Review Article

The current status of maternal HIV infection in Sudan: time for action?

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Abstract

This review article assesses the current situation of the human immunodeficiency virus (HIV) infection among pregnant women in Sudan. Moreover, current levels of access and utilisation of existing maternal services as well as strategies to prevent mother-to-child transmission of HIV infection are also discussed. At present, Sudan has a low-level epidemic of HIV infection with a maternal prevalence level of <1% but the situation may change in future. Despite the existing disparities in the level of use of antenatal services between urban and rural areas in Sudan, more than two thirds of pregnant women received antenatal care by any skilled personnel, at least once during their pregnancy and nearly half of them had a blood sample obtained during their antenatal visits. However, access to antenatal HIV testing and antiretroviral therapy during pregnancy has been severely restricted to <1% and <10%, respectively. The poor performance of the current programme for prevention of mother-to-child transmission (PMTCT) in Sudan could be attributed to its vertical nature that makes it run parallel to the existing healthcare system. Routine antenatal HIV testing on an opt-out basis coupled with an integrated approach to PMTCT is likely to improve coverage of this essential service.

Keywords: HIV, pregnancy, Sudan
**Introduction**

The current pandemic of the human immunodeficiency virus (HIV) presents unprecedented challenges to the health of women and children living in resource-constraint settings in which antiretroviral therapy, elective caesarean sections, and safe alternatives to breastfeeding are not readily accessible\(^1\). With over 13-million women infected with HIV in sub-Saharan Africa and nearly 400,000 HIV-infected infants born each year\(^2\), urgent concerted action is needed to effectively deliver evidence-based interventions aimed at preventing mother-to-child transmission.

In this article, we will assess the current situation of the HIV epidemic in Sudan with particular emphasis on pregnant women, review the quality of existing maternal services, and discuss current strategies to prevent mother-to-child transmission of HIV infection in Sudan.

**Current burden of maternal HIV infection in Sudan**

In epidemiological terms, the spread of HIV infection is usually described as low-level, concentrated, or generalized and these patterns are characterised by HIV prevalence rates not consistently exceeding 5% in any defined sub-population, consistently >5% in at least one defined sub-population but <1% in pregnant women in urban areas, or consistently >1% in pregnant women, respectively\(^3\).

The current HIV epidemic in Sudan is fuelled by heterosexual transmission\(^4\). Recent estimates of HIV infection indicate a prevalence of 1.4% in adults aged 15-49 years and that 59% of all new infections have occurred in women aged 15-49 years\(^4\). Furthermore, high-risk groups such as commercial sex workers in Khartoum state were reported to have low prevalence levels of 0.9%\(^5\). However, there is paucity of accurate data on the current burden of maternal HIV infection in Sudan as <1% of antenatal care (ANC) clinics performed routine HIV testing\(^6\).

Recently published studies from central and eastern Sudan reported HIV prevalence rates of 0.98% and 0.23%, respectively, among pregnant women\(^6,7\). Of note, the former study used direct interviews as a means to seek informed consent for HIV testing but suffered a high refusal rate of nearly 60%. By contrast, the latter study adopted an anonymous unlinked testing strategy to adjust for participation bias. Moreover, the 95% confidence intervals of both studies overlapped indicating no significant difference in their reported prevalence estimates. An earlier study from central Sudan reported high prevalence of sexually transmitted infections among ANC attendees but none was due to HIV\(^8\). Another study from eastern Sudan found no cases of HIV and visceral leishmaniasis co-infection in a small cohort of pregnant women\(^9\).

Prevalence estimates provided by the existing prevention of mother-to-child transmission (PMTCT) services in Sudan are unreliable due to low levels of HIV testing uptake. For example, Kassala state records indicate that PMTCT services only managed to test 27% of pregnant women who were offered HIV testing during 2009\(^10\).

Overall, 70.4% of Sudanese women aged 15-49 years have heard about AIDS (Acquired Immunodeficiency Syndrome) but only 4% were aware of the major methods for preventing HIV transmission (having only one faithful uninfected sex partner; always using a condom when having sex with anyone else; and abstaining from sex before finding a long-term partner)\(^11\). Furthermore, knowledge on major routes of HIV transmission such as unprotected sexual intercourse, unscreened blood transfusions and sharing of contaminated needles was satisfactory in 52%, 40%, and 39%, respectively. However, the proportion of women who were aware of all
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Three routes of mother-to-child transmission (during pregnancy, during labour, and through breast feeding) was only 26%\(^{11}\).

There are gender-specific differences in heterosexual transmission of HIV as male to female transmission is generally two to three times higher than that of female to male\(^{12-15}\).

The fact that the female genital tract anatomy allows post-coital retention of semen in much greater volume than that of vaginal fluid on the penis and that women are more likely to experience asymptomatic sexually transmitted infections that facilitate virus entry, provide biological explanations for women’s vulnerability to HIV infection. Moreover, young age at first sexual intercourse has been shown to be an independent risk factor for acquiring HIV infection in women in settings where the mode of spread is predominantly heterosexual\(^{16}\). This is supported by the fact that younger women tend to have larger areas of cervical ectopy and are more likely to experience traumatic coitus\(^{17-19}\).

As pre-marital sex is frowned upon in most parts of Sudan and unlikely to be admitted, it might not be unreasonable to use women’s age at the time of marriage as a surrogate for their first coital debut. In Sudan, 36% of women get married under the age of 18 years and, worryingly, 12.4% of them get married before their 15\(^{th}\) birthday\(^{11}\). Polygamy is rife in the Sudanese society and, alarmingly, this has been associated with low levels of male condom use\(^{11}\). Nevertheless, the overall HIV prevalence in adults has remained low. The widespread practice of male circumcision, which has been shown to reduce HIV transmission by up to 60 %\(^{20,21}\), seems the likeliest explanation for this paradox.

Socio-cultural traditions in Sudan give women a status that is generally inferior to their male counterparts. Of interest, there is evidence from rural Uganda suggesting that women tend to seek their partners’ approval before agreeing to undergo HIV testing\(^{22}\). Furthermore, Sudanese women diagnosed with HIV infection suffer extreme social stigmatisation. This often takes various forms of social exclusion such as eviction from rented accommodation, loss of earnings, and expulsion of their children from schools (Members of the Sudanese society of people living with HIV/AIDS, personal communication, August 2008).

Failure to avert vertical HIV transmission eventually leads to increasing the burden of paediatric morbidity and mortality. The current prevalence of HIV infection in Sudanese children aged 0–14 years has been estimated to be 0.13% at the population level\(^{4}\). However, a significantly higher rate of 5.7% was recently observed among acutely hospitalised children aged 1.5–14 years in central Sudan\(^{23}\). The Sudan Household Health Survey (2006), which provided new data on critical child and maternal health indicators for more than 20 years, confirmed a staggeringly high maternal mortality of 1107 per 100,000 live births. Corresponding neonatal, infant and under-fives mortality rates were 41, 81 and 112 per 1000 live births, respectively\(^{11}\). Higher maternal mortality rates attributed to obstetric as well as HIV-related causes have been documented in populations with high HIV prevalence\(^{24-27}\). However, the exact contribution of HIV infection to Sudan’s high maternal mortality remains far from clear and therefore more research is needed to ascertain this.

Access and utilisation of existing maternal services

Family planning services were introduced in Sudan in 1965 by the Sudan family planning association\(^{28}\). In 1985, family planning services were integrated into the primary health care system\(^{29}\). Despite the availability of most contraceptive methods in Sudan, the use of male methods such as condoms and vasectomy is extremely low\(^{11}\). To the best of
our knowledge, there are no centres dedicated to providing HIV-couples (whether sero-concordant or sero-discordant) with appropriate advice on safe sexual practices, post-exposure prophylaxis after sexual exposure, or fertility. There are considerable disparities in the levels of access to ANC services between northern and southern states of Sudan. For example, this was zero per cent in Unity state in south Sudan compared to 89% in Khartoum state in the northern part of the country. However, >50% of available services did not fully meet expected standards of care even where such service is accessible. Current guidelines by the World Health Organisation (WHO) recommend a minimum of four ANC visits. The contents of such visits include the following as a minimum: blood pressure measurement, urine testing for bacteruria and proteinuria, blood testing to detect syphilis and severe anaemia, and optional measurement of weight and height. To the best of our knowledge, blood samples are usually obtained in Sudan to check haemoglobin levels and/or blood grouping and not treponemal serology on routine basis.

Despite considerable differences in levels of ANC access between urban and rural settings, 63.7% of women received care by a skilled personnel at least once during their pregnancy. Furthermore, 45.5% of all Sudanese women had a blood sample taken during their antenatal visits. These findings are encouraging and will have direct implications on scaling up antenatal HIV testing in Sudan. At present, at least four out of five deliveries in Sudan take place at home, but only one out of two deliveries is supervised by a skilled attendant. Furthermore, the mode of delivery is vaginal in 86.7%, instrumental in 2.1%, caesarean section in 4.5%, and missing or not ascertained in the remaining 6.7% of women. Of note, data on whether caesarean sections were performed on elective or emergency basis were not recorded. Overall, these findings raise questions as to the frequency of elective caesarean sections among HIV-infected pregnant women and the likelihood of timely and appropriate administration of antiretroviral prophylaxis to them and their babies.

**Prevention of mother-to-child-transmission of HIV infection**

The risk of HIV transmission from mother-to-infant during pregnancy, delivery, and breastfeeding - in the absence of any intervention - has been estimated to be around 15-45%. The risk of HIV transmission is enhanced by advanced maternal HIV disease as well as co-infection with herpes simplex virus or other sexually transmitted infections that cause ulcerative genital lesions. Furthermore, there is evidence to suggest that placental malaria may increase the risk of HIV transmission. Examples of obstetric factors associated with vertical transmission of HIV include prematurity, prolonged rupture of membranes, and invasive procedures such as amniocentesis and monitoring of foetal scalp blood.

Current strategies employed to prevent mother-to-child transmission of HIV infection involve improving case detection during pregnancy, administration of antiretroviral therapy by week 28 of pregnancy, minimising exposure to invasive procedures, active management of labour including caesarean delivery for women with high HIV viral loads, and avoidance of breastfeeding in developed countries. Infant feeding practices have major influence on the risk of mother-to-child transmission of HIV. Current HIV clinical guidelines in developed settings recommend complete avoidance of breastfeeding including women who are receiving long-term antiretroviral therapy for their own health. However, exclusive breastfeeding is crucial to
improving survival of infants in resource-poor settings where diarrhoeal and respiratory infections are leading causes of morbidity and mortality. Therefore, the risk of HIV transmission through breast milk should be carefully weighed against the benefit of children’s own survival in less developed countries."}

Recent evidence from the Kesho bora study (means “a better tomorrow” in Swahili), which was conducted in Burkina Faso, Kenya and South Africa, indicated that extending the course of antiretroviral therapy started in the third trimester of pregnancy and continued during breastfeeding until six months post-delivery conferred 40% reduction in mother-to-child transmission compared to breastfeeding infants whose mothers were not on concurrent antiretroviral therapy. In light of these results, WHO has revised its guidance on antiretroviral therapy during pregnancy by adopting two key approaches in less-developed settings. The first approach focuses on providing long-term antiretroviral therapy for pregnant women in need of treatment for their own health (judged by clinical staging or CD4 criteria) whereas the second approach is concerned with providing short-term antiretroviral prophylaxis for HIV infected women with no evidence of immune compromise in order to prevent mother-to-child transmission during pregnancy, delivery, and breastfeeding. It is anticipated that these approaches could reduce the risk of mother-to-child transmission to <5% in breastfeeding populations and to <2% in non-breastfeeding populations. Current paediatric practice in Sudan endorses exclusive breastfeeding for infants born by HIV-infected mothers, which is in line with previous WHO guidance, but clinicians and health policy makers in Sudan should take a note of the new evidence provided by the Kesho bora study and adapt current WHO recommendations to suit their local context.

The Sudan National AIDS Control Programme (SNAP) provides HIV services in 15 northern states through 94 voluntary counselling and testing (VCT) centres, 35 care and treatment centres, and seven centres dedicated for PMTCT. However, a major drawback to this service model is the fact that it runs parallel to the mainstream healthcare system and that it is devoid of any multidisciplinary links. At present, clinical governance systems in Sudan are not well-developed and therefore there are no established referral pathways between relevant clinical specialties looking after HIV-infected pregnant women. Apart from a few individual initiatives, clinical leadership in HIV management is extremely lacking due to high levels of stigma attached to HIV. Furthermore, HIV education is almost absent from both undergraduate and postgraduate medical training curricula despite Sudan’s geographical location in sub-Saharan Africa, which is the most devastated region in the world by the HIV pandemic.

Overall, the current service delivery model for PMTCT in Sudan achieved <1% antenatal coverage for HIV testing and <10% coverage for antiretroviral therapy for HIV-infected pregnant women. These figures are disappointing and therefore more concerted efforts must be exerted to improve accessibility and acceptability of antenatal HIV testing. There are no satisfactory explanations for the high refusal rates for HIV testing among Sudanese pregnant women. Mahmoud et al reported that factors such as age >26 years, primigravidity, and Islamic faith were associated with increased likelihood of HIV testing acceptability. However, these findings were not triangulated by qualitative data that might have helped improve our understanding of women’s potential willingness to undergo HIV testing. High levels of social stigma lead to reluctance of both patients and providers to discuss HIV testing. Furthermore, the low uptake figures
for HIV testing in Sudan raise questions about the quality and consistency of healthcare workers’ approaches to seek informed consent. Our own experience reveals that there is a lot of myth surrounding HIV counselling and testing in Sudan. Doctors, midwives and other health professionals have generally shied away from offering a concise yet informative pre and post-test discussion due to the widespread misconception that HIV testing requires input from dedicated professional counsellors.

Evidence from sub-Saharan countries reveals that offering routine HIV testing on an opt-out basis not only improved its uptake, but also improved coverage of antiretroviral prophylaxis as well as post-natal follow-up attendance (47,48). Although current evidence suggests high default rates of 48% among Sudanese patients receiving antiretroviral therapy (44), there is no data on adherence among pregnant women in Sudan. Similarly, there are no published studies on maternal or perinatal outcomes of HIV-infected women.

Due to persistence of maternal HIV antibodies in infants, molecular diagnostic tests utilising the polymerase chain reaction (PCR) are needed for screening the newborns of HIV-infected mothers (1). However, PCR assays are not currently available for routine diagnostic use in Sudan and this, in turn, leads to significant delays in confirming the HIV status of these infants. Improving access to HIV serological and molecular diagnostics will help optimise the quality of care received by pregnant women and their newborns (1,23). Furthermore, this will allow healthcare professionals and planners in Sudan to assess the efficiency of PMTCT interventions by obtaining precise estimates of averted vertical HIV infections.

In conclusion, the burden of maternal HIV infection in Sudan is currently low and this fact in itself presents opportunities as well as challenges. What should be clear, however, is that there is no room for complacency as the epidemiological situation may change in future due to civil unrest, internal displacement, and sharing open borders with countries that have significantly higher HIV prevalence. Careful monitoring and evaluation of the situation through strong surveillance systems is of paramount importance.

The fact that two out of three Sudanese women received antenatal care by any skilled personnel at least once during their pregnancy and that approximately one out of two women had a blood sample taken during their antenatal visits present an excellent opportunity to provide point-of-care rapid HIV testing on an opt-out basis. Women of reproductive age should be targeted by an assertive, far-reaching, and sustained information, education & communication campaign in an effort to raise their awareness on PMTCT. Political commitment and support to PMTCT activities should be secured in order to facilitate future success.

Adopting an integrated multidisciplinary approach is crucial to delivering effective PMTCT service and the leadership of SNAP will need to consider innovative ways for engaging obstetricians, midwives, health visitors, physicians, paediatricians, and other health professionals in PMTCT activities. Adherence to standards of good medical practice such as preserving patients’ dignity and confidentiality should be promoted. National clinical guidelines on PMTCT should be updated, made readily accessible to all practitioners, and get regularly audited. Further research into the impact of HIV on the health of women and children in Sudan is urgently needed.

**Conflict of interest:** None to declare.
References