent 23% pts had multiple partners 44% ≥1 UPS in previous 6 mo Non-ART pts twice as likely to have had UPS than ART pts 80% ART-treated and 59% non-ART-treated pts used condoms during last sex
Bateganya et al, 2005 (41) (H)	Aug. – Dec. 2003	Cross-sectional	Interviews	755 HIV-infected adults attending out-patient HIV clinic (97.4% response rate)	51% ARV-experienced, 49% ARV-naïve pts	Multivariate analysis	48% SA in past 6 mo. Of these, 35% had ≥1 casual partner 35% had multiple partners ARV-treated pts more likely to disclose (OR: 1.6 [1.1-2.3]) ARV experience related to more CCU (OR: 2.8 [1.7-4.6]) ART users more likely to report last-sex condom use with regular partner (OR: 3.6 [1.5-13.3]) 27% reported being treated for STI in past 6 mo ARV-experienced pts more likely to report STI (AOR: 2.6 [1.8-3.8])
Sarna et al, 2005 (42) (L)	NR	Cross-sectional	Interviews	322 HIV-positive pts on medical care	56%pts on ART, 44% pts on PT	Univariate and multivariate analyses	45% SA during previous 6 mo Pts on ART less likely to report sex with casual partner (3% vs. 23%) and multiple partners (1% vs. 13%) Within regular partnerships, ART pts reported more condom use at last sex (93% vs. 77%) and CCU (53% vs. 22%) during past 6 mo Pts on ART 4 times less likely to have had UPS with a regular partner Married or cohabiting pts 3 times more likely to have had UPS during past 6 mo 25% SA pts with regular partner had STI in past 6 mo
Bunnell et al, 2006 (32) (H)	May 2003 – Nov. 2004	Before-and-after study	Home-based interviews, biological markers	926 HIV-infected patients with advanced HIV infection at baseline in home-based ART programme (95% response rate)	All participants initiated on ART (within a mean follow-up time of 185 days)	Participant-level analysis, multivariate logistic regression models	28% pts SA at baseline After 6-mo follow-up on ART: CCU and last-time condom use with 'at-risk' partners increased by 39% and 35% respectively; 70% UPS decline with 'at-risk' partners in last 3 mo Over 86% of risky sexual acts both before and after ART in stable relationships

(Continued)

Table 2: Methodology and main results of studies on HIV risk perception and sexual behaviour in heterosexual-transmission settings (*cont.*)

Citation (and Quality Score)	Study Time Period	Study Design	Data Collection Method	Sample	ARV Treatment Status	Method of Data Analysis	Statistically-*significant* Results on Sexual Risk Behaviour
North America							
Wilson et al, 2004 (44) (H)	Jan. 1996 – Jan. 2001	Prospective cohort	Interviews, biological markers	724 HIV-positive women enrolled in the WIHS and initiated on ART	All initiated on ART during follow-up period (those not on ART [another 767] not included in the analysis)	Repeated-measure logistic regression models	87% SA at some point during observation period After ART initiation, women's risk for UPS increased in both single- (AOR=1.22) and multiple-partner (AOR=1.84) relationships Compared to pre-ART visits, women were 20% less likely to report having ≥2 partners after ART initiation
van der Straten et al, 2000 (27) (H)	Dec. 1996 – Jan. 1999	Cross-sectional	Interviews	104 HIV serodiscordant couples	51% on a median of 3 ARVs	Univariate (bivariate) analysis	69% had UPS with discordant partner in past 6 mo Pts with undetectable VL as likely as those with higher VL to have had UPS Pts on ART were 2.4 times less likely to report UPS as compared to pts not on ART 33% seropositive and 40% seronegative respondents acknowledged decreased transmission concerns in light of the new treatments
McGowan et al, 2004 (53) (H)	Sept. 1997 – Feb. 1998	Cross-sectional	Interviews	256 HIV-infected individuals who took HIV risk reduction counselling and education (82% heterosexual)	51% on ART	Multivariate analysis	41% reported having had UPS after knowing their HIV-positive status Pts on ART were more likely to engage in UPS (AOR: 1.8; [1.1 – 3.1]) 25% had STIs after knowledge of HIV positivity
Demmer, 2002 (28) (M)	June – Sept. 1999	Cross-sectional	Self-administered questionnaire	196 inner-city HIV-infected men and women (71% heterosexual)	75% on ART (PI-based)	Chi-square tests, t-tests, one-way analysis of variance	33% reported being less worried about their HIV-positivity as a result of new treatment 19% felt new treatments made safer sex less important 23% reported practicing safer sex less often since new treatments arrived
Kozal et al, 2004 (51) (M)	2000 – 2001[c]	Cross-sectional, retrospective	Computer-administered self-interview with audio (ACASI), biological markers, genotypic resistance testing	333 HIV-positive individuals (79% heterosexual)	73% on ART	Univariate and multivariate analyses	27% of those on ART and with detectable VL had ARV resistance 51% SA in previous 3 mo; 44% of these engaged in UPS during reference period 24% of pts engaging in UPS had ART-resistant virus No difference in engaging in UPS among those with and without detectable VLs Sexual orientation was not an independent risk factor of SRB
Weinhardt et al, 2004 (54) (M)	June 2000 – Jan. 2002	Cross-sectional	ACASI, Computer-assisted personal-interviewing (CAPI)	3723 HIV-positive individuals enrolled for coping and sexual risk reduction intervention trial (48% heterosexual)	73% on ART	NR	74% SA in past 3 mo 44% reported sex with 'at-risk' partners in last 3 mo 35% pts reported UPS in past 3 mo 16% reported UPS with 'at-risk' partners in past 3 mo 65% disclosed their HIV-positive status to partners 66% disclosed their serostatus to 'at-risk' partners

(Continued)

Table 2: Methodology and main results of studies on HIV risk perception and sexual behaviour in heterosexual-transmission settings (*cont.*)

Citation (and Quality Score)	Study Time Period	Study Design	Data Collection Method	Sample	ARV Treatment Status	Method of Data Analysis	Statistically-significant Results on Sexual Risk Behaviour
Europe							
Girardi et al, 2001 (55) (H)	Mar. 1997 – Mar. 1999	Prospective cohort	Self-administered questionnaire	1652 HIV-positive ART-naïve respondents [d] (38% non-IDU)	No ART experience (all ART-naïve)	Univariate analysis	57% had been proposed ART; of these, 17% refused, 30% not initiated due to time constraints 49% women and 25% men stated acquisition of HIV through sex with infected partner whose status they were not aware of More men (58%) than women (15%) reported acquiring HIV from casual partners 66% SA after knowing HIV-positive status Similar proportion of life-time sexual partners among IDU and non-IDU 58% used condom at last sex 40% reported having an HIV-negative partner
Miller et al, 2000 (52) (M)	NR	Before-and-after study	Interviews, biological markers, clinical and behavioural data	191 pts enrolled in a study (SEROCO) to describe natural history of HIV infection. (59% heterosexuals)	100% on ART	Analysis of variance, chi-square tests, matched-pair analysis	63% were SA during study period Non-significant decrease in UPS with 'at-risk' partners before (16%) and after (6%) ART (RR=1.0, 95% CI=0.9-1.1, p=0.74)
Panozzo et al, 2003 (33) (M)	Oct. 2000 – June 2001	Cross-sectional	Self-administered questionnaire (sent by prepaid mail)	114 HIV-positive heterosexual pts with serodiscordant partner (32% response rate)	80% on ART	Chi-square test, Fischer's exact test, t-test	25% had at least 1 child 21% pts expressed desire for children during study period 44% pts intended to have children in the future Among pts on ART, those with better health were 2.6 times more likely to desire a child 73% pts reported CCU
Lambert et al 2005 (50) (H)	Jan. – Dec. 2002	Cross-sectional	Interviews	82 HIV-positive women	59% on ART (mean duration: 33 mo)	Univariate analysis	28% abstinent since HIV diagnosis (mean duration since HIV diagnosis: 68 mo) 59% reported regular male partners; of these, 52% were SA in the past month 79% of the SA women disclosed their serostatus to their male partners 54% of the SA women had 'at-risk' partners 60% of the SA women reported CCU 7% of the SA women stated that they did not use condoms because they wanted to become pregnant

[a] Unless otherwise specified, the samples are assumed to be composed of 100% heterosexuals.
[b] Results valid for heterosexual HIV-positive pts
[c] Study duration not reported on paper, retrieved by personal communication with principal investigator.
[d] Only results valid for non-IDU patients reported.

Abbreviations: *ARV*, antiretroviral; *CCU*, consistent condom use; *H*, high-quality; *IDU*, injecting drug use(r); *L*, low-quality; *M*, medium-quality; *mo*, month(s); *no.*, number; *NR*, not reported; *PT*, preventive or prophylactic therapy with isoniazid (INH) and/or co-trimoxazole; *PP,* postpartum; *pt,* patient; *SA*, sexually active; *STI,* sexually transmitted infection; *UPS*, unprotected sex; *VCT*, voluntary HIV counselling and testing; *VL*, viral load; *WIHS*, Women's Interagency HIV Study; *yr*, year

6. DISCUSSION

The primary papers analysed in this systematic review exhibited a good geographic balance amongst the three continents. This has allowed comparison of similarities and differences and description of trends among heterosexually-identified HIV-infected patients regarding sexual risk behaviours across different social, cultural and economic settings in the age of potent HIV therapies.

6.1. SEXUAL RISK BEHAVIOUR IN THE CONTEXT OF HAART

6.1.1. Overall Sexual Activity

This review showed that HIV-positive individuals have similar levels of sexual activity as compared to the general population (3, 56). One behavioural adjustment adopted by HIV-positive adults for preventing the transmission of HIV was to entirely desist from any sexual activities (40, 49, 50). This could be in the form of prolonging postpartum abstinence or avoiding casual partners, at times all the way from the time of initial HIV serodiagnosis.

In stark contrast to MSM and IDU, all papers on heterosexual subjects that assessed the levels of general sexual activity on the grounds of ART status showed that treatment with ART did not lead to increased sexual activity. Nevertheless, Bunnell and co-authors (2006) showed that the participants had increased desire for sex and more occasions to meet potential sexual partners during a six-month follow-up on ART. This may correlate with improved overall health status due to antiretroviral treatment. The regional median value of the level of sexual activity for the African studies was slightly lower. This could be related to the fact that most of the participants had relatively more advanced HIV

disease, were older and widowed (32) , or reported sexual activity less often for cultural reasons. In some societies, sexually active youth and unmarried people are shamed into not using reproductive health and family planning services (57-59) as the societal expectation is that they are not sexually active.

6.1.2. Unprotected Sex and Condom Use

The majority of reviewed materials and all of those from Africa showed that treatment with HAART was associated with reduced risk of unsafe sexual behaviour, even in marital or stable partnerships. This may be related to the overall improvement in health, hopefulness and positive perception about life or the regular counselling and support ARV-treated patients get from health care providers. Such a positive image is also held by the community when ART is rolled out. A study by Médecin Sans Frontières (MSF) in the Khayelitsha township of Cape Town, South Africa, where large-scale ART was put into operation, also found that the community had higher condom use rates and improved readiness to undergo VCT following the implementation of ART (60, 61). In addition, there was no increased involvement in unsafe sex subsequent to reductions in plasma viral loads (27, 51). This is well-timed good news for policy makers and health providers in the developing world as large-scale roll-out and scaling-up of ART programmes could be coupled with preventive counselling for best results.

With a level of up to 51% in different settings, HIV serodiscordance within stable relationships is a relatively common phenomenon in many parts of sub-Saharan Africa (62, 63). The reviewed primary articles indicated the level of sexual activity

was similar between HIV seroconcordant and discordant couples. This shows that partner's serostatus does not affect the level of sexual activity in HIV-positive couples (49). Moreover, many spouses (more than one third in this review study, for example) do not know their partners' serostatus and have mistaken beliefs and misapprehensions about serodiscordance (64). Considering the fact that condom usage is very low and its consistent use is a challenge in marriage or stable relationships, potential transmission of HIV infection and the risk of acquiring primary drug resistance (from HAART-experienced partners) is a menacingly enormous problem.

Little is known about how to surmount challenges to promote protective sexual behaviour in married or cohabiting people. Unlike what was thought in the past, marriage is not a safe haven but often a prominent risk factor to HIV infection for women in the developing world (32, 42). "Safer sex fatigue", a phenomenon originally described in MSM (65), which is exhaustion (burnout) to practice and maintain protective sex, could possibly explain the lower rates of condom use in married couples. For the majority of women, who live in marriage or cohabiting relationships, unprotected sex with their spouses is the only risk (30, 31). These women could not usually negotiate condom use with their partners (66). This highlights the importance of targeting couples in prevention activities.

6.1.3. Number of Sexual Partners

The reviewed articles showed that 13 to 35% of HIV-positive patients had multiple sexual partners. This is too huge a figure to cause concern. Compounded by the level of unprotected sex going on, promiscuous

relationships could fuel the spread of the HIV epidemic with a domino effect. HAART has not been linked with increased number of sexual partners, and this could, again, be related to the regular care, support and counselling from the health facility and/or positive image about life developed by ART-experienced patients.

6.1.4. Sexually Transmitted Infections (STIs)

The primary studies indicated that one out of four HIV-positive individuals reported a history of sexually-transmitted disease. Only one study used in the review herein compared reported STI treatment histories in ART-treated and ART-naïve patients. The study showed that ART-treated individuals were 2.6 times more likely to report history of STI treatment in the preceding 6 months. The same study found that ARV experience was associated with higher rates of disclosure and condom use. Because of this, it is more likely that the observed higher STI treatment history could be due to better access to treatment and follow-up rather than indulgence in unsafe sexual activity by the ART-experienced group.

6.2. INFECTIVITY CONCERNS OF HIV-POSITIVE INDIVIDUALS

Clinical researches have shown that declines in plasma HIV viral levels from HAART receipt correlate with a decreased risk of HIV transmission. This may induce to a sense of lesser need for protective sex. However, it does not remove all threats and could still cause HIV transmission and, even more dangerously, poses risks for acquisition of primarily resistant viral strains. Both seropositive and seronegative individuals could be smitten by altered perceptions and

behavioural changes stemming from HIV treatment advances. None of the African studies touched upon this important theme. Such misunderstandings about treatment benefits could prove even more perilous in sub-Saharan Africa where only 11% of those who need ARVs have access (21), if the beliefs are already on the ground. A recent meta-analytic work by Crepaz et al (2004), which was widely acknowledged for its overall high quality but sternly criticised for including patients only from Western countries and mixing articles dealing with participants with different sexual orientations, also showed that the prevalence of unsafe sex was not increased among ART-treated participants unless they held the belief that HAART shielded from HIV transmission (29).

6.3. SEROSTATUS DISCLOSURE AND SEXUAL RISK BEHAVIOUR

The concept of serostatus disclosure to a sexual partner is gaining central stage in the HIV prevention front. Disclosure is positively associated with more diligent usage of condoms and protective sexual behaviour (37). In keeping with other works on disclosure (67), the findings of this systematic review also corroborate the same. Nearly two out of three HIV-infected individuals disclosed their HIV status to their partners. On the other hand, ART-receiving patients are more likely to notify their partners about their status. All this is quite heartening as it paves the way for the local design of reciprocally-strengthening responses to the pandemic that integrate ART with prevention activities (1, 68, 69).

6.4. FERTILITY DESIRES/INTENTIONS AND SEXUAL RISK BEHAVIOUR

An HIV-positive couple wishing to have a child need to engage in unprotected sex. Parenthood intention is at times the sole reason for not using condoms (50).

HIV-positivity or serodiscordance may not deter a couple from future desires and intentions to bear a child (33, 34). In many areas of Africa, women, particularly those in marriage, are expected to have children to gain higher societal recognition. Moreover, improved health brought about by HAART (33) and the availability of pPTCT services could lead to increased fertility desires. On the other hand, these women's reproductive concerns are not well addressed and their fertility desires are shunned by health care providers (33, 70, 71). Only two papers reported on both variables in a dissimilar manner making any sound description difficult. Considering the significance of understanding HIV-positive individuals' fertility issues, particularly in this era of potent HIV treatments, a literature review that takes into account the different factors interplaying in the reproductive decisions of this group of the community and arrives at some plausible recommendations is separately performed and annexed to this document (Annex A).

6.5. HIV SEXUAL RISK BEHAVIOUR MODEL

Sexual risk behaviour in the context of HIV/AIDS refers to a complex array of manners and actions that sexually-active people exhibit which puts them at risk of transmitting or acquiring HIV and other STIs. The risky behaviour could be engagement in unprotected sexual activity and having multiple sexual partners. The theme has gained re-emphasis following the introduction of HAART, and relates to a number of socio-demographic, economic and psychosocial factors.

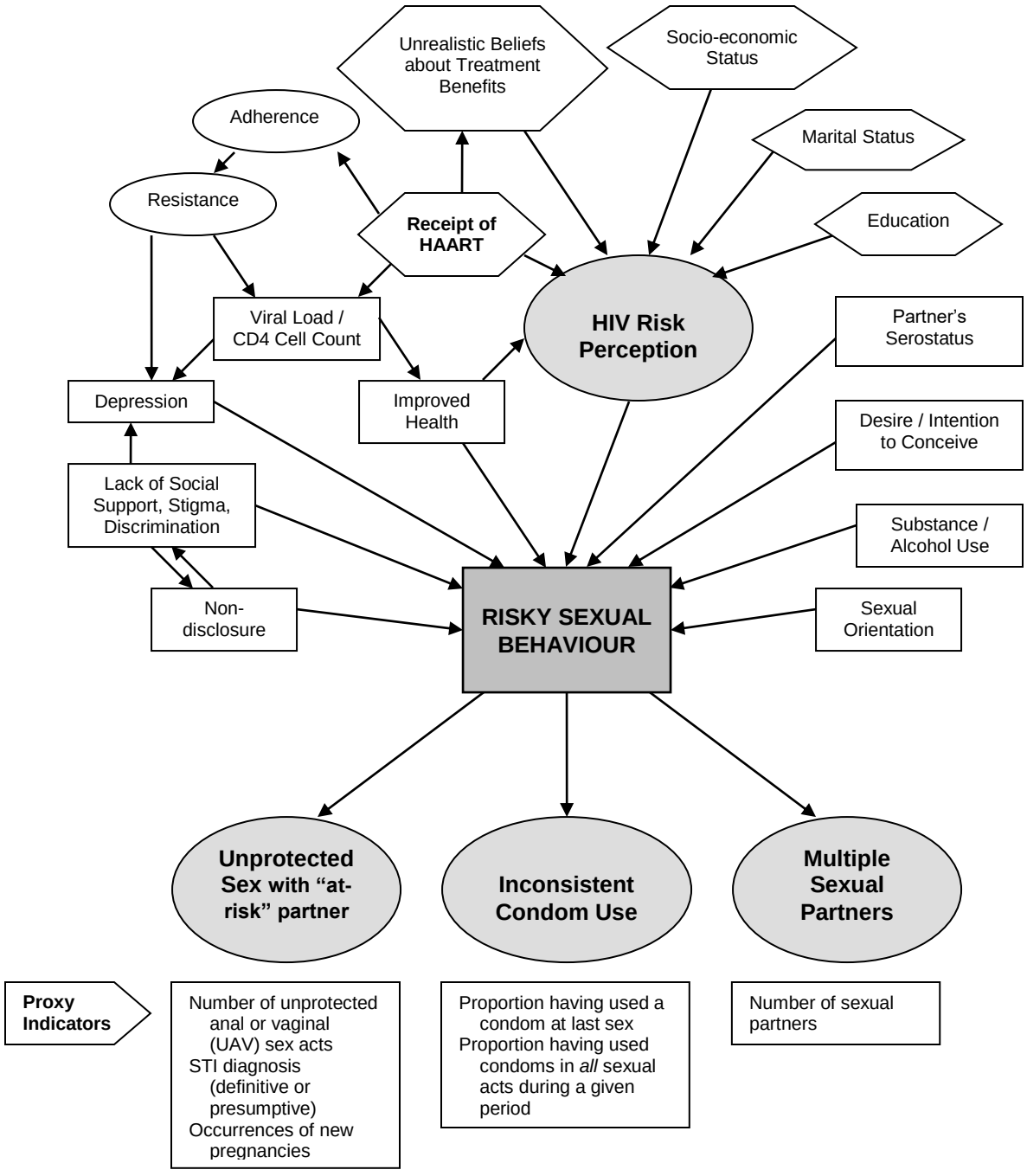

Fig. 2: A Model for Risky Sexual Behaviour for HIV Transmission in the Context of HAART

In order to conceptualise the web of factors interplaying in the formation of specific HIV risk constructs and risky sexual behaviours of HIV-infected people, a model of events was created, with the view to explicating potential areas for

intervention (Fig. 2). The model tries to elucidate important interactions among various factors contributing to the final outcome variables.

Owing to the fact that these behavioural phenomena are difficult to measure, proxy indicators that are objective, approximate descriptions of variables for which direct quantitation or measurement is not available or feasible (72, 73), have been used.

6.6. LIMITATIONS

A number of limitations in this review work merit mention. Authorities recommend that review works be preferably performed by a group of reviewers who meticulously scrutinise each work individually and come to a group consensus on extracted data to minimise bias. This work was undertaken in partial fulfilment of the award of tropEd European Master of Science (MSc) degree in International Health and the articles included in this study were evaluated and data extracted by the reviewer under the guidance of the study advisor.

Due to the heterogeneity of the articles in this work in terms of study setting, location, populations studied, design, duration, sample sizes and indicators used, a meta-analysis using statistical tests could not be carried out. Moreover, most studies did not provide information on sampling methods, loss to follow-up and reasons for attrition. On the other hand, two-thirds of the studies reviewed had cross-sectional study design which makes causal associations difficult, if not impossible, to deduce.

On virtue of the fact that sexual behaviour and HIV risk perception are intangible behavioural phenomena closely related to social, cultural, economical and

geographical characteristics of communities, the use of qualitative research tools would give more “human” insights into the issues (74). Lack of such “insider’s” perspectives in the reviewed papers due to their quantitative nature could be another important limitation of this work.

Most studies reviewed herein did not describe the sampling method used to conduct the studies. Again only few documented the participation rates of respondents. Important social variables such as duration of antiretroviral treatment, length of time after HIV-seropositivity was established were also omitted by most papers. These could have introduced a bias on the aggregated results of this systematic review.

Though it is well documented that the majority of new HIV infections in sub-Saharan Africa could be accounted for by heterosexual intercourse, this may not be the case in the western studies on heterosexual subjects, where other modes of HIV acquisition such as injecting drug use are also widely practiced.

The studies on consistent use of condoms used proxy indicators such as the proportion of respondents who used condoms in *all* sexual acts during a reference period (which could be 3 or 6 months) or the proportion who used a condom at last sex. These indicators of self-reported behaviour, while being theoretically close enough to measure steady condom use and are widely used, may fail to estimate the reality due primarily to recall biases and reporting of socially-desirable responses, warranting cautious interpretations (31, 75). The reliability of reported unprotected anal or vaginal intercourse, STIs and number of

partners in a given reference period could also be challenged by similar setbacks.

Last, similar works from Asia and Latin America, which also contain many developing countries, were not represented in this review due to a paucity of relevant materials from these regions and the fact that the relevant studies did not fulfil the selection criteria, making the contribution of findings from these settings not possible.

7. CONCLUSIONS AND RECOMMENDATIONS

This systematic review has revealed key findings of that have policy and practice implications. Receipt of HAART is predominantly associated with more consistent condom use (or safer sex), more disclosure to partners and being less likely to have multiple sexual partners. Quite importantly, HAART use and the subsequent health gains have been linked with increased desire to bear a child in the future. The findings from this review work also suggest that, in light of the new HIV treatments, both HIV-infected and HIV-uninfected people could be misled into believing that HAART confers full protection from new HIV infection, jeopardising prevention and control efforts.

According to this review, over 25% HIV-positive respondents in the primary studies had history of an STI in the preceding 6 months. Health care workers should support patients to adhere to ARV therapy and use the opportunity of the regular visits for HAART follow-up to promote condom use, achieve early STI detection and treatment and encourage such patients to disclose and bring their partners for STI screening and VCT.

Researches indicate that health professionals are often prejudiced against the childbearing of HIV-positive patients and do not address the patients' worries concerning reproductive health matters (33, 70, 71). A study indicated that physicians were repeatedly advising women not to bear more children (76). However, the women desired to have children even though they understood the risks of mother-to-child transmission of HIV. In addition, many health professionals still cling to the mistaken belief that pregnancy could accelerate an infected woman's progression to AIDS. This is, however, not supported by scientific evidence and current literature argues to the contrary (77). It is imperative that clients be provided appropriate, need-based advice and fertility issues and desires of HIV-infected individuals be addressed during counselling visits before initiation of ART so that they could make informed decisions. This also provides opportunities to combat unrealistic beliefs about ART benefits and clarify reproductive concerns, risks of vertical transmission and discuss contraceptive choices suitable for this group of the community.

Behavioural HIV surveys do provide very extensive information on knowledge about HIV/AIDS transmission, sexual activity, condom use, misconceptions about HIV/AIDS, STI histories, involvement with multiple sexual partners and so on (3, 56). However, they often miss the important issues of HIV transmission concerns and knowledge and beliefs of the general population about modern HIV treatments. These behavioural parameters must be integrated in future rounds of HIV behavioural surveys in the wake of HAART. Prevention programmes targeting unrealistic beliefs stemming from benefits of HAART are also urgently needed.

HIV prevention fatigue that was described by Stockman et al (2004) as “an attitude that HIV prevention messages, programmes, outreach or counselling services have become tiresome” (78), could be commonplace if messages are constantly repeated and not catchy. This calls for innovative HIV prevention approaches to seize the attention of HIV-positive individuals and the general public.

HIV prevention activities in developing countries tend to stick to a *“one size fits all”* approach. More emphasis should be placed on neglected risk groups such as married people, HAART-experienced patients and serodiscordant partners in order to efficiently check the spread of the epidemic. There is also a dire need for designing focused, culturally-appropriate and group-specific interventions that reach the grass roots level.

Marriage should no more be regarded as a refuge safeguarding from HIV/AIDS. Findings should serve as a wake-up call for policy makers to redirect efforts to embrace married people in HIV prevention efforts. In order to fight “safer sex fatigue”, serodiscordant couples must as well be particularly targeted for HIV risk reduction interventions.

Prevention must remain the mainstay of our concerted response to fight the epidemic. Popular belief notwithstanding, this systematic review showed that ART experience was related to less risky sexual behaviour. Knowledge about the contribution of HAART to overall protective behaviour should be garnered for use in targeted preventive interventions. In addition, HAART should be anchored to sustained preventative activities (68, 69). Policy makers must pledge their

commitment to remove obstacles to early HIV diagnosis and ensure universal access to HIV treatment. Social support systems for PLHIV that help lessen stigma and discrimination must be devised in such a way that the community is also actively involved. Moreover, it's a well-established fact that poverty, illiteracy, and lack of comprehensive knowledge about HIV transmission and safe sexual behaviour add tremendously to the spread of the HIV pandemic. Governments in sub-Saharan Africa should as well keep their promise to realise the United Nations' Millennium Development Goals (MDGs) to alleviate the scourge of poverty, combat the multi-faceted challenges of HIV/AIDS, and promote women's empowerment and universal education for their people (79).

This systematic review has provided interesting findings about the sexual risk behaviours of heterosexual HIV-infected individuals in the age of effective antiretroviral therapy. These results need to be built on by further research work in the areas of sexual risk-taking and underlying social and cultural factors influencing it, HIV risk perception, serostatus disclosure and fertility issues in the context of HAART. The impact of HAART implementation on ongoing HIV prevention programmes must also be closely followed.

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10. ANNEXES *(See next pages)*

A. Fertility Desires & Intentions of HIV-Infected Individuals in the HAART Era: What They Mean to High-Burden countries like Ethiopia

B. Data extraction form

10.1. ANNEX - A

FERTILITY DESIRES & INTENTIONS OF HIV-INFECTED INDIVIDUALS IN THE HAART ERA: WHAT THEY MEAN TO HIGH-BURDEN COUNTRIES LIKE ETHIOPIA

I. INTRODUCTION

The HIV/AIDS pandemic is the world's leading public health emergency, with a particularly severe impact on sub-Saharan Africa. In Ethiopia, the AIDS epidemic began in the early 80s. At present, the country hosts the world's fifth largest number of people living with HIV (PLHIV) (1). It was estimated that by the end of 2004, there were about one and half million Ethiopians infected with the virus. According to the Ministry of Health of Ethiopia, about 40% to 60% of the hospital beds in the country were occupied by AIDS patients in 2001. In urban areas of Ethiopia, the problem is even worse. In the capital, Addis Ababa, 15.6% of the adult population lives with HIV/AIDS.

The development of antiretroviral drugs has brought new optimism and hopes of prolonged, disease-free and productive life. This combination antiretroviral therapy has now been made available many resource-poor settings through various price-lowering mechanisms. Moreover, with advances in prevention of parent-to-child transmission (pPTCT), such as nevirapine and other antiretroviral drugs that have reduced parent-to-child transmission to about 2%, the fertility issues of HIV-infected people are gaining growing importance. In spite of such encouraging successes in vertical-transmission reduction strategies, little emphasis is given to the reproductive health needs of HIV-infected individuals.

In order to map out the chain of events as to how childbearing motivations lead to fertility desires, intentions and childbearing, a framework developed by Miller

(which was used by most papers revised for this essay) was adopted (2). This framework points out that the initial step towards parenthood is the creation of motivations, which are ‘characteristics that make an individual respond in certain ways under particular circumstances’. These motivations are then transformed into the individual’s childbearing desires (or wishes) which are then changed into intentions to conceive a child. In this view, fertility intentions signify a conscious dedication of a partner(s) to bear a child.

With the rising demand for reproductive health and family planning services in HIV-infected individuals due primarily to the roll-out of highly-active antiretroviral treatment (HAART) and pPTCT programmes, a thorough look into the fertility desires and intentions of these groups of the society remains crucial. This is particularly a matter of urgency in resource-constrained settings where the HIV problem is more daunting, fertility is very high and resources and often scarce. Therefore, this essay looks into current issues revolving around the reproductive decision making of HIV-positive people and tries to draw some plausible conclusions and recommendations for the formulation of effective public health interventions addressing these sections of the society and the general public.

II. HIV/AIDS AND FERTILITY

Many young adults in the developing world express desire for parenthood. Parenthood is considered one fundamental essence of life in many cultures and women are expected to bear children in order to gain a higher social acceptance. Even with knowledge of their positive HIV status and associated risks of transmission to the baby, some women still hold a strong desire for perpetuating

life beyond death that seems to be so close. This may not be always possible due to a number of factors that have a bearing on the reproductive physiology of HIV-infected patients.

Various studies have consistently found out that the incidence of pregnancy is reduced in HIV-positive individuals both during the asymptomatic period and after they develop AIDS. A work in Uganda by Gray et al (1998) indicated that the incidence of recognized pregnancy was significantly lower among HIV-infected mothers (14.4%) than among uninfected counterparts (21.4%) (3). This study also revealed that the pregnancy rate was nearly two times higher among HIV-infected symptom-free women than those with clinical signs suggestive of AIDS. In a similar fashion, a study by Ross A et al (2004) demonstrated that the reduction in the incidence of pregnancy was evident from the earliest symptom-free stages of HIV infection (and more so during the advanced clinical AIDS stage), and was due mainly to lowered rates of recognized pregnancy and increased foetal demise (4). Other studies on HIV-infected women have also shown a decline in the incidence of pregnancy and live births with lowering CD4 lymphocyte counts (5).

Nevertheless, in spite of what has once been a popular teaching, current studies on effects of pregnancy on HIV disease progression indicate that pregnancy has no untoward effect on the progression of asymptomatic HIV infection to clinical AIDS. Saada and co-workers showed, in a multi-centre study in France, that pregnancy, regardless of the time of seroconversion, has no deleterious consequence on the progression to and development of AIDS (6).

III. WHY FERTILITY ISSUES IN HIV-POSITIVE PATIENTS ARE IMPORTANT

In spite of the fact that the fertility is reduced from the earliest stage of infection due both to a decreased rate of recognized pregnancy and to increased foetal death, a study work in Nigeria found that 63.3% of HIV positive patients desire to have children, even though 50.4% of them already had more than one child (7). Chen et al indicated that HIV infected individuals who intend to have children are less likely to be married (8). This study also showed that being HIV-infected has little impact on the fertility decisions of HIV-positive people.

More often than not, HIV is first diagnosed during pregnancy, making primary prevention efforts too late to be useful (9). Contraceptive prevalence in most developing countries is very low and fertility, both intentional and unintentional, is high. Besides, discontinuation among contraceptive users is high and condoms are not consistently used. These all call for better understanding of issues surrounding these patients' reproduction decision-making in order to avert vertical transmission of HIV and the creation of an orphaned generation.

IV. ATTITUDES OF THE COMMUNITY AND HEALTH PROFESSIONALS

The community and health professionals continue to hold negative attitudes towards childbearing by HIV-positive individuals (10). It was shown that, contrary to HIV-positive patients' high degree of desire, health professionals did not address the patients' worries concerning reproductive health matters (11, 12). A study indicated that physicians were repeatedly advising women not to bear more children (9). However, the women desired to have children even though they understood the risks of mother-to-child transmission of HIV. In addition,

many health professionals still cling to the mistaken belief that pregnancy could accelerate a woman's progression to AIDS. This is, however, not supported by scientific evidence and current literature argues to the contrary (6).

Health professionals should offer details of reproductive and family planning options suitable for HIV-positive women and couple so that they could make informed decisions on reproductive issues. Some professionals think hormonal contraceptives could influence virologic and immunologic responses of patients to antiretroviral therapy, and may refrain from offering hormonal contraceptive methods to HIV patients. However, there is no substantial evidence supporting this and Chu and co-workers have shown that there were no differences (of statistical significance) among HIV-infected contraceptive users and non-users with regard to viral load reduction and CD4 cell increases (13). This suggests that the overall effectiveness of HAART is not affected by concurrent use of hormonal contraception.

V. RELEVANCE TO HIGH-BURDEN COUNTRIES LIKE ETHIOPIA

The total fertility rate (TFR) in Ethiopia is one of the highest in the world. According to the preliminary report of DHS 2005-Ethiopia, the TFR calculated for the three years preceding the survey was 5.4 births (14). The results of the survey also indicated that 13.2 percent of married women used hormonal contraceptives and only 0.2 percent use condoms. HIV prevalence among pregnant women attending antenatal services is 8.6 percent (1). In addition, more than 14% of in women in Ethiopia undergo spontaneous abortion (15).

The problem of HIV orphans in sub-Saharan Africa is also growing at an alarming rate. There are close to a million children orphaned by HIV/AIDS in Ethiopia (16). This calls for additional social support services for orphaned children. Most of these children, in fact, fall into the care of grand parents or other close relatives and this creates a lot of financial crises to the care givers and the psycho-social needs of the children are not well attended to. They may not be sent to school and could be exposed to labour exploitation and sexual abuses.

With increasing fertility and reproductive health needs of HIV positive individuals, family planning services will also be overburdened. In Ethiopia, the potential health service coverage is accessible to only about 61% of the population and the service-utilization rate is only 27% (17). This will inevitably have serious repercussions on the frail health care system and shortage of health care providers.

VI. CONCLUSIONS AND RECOMMENDATIONS

Fertility is very high in many developing countries. Ethiopia is not an exception in this regard. The country is hard-hit by the HIV epidemic. The prevalence of HIV infection among antenatal care (18) attendants is also high and HIV is usually diagnosed for the first time in pregnancy. Studies indicate that HIV-infected individuals continue to have high levels of fertility desires and intentions, irrespective of their knowledge about their status and the potential of HIV transmission to their babies and uninfected partners.

Many health care providers are worried about the interactions between antiretroviral therapy and hormonal contraception (13). On top of this, they do not

encourage pregnancy and, in fact, advise against it, for fear that HIV could be transmitted to the baby and the women would progress to AIDS. This reduces the range of reproductive options to be offered for these patients and could be a breach of human rights and put pressure and coercion on HIV-positive women, further compounding the situation. These misunderstandings keep on shaping how health providers perceive fertility issues of HIV-positive women and their professional advice on reproductive matters.

The child bearing wishes and reproductive decision-making of HIV-positive individuals have serious implications on the health of uninfected spouses. It is also shown that nearly all cases of HIV infections in children are acquired from an infected mother. Thus, interventions that promote consistent condom use and prevention of mother-to-child transmission of HIV should be prioritised.

Health care providers should provide accurate, practicable and non-coercive information to HIV-infected individuals who seek advice on fertility issues. They should also adequately address the patients' worries on family planning matters. The message must include the fact that pregnancy does not lead to progression to AIDS.

Health ministries in developing countries should focus on updating health care providers with current knowledge through continuing medical education (CMEs), trainings, seminars and similar forums. Reproductive health services should also be strengthened to accommodate the growing demands for health care from this group of the society. All concerned parties should work to intensify efforts to strengthen social support systems for children born to HIV-positive parents.

Awareness campaigns to improve the knowledge, attitude and beliefs of the community should also be implemented using all available media.

Therefore, further research and critical assessment of the fertility issues of HIV patients in low-income, high-prevalence, and high-fertility settings in order to help patients make informed decisions and to elucidate accurate data for the development of effective public health interventions that target the reproductive issues of HIV positive individuals remains a matter of urgency.

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10.2. ANNEX

DE Form No. _____

Data Extraction Form

Title/Author and year of publication: ………………………………………………............................

Type of literature: □*Published article* □*Abstract/presentation* □*Report*
□*Book/chapter* □*Unpublished article* □*Other …………..*

- -

Description: General

1. Data collection setting: ……………………………………
2. Study population: …………………………………………..

Gender (% F).……….. Age (mean/range)..…………... Ethnicity …………………………
Religion …………….. Residence…………………….. . Geographical region ……………
Education…………….. % Married/Cohabiting ……….

3. Study time period: ………………………………………..

4. Participants' HIV serostatus: □*Positive* □*Negative* □*Unknown* □*Mixed*

4.1. If positive, average length of time since knowing status: …………………….
4.2. Mean duration of HAART: …………yrs (*Label* 0 *if not on therapy and* NA *if not applicable.)*

5. Study focus: □*Risk perception* □*Sexual behaviour* □*Condom use* □*STIs* □*Beliefs* □*Other …………..*

6. Data collection method: □*Interviews* □*Self-adm. questionnaires* □*Medical records* □*Other…………………*

7. Sampling method used for selection: ………………………………………………………………

8. What exposure/intervention was studied? ……………………………………………………………

9. What was/were the outcome/s, i.e., what was measured as end-point?
(E.g., STIs, Level of condom use, viral load, CD4 count, new HIV infections, knowledge scores, etc.)
……
……
……

10. Describe the outcome variables.
……
……
……
……

11. Study design/type. □*Cohort (mention type)…………………..* □*Cross-sectional* □*Other ………………………..*

12. Sample size: …..….………………
12.1. Participation rate: ……

13. Are the inclusion and exclusion criteria for the study described? □*Yes* □ *No*

Cohort Studies

14. Number of exposed and unexposed individuals who have been included in the analysis. Give number and person-years.
Exposed: …………………………...
Unexposed: …………………………

15. Exposure criteria

In the exposed group: □*Direct measurements* □*Self-reports*

In the unexposed group: □*Direct measurements* □*Self-reports*

16. Are control and exposure areas comparable? □ *Yes* □ *No*

17. Blinding? □*Single* □*Double* □*Triple* □*Not described*

18. Did the study cover a sufficient period of time? □*Yes* □ *No*

19. Are other potential exposures described? □*Yes* □*No*

20. Were the measurements of outcome valid? □*Yes* □*No*

Other Study types

21. How long after the beginning and end of the intervention was the outcome studied?.....

22. Was follow-up time sufficiently long to allow assessment of the stability of the changes observed? □ *Yes* □ *No*

Analysis: General

23. What was the primary outcome?.....

23.1. Is it relevant? □ *Yes* □ *No*

24. What are the main results?

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25. Were all the participants included in the analysis? □*Yes* □ *No*

25.1. Method of analysis of results …….

26. Were the statistical tests used suitable and correctly done? □*Yes* □*No*

27. Were bias and confounders controlled for? □*Yes* □*No*

28. Were there other types of bias and confounders? □*Yes* □*No*

29. Other important limitations of the study

.....

.....

30. Quality assessment. □*High* □*Medium* □*Low*