

**Sudan HIV/AIDS Working Group (SHAWG)**

# Preventing mother-to-child transmission of HIV in Sudan: One test...Two lives

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**DEDICATION:**

*To all Sudanese pregnant women and their unborn babies: may you be safe and protected from all harm.*

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## ABBREVIATIONS:

AIDS: Acquired immunodeficiency syndrome

ANC: Antenatal care

ART: Antiretroviral therapy

HIV: Human immunodeficiency virus

MOU: Memorandum of understanding

OGSSD: The Obstetrical and Gynaecological society of Sudan

OMACU: Omdurman AIDS Care Unit

PLWHA: People living with HIV/AIDS

PMTCT: Prevention of mother-to-child transmission of HIV

RH: Reproductive Health programme

SHAWG: Sudan HIV AIDS Working Group

SMoH: State ministry of health

SNAP: Sudan National AIDS Control Programme

STI: sexually transmitted infections

TOKTEN: Transfer of Knowledge Through Expatriate Nationals

UNDP: United Nations Development program

WHO: World Health Organisation

UNICEF: United Nations International Children Emergency Fund

## EXECUTIVE SUMMARY AND RECOMMENDATIONS:

At present, the seemingly low burden of maternal HIV infection in Sudan presents healthcare professionals with many challenges as well as opportunities to mitigate the risks associated with it. The following points summarise our recommendations to improve service delivery of PMTCT in Kassala state, eastern Sudan.

- Expand access to antenatal HIV testing on an opt-out basis for ALL pregnant women attending ANC clinics in Kassala state.
- Requests for HIV testing should be “normalised” by introducing standard laboratory request forms that includes specific fields designated for its request.
- Introduce an integrated service model for PMTCT and ANC in Kassala state (appendix4).
- Establish multidisciplinary core management teams for PMTCT activities along with clearly defined referral pathways between different specialties (appendices 2 & 3).
- National PMTCT clinical guidelines and protocols must be disseminated effectively to all parties concerned and should be regularly revisited on trainee doctors’ induction programmes and other teaching activities.
- Clinical outcomes of HIV-infected mothers and their infants must be documented appropriately.
- Improve stock management systems for antiretroviral drugs, HIV test kits, CD4 count equipment/reagents, and other relevant items.
- Further cycles of generic as well as hands-on training on PMTCT should be organised during 2012/2013 with a view to training local trainers so as to ensure long-term sustainability of knowledge and skill transfer.
- HIV operational research priorities should be set and pursued in order to inform local health policy making.

- SNAP must adopt innovative approaches to engage with clinicians on PMTCT in order to bridge to leadership gap and ensure satisfactory translation of national policies into clinical care.
- Civil society groups should be involved in orchestrating effective information, education and communication campaigns in order to fight stigma and raise public awareness on PMTCT.

These recommendations are not set in stone and can be adjusted to suit the local needs while maintaining high quality standards.

## **TERMS OF REFERENCE:**

1. Conduct a two-day educational workshop on the prevention of mother-to-child transmission of HIV infection in Kassala state.
  - Target audience should include obstetricians, physicians, paediatricians, pharmacists, midwives, health visitors, and health planners in Kassala state.
2. Develop, in collaboration with relevant stakeholders, an integrated framework for the prevention of mother-to-child transmission of HIV infection in Kassala state.

This should include the following:

  - Recommend strategies to scale up antenatal HIV testing.
  - Propose multidisciplinary referral pathways for HIV-infected pregnant women.
  - Address issues surrounding access to maternal and neonatal antiretroviral therapy.
3. Review local management protocols for maternal and neonatal HIV prophylaxis.

## **EXPECTED RESULTS OF THE ASSIGNMENT:**

1. Conduct a one-day symposium on PMTCT as part of the annual conference of the Obstetrical and Gynaecological society of Sudan (Khartoum, February 2011).
2. Conduct a two-day workshop on the prevention of mother-to-child transmission (PMTCT) of HIV infection (Kassala, March 2011).
3. Submit a proposal on the development of an integrated framework for the service delivery of PMTCT in Kassala state.

## INTRODUCTION:

The current burden of maternal infections with the human immunodeficiency virus (HIV) in Sudan remains low but this situation should not promote complacency as there are challenges to be tackled and opportunities to be seized in order to keep the epidemic in its tracks.<sup>1</sup>

The Sudan HIV/AIDS Working Group (SHAWG; [www.shawg.org](http://www.shawg.org)), which is a voluntary network of Sudanese medical expatriates with interest in HIV/AIDS, has adopted prevention of mother-to-child transmission (PMTCT) of HIV infection as its main theme for 2010/2011 and, therefore, sought to establish long-term partnerships with Sudanese institutions with similar interest.

The university of Kassala ([www.kassalauni.edu.sd/en/](http://www.kassalauni.edu.sd/en/)) and SHAWG launched their collaboration with an operational research project assessing the prevalence of maternal HIV infection in Kassala state.<sup>2</sup> Furthermore, both parties agreed on the necessity to review PMTCT activities in Kassala state in collaboration with the state Ministry of Health and the Sudan National AIDS Control Programme (SNAP). Further assistance was sought from the United Nations Development Program (UNDP) through their programme “Transfer of knowledge Through Expatriate Nationals” (TOKTEN) to facilitate transfer of up to date knowledge on HIV to frontline staff in Kassala.

Kassala state is located in eastern Sudan and has a total population of 1789000, the majority of which lives in rural settings.<sup>3</sup> In addition, it has provided refuge to thousands of internally displaced people as well as refugees from Eritrea and Ethiopia over the past few decades.

This report presents the findings of a two-week mission requested by the University of Kassala and sponsored by the UNDP/TOKTEN programme with support from the Obstetrical and Gynaecological society of Sudan (OGSSD).

## ITINERARY:

<b>Date</b>	<b>Activity</b>
February 21, 2011	UNDP reception.
February 23, 2011	PMTCT symposium at Khartoum Teaching Hospital.
February 24, 2011	Joint meeting with SNAP and WHO.
February 26, 2011	Travel to Kassala.
February 27-28, 2011	PMTCT workshop for doctors.
February 27, 2011	Press conference with local media, Kassala University.
February 28, 2011	Workshop on HIV/AIDS stigma at Kassala University.
March 1 <sup>st</sup> , 2011	PMTCT workshop for midwives and health visitors.
March 1 <sup>st</sup> , 2011	Visit to PMTCT centre at Kassala new maternity hospital.
March 1 <sup>st</sup> , 2011	Signing MOU with University of Kassala.
March 2 <sup>nd</sup> , 2011	Field visit to the PMTCT centre at Wad Sherifree refugee camp and the ART centre at Kassala teaching hospital.
March 3 <sup>rd</sup> , 2011	ART centre Gedaref teaching hospital, meeting with senior obstetrician at Gedaref Maternity hospital.
March 4 <sup>th</sup> , 2011	Hepatitis B talk to the Sudanese gastroenterology society.
March 6 <sup>th</sup> , 2011	Meeting with UNAIDS country coordinator
March 7 <sup>th</sup> , 2011	Meeting with SNAP leadership: national programme director and head of PMTCT.
March 8 <sup>th</sup> , 2011	Joint meeting the Sudanese Association of Physicians: an update on infectious diseases.
March 9 <sup>th</sup> , 2011	TOKTEN & SHAWG's advocacy trip to Gezira University, joint meeting with SNAP, and visit to the Blue Nile national institute for communicable diseases.
March 10 <sup>th</sup> , 2011	Visit to Omdurman maternity hospital and attended PMTCT technical group meeting.

## ACTIVITIES:

### Khartoum:

- Reception at UNDP Khartoum: networking with United Nations' agencies, University of Kassala, OGSSD, OMACU, national media, Sudan AIDS Network and other civil society groups.
- One-day symposium on maternal HIV infection held at Khartoum teaching hospital and in collaboration with the obstetrical and gynaecological society of Sudan and Kassala University. This symposium was well received and, in view of its success, the obstetrical and gynaecological society of Sudan decided to adopt PMTCT as a major theme for its next conference in February 2012.
- Joint meeting with SNAP/WHO officials on PMTCT activities in Sudan

### Kassala:

- Two-day training workshop on PMTCT targeting physicians, obstetricians, and paediatricians as well as representatives of SNAP from Kassala, Gedaref, and Red Sea states. The workshop was held at Kassala University and was attended by representatives from the Health Alliance International (HAI) and WHO (Khartoum).
- The opening ceremony for the two-day workshop was addressed by state minister of health, vice chancellor of Kassala University, and the director general of SMOH.
- Workshop on combating HIV stigma organised by the association of medical students at Kassala University in collaboration with SNAP Kassala state.
- One-day symposium for midwives and health visitors held at Kassala New Maternity Hospital.
- Visit to ANC clinic and PMTCT centre at Kassala New Maternity Hospital.
- Visit to Kassala teaching hospital: ART centre as well as treatment centres for tuberculosis and leprosy.
- Visit to the society of people living with HIV/AIDS, Kassala state.
- Live televised interview on HIV and PMTCT on regional television station.

- Visit to PMTCT centre in Wad Shareefai refugee camp: run Sudanese Red Crescent
- Visit to the facilities of the faculty of Medicine including the tuberculosis research laboratory.

### **Gedaref:**

- Visit to the ART centre at Gedaref teaching hospital.
- Visit to Gedaref maternity hospital and had a meeting with the Dr Abdalla Ahmed Abdalla (lead obstetrician) regarding the introduction of antenatal HIV testing on an opt-out basis.

### **Khartoum:**

- Visit to the PMTCT centre at Omdurman maternity hospital.
- Meeting with major PMTCT stakeholders: WHO, UNICEF, Health Alliance International, SNAP, and the national reproductive health (RH) programme.
- Meeting with UNAIDS country coordinator, Khartoum.
- Meeting with the director general of SNAP and head of PMTCT.

### **Wad Medani:**

- TOKTEN & SHAWG's advocacy trip to University of Gezira and a presentation on SHAWG's PMTCT initiative.
- Meeting with SNAP coordinator in Gezira state regarding the challenges facing the introduction of routine antenatal HIV testing on an-opt out basis.
- We were given information on the progress of the safe motherhood and childhood initiative spearheaded by University of Gezira and their recent successes.

### **El Obeid:**

- Telephone conversation with Dr Akhidir Alamin, Dean of Faculty of Medicine Kurdufan University, to replicate PMTCT workshops in El Obeid.

## **SITUATION ANALYSIS:**

### **Epidemiology:**

Revised figures on the burden of HIV infection in Sudan estimate a prevalence of 0.67% among adults aged 15-49 years.<sup>4</sup> Overall maternal HIV prevalence is estimated to be 0.19% in all 15 states, 0.98% in Khartoum state, and 0.23% in Kassala state.<sup>3-5</sup> The current prevalence of HIV infection in Sudanese children aged 0-14 years is thought to be 0.13% at the population level, however, a significantly higher rate of 5.7% was recently observed among acutely hospitalised children aged 1.5-14 years in central Sudan.<sup>6,7</sup>

The Sudan Household Health Survey (2006) confirmed a staggeringly high maternal mortality of 1107 per 100,000 live births.<sup>8</sup> Corresponding neonatal, infant and under-fives mortality rates were 41, 81 and 112 per 1000 live births, respectively. 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. Poor public awareness of HIV-related interventions, inefficient surveillance systems, on-going civil unrest, and sharing open borders with countries of higher burden of HIV infection are likely to fuel the spread of HIV in Sudan.

### **HIV testing:**

Offering antenatal HIV testing on an opt-out basis is the cornerstone for any successful PMTCT programme. However, the uptake of antenatal HIV testing in the vertically-run PMTCT services in Kassala state was only 27% in 2009.<sup>9</sup> We followed the journey taken by pregnant women attending ANC at Kassala New Maternity Hospital (KNMH) and Omdurman Maternity hospital in order to learn more about the process of antenatal HIV testing.

At present, pregnant women are offered group counselling for HIV testing while receiving other health messages relating to nutrition and hygiene when they attend hospital for ANC. When they are seen by a doctor, routine obstetric examination takes place and some tests are requested. These usually comprise blood tests for haemoglobin level, blood

grouping, and urine microscopy but not necessarily an HIV or syphilis test. Some of the doctors we interviewed did not object in principle to HIV testing but they cited reasons such as simply forgetting to request the test. We concluded that lack of standard laboratory request forms impedes normalisation of HIV testing and may account for the low antenatal testing rates. We therefore think that introducing standard forms for locally available tests, with specific additional fields for HIV and syphilis serology, may improve antenatal testing rates.

According to laboratory staff in Omdurman maternity hospital, the frequency for HIV test requests appears to be a function of the consultant running the ANC clinics with some consultants requesting far more than others. Despite the seemingly high uptake of antenatal HIV testing at Omdurman maternity hospital, we were not able to precisely establish the rate of HIV uptake due to denominator problems. We also noticed that women seen in the labour or post-natal wards were not routinely offered HIV testing. We believe that engaging clinicians in PMTCT activities will encourage them to consider HIV testing whenever it is indicated.

The reproductive health programme (RH) runs ANC at the primary care level. Whilst on field visits, we identified some teething problems for the proposed merger of PMTCT and RH services: ANC follow-up cards designed by RH do not include a field for requesting or recording HIV test result. As a temporary solution, we proposed using a rubber stamp to document the HIV test result until the current supply of cards is used up with a view to including specific fields for HIV testing in the next batch of RH cards.

HIV diagnostic infra-structure in Sudan is generally poor. The country mainly relies on rapid test kits for the serological diagnosis of HIV. Although there is a national algorithm for the serological diagnosis of HIV, we could not precisely establish the validation methods used on these kits before they were rolled out for general use. Furthermore, the supply of HIV test kits is often erratic in some centres and, worryingly, we heard stories of test kits expiring before they are put to use.

The laboratory staff we met in our field visits appears to be well-trained in HIV rapid diagnostics but we were concerned about the accuracy and comprehensiveness of their collected data. We think this can be improved by restructuring current reporting mechanisms to allow for the use of unique identifiers that can be used to link laboratory clinical, and demographic data.

We understand that there are plans by UNICEF and SNAP to carry out a pilot study examining the utility of molecular testing of dry blood spots in Sudan (personal communication with Dr Anjala Illemassene, UNICEF). This is certainly a step in the right direction but the current diagnostic infra-structure should be upgraded to accommodate any future roll out of any molecular testing.

### **PMTCT service delivery issues:**

The HIV epidemic in Sudan is fuelled by heterosexual transmission and it is estimated that 59% of incident HIV infections occurred in women aged 15-49 years<sup>6</sup>. This makes PMTCT an important public health intervention in Sudan's setting. Effective delivery of PMTCT interventions is highly rewarding as it can reduce the risk of mother-to-child transmission of HIV infection from 20-45% to <5% in breastfeeding populations and to <2% in non-breastfeeding populations.<sup>10</sup> However, the performance of the existing PMTCT services in Sudan has been poor as evidenced by <1% access to antenatal HIV testing and <10% coverage of antiretroviral therapy for HIV-infected pregnant women.<sup>6,11</sup> These disappointingly low figures are partly to be blamed on the current vertical structures for delivering PMTCT and routine ANC, the stigma associated with HIV, and the reluctance of healthcare professionals to engage in HIV care and treatment activities. We believe that adopting an integrated approach to PMTCT (see appendix 2) will help "normalise" HIV care and make it part and parcel of routine clinical duties.

Despite considerable differences in levels of ANC access between urban and rural settings, 63.7% of women received care by skilled personnel at least once during their pregnancy.<sup>8</sup>

Furthermore, 45.5% of all Sudanese women had a blood sample taken during their ANC visits. Although there is room for improvement, the aforementioned findings are encouraging and, indeed, present an excellent opportunity to scale up point-of-care rapid HIV testing on an opt-out basis. These findings are encouraging and provide strength to the argument in favour of equipping ANC clinics with adequate resources for HIV testing.

During our meetings with various officials in Sudan, we learned about the impending integration of PMTCT services into ANC-clinics run by the national reproductive health (RH) programme at the primary care setting. In Sudan, ANC is provided by RH at community level but pregnant women attending ANC at their local hospital are looked after by obstetricians. This situation creates a dichotomy and perhaps tension between hospital-based ANC activities and community services, which may adversely affect the quality of care when the two systems run parallel to each other. It is therefore imperative to clarify ANC/PMTCT referral pathways at community and hospital levels otherwise PMTCT activities will be hampered by fragmentation of service.

### **Documentation of PMTCT outcomes:**

Poor documentation of PMTCT outcomes was not only observed at Kassala state level but also nationally. For example, we were not able to ascertain reliably any the following: number of HIV-infected women who were diagnosed during pregnancy; number of women who received antiretroviral therapy during pregnancy; number of HIV-infected women who had a caesarean section; number of infants born to HIV-infected mothers; number of infants who received antiretroviral prophylaxis; number of infants who had an HIV test at 18 months of age nor the result of that test. Failure to provide data on number of neonatal HIV infections averted by the national or local PMTCT programmes is major weakness and, indeed, raises a few question marks about the rigor and efficacy of monitoring and evaluation systems used at national and local levels.

In order to address the dearth of information on PMTCT outcomes in Kassala, we designed a simple EXCEL<sup>®</sup> sheet for routine prospective PMTCT data collection and we intend to transform this into a paper-based clinical proforma in view of the issues surrounding access to computers in Sudan. However, a far-reaching major overhaul of PMTCT data collection, analysis, and dissemination at national and local levels is needed. Furthermore, precise assessment of the number of averted vertical HIV infections requires improved access to serological and molecular diagnostics as well as robust clinical follow-up systems.

### **Impact of scaling up HIV testing on routine health services:**

Evidence from some sub-Saharan countries reveals that offering routine antenatal 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.<sup>12,13</sup>

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 (see appendix 2).

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 and caesarean sections only accounting for 4.5% of all deliveries.<sup>8</sup> Scaling up antenatal HIV testing uptake would eventually mean those who are positive have to be delivered by skilled birth attendants in a hospital setting where facilities for caesarean section, ARVS and neonatal care and follow-up are available. This scenario raises concerns about the capability of hospitals to cope with such an increase in demand for obstetric and neonatal services.

Pregnant women receive either long-term ART for their own health or short-term ART solely for the protection of their unborn infants. The decision about ART is informed by clinical guidelines, which we trust have now been finalised, but there remain some

concerns about access, adherence, and monitoring of toxicity. At present, access to ART is severely restricted with only <10% HIV-infected women managed to receive ART in the whole country.<sup>11</sup> Furthermore, high default rates of 48% have been observed among Sudanese patients receiving ART (personal communication with Dr Omer Nemery, OMACU), but there are no data on adherence among pregnant women. The reason for poor adherence is not clear but certainly warrants further research into this phenomenon.

Clinical governance systems in Sudan are still in their infancy and as a result there are no established referral pathways between clinical specialties looking after HIV-infected pregnant women. Furthermore, the use of clinical audit as a tool in the day to day practice remains unsatisfactory. We participated in the weekly morbidity and mortality meeting at KNMH and we see this as a potentially useful platform to run and monitor PMTCT activities at hospital level in a multidisciplinary fashion (see appendix 2).

### **Public awareness of HIV/AIDS:**

General awareness of the existence of HIV/AIDS among the general population is deficient. Overall, 70.4% of Sudanese women aged 15-49 years have heard about AIDS but only 4% were aware of the major methods for preventing HIV transmission.<sup>8</sup> Furthermore, the proportion of women who were aware of all three routes of mother-to-child transmission (during pregnancy, during labour, and through breast feeding) was only 26%. Public awareness of HIV/AIDS and a better understanding that HIV/AIDS, when diagnosed and treated appropriately, no longer means a death sentence is vital in combating the HIV epidemic. The local broadcasting station in Kassala state broadcasts general HIV awareness messages using several local dialects but there seems to be a lack of focus on key PMTCT messages. SHAWG participated in a live television show on HIV broadcast by the local television station but obviously more concerted long-term effort has to be exerted to advance public awareness on HIV/AIDS with particular emphasis on PMTCT.

### **HIV-related Stigma:**

HIV-infected women are particularly vulnerable and tend to endure extreme forms of social stigmatisation such as eviction from rented accommodation, loss of earnings, and expulsion of their children from schools (personal communication with members of the society of people living with HIV/AIDS in Khartoum and Kassala states). Women's vulnerability to extreme stigmatisation is compounded by their generally low status in the Sudanese society. Politicians should be lobbied to pass legislations protecting the civil rights of women and all HIV-infected individuals.

We were disappointed to learn that healthcare professionals been the worst offenders with regards to HIV stigma but we believe that they can be reformed through education. We believe that their lack of knowledge on HIV is likely to be a major contributing factor to the widespread prejudice against HIV-infected patients in the Sudanese medical profession. Adherence to standards of good medical practice such as preserving patients' dignity and confidentiality should be actively promoted and monitored. Investing "tomorrow's doctors" is certainly worthwhile and therefore undergraduate medical curricula should be updated with relevant HIV knowledge. By the same token, junior doctors undertaking postgraduate should also have their training curricula updated.

### **HIV medical education:**

We believe that deficiency in HIV-related medical knowledge at both undergraduate and postgraduate level has adversely affected the willingness of clinicians to engage in HIV care and treatment activities.<sup>1</sup> Although our PMTCT training workshops targeted physicians, paediatricians, obstetricians, midwives, and health visitors (see appendix 1), more need to be done to address HIV educational and training needs of healthcare professionals.

### **Operational research on HIV:**

We believe that conducting research on PMTCT-related operational issues will provide invaluable wealth of knowledge that can be used to inform local health policy planning. To that end, SHAWG and the University of Kassala published an original research article on Kassala's burden of maternal HIV infection in a peer-reviewed journal.<sup>2</sup> We also jointly published a review article on major issues relating to PMTCT in Sudan.<sup>1</sup> SHAWG and the University of Kassala signed a [memorandum of understanding](#) on March 1<sup>st</sup>, 2011 in order to expand their collaboration on various aspects of knowledge transfer.

### **Clinical leadership:**

We believe the vertical nature of the HIV interventions in Sudan has created a widening gulf between SNAP and clinicians that resulted in poor translation of HIV policies into palpable bedside clinical care. At the heart of this, is a clear lack of ownership of HIV interventions in most clinical settings in Sudan. Furthermore, SNAP introduced financial incentives (in its early days) as an attractive means to engage clinicians in HIV care and treatment activities but this approach has backfired badly by creating unrealistic sense of entitlement for those engaged and deep resentment for those excluded. For the PMTCT initiative to succeed, SNAP must seriously attempt to bridge the gap with clinicians at all levels by integrating their services into the mainstream healthcare system and ensuring safe working environment for healthcare professionals (e.g advice on universal infection control precautions, access to post-exposure antiretroviral prophylaxis, etc). Moreover, clinicians must view HIV care and treatment as a core professional duty and stand up to the challenge of updating their knowledge and maintaining high professional standards.

### **Political commitment:**

The nature of PMTCT intervention lends itself for political support as it is the least controversial HIV intervention from a Sudanese socio-cultural perspective. In fact, everyone would love to save babies and this is a particular point of strength when PMCT is promoted to politicians. In our experience in Kassala state, our mission was well-received by the state ministry of health and the state minister of health addressed the opening session of our PMTCT training in Kassala. However, the long-term challenge is to keep politicians interested. This may be achieved by presenting them with a local PMTCT success story that they can relate to.

## PROPOSED PLAN OF ACTION:

- Expand access to antenatal HIV testing on an opt-out basis for ALL pregnant women attending ANC clinics in Kassala state.
- Requests for HIV testing should be “normalised” by introducing standard laboratory request forms that includes specific fields designated for its request.
- Introduce an integrated service model for PMTCT and ANC in Kassala state (appendix4).
- Establish multidisciplinary core management teams for PMTCT activities along with clearly defined referral pathways between different specialties (appendices 2 & 3).
- National PMTCT clinical guidelines and protocols must be disseminated effectively to all parties concerned and should be regularly revisited on trainee doctors’ induction programmes and other teaching activities.
- Clinical outcomes of HIV-infected mothers and their infants must be documented appropriately.
- Improve stock management systems for antiretroviral drugs, HIV test kits, CD4 count equipment/reagents, and other relevant items.
- Further cycles of generic as well as hands-on training on PMTCT should be organised during 2012/2013 with a view to training local trainers so as to ensure long-term sustainability of knowledge and skill transfer.
- HIV operational research priorities should be set and pursued in order to inform local health policy making.
- SNAP must adopt innovative approaches to engage with clinicians on PMTCT in order to bridge to leadership gap and ensure satisfactory translation of national policies into clinical care.

- Civil society groups should be involved in orchestrating effective information, education and communication campaigns in order to fight stigma and raise public awareness on PMTCT.

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## APPENDIX 1: Training Curricula for Prevention of Mother-to-Child Transmission of HIV infection:

- (i) **One-day Symposium on Maternal HIV Infection in Sudan, 23 February 2011, Khartoum Teaching Hospital, Khartoum, Sudan**

<b>First session</b>	
Chairperson: <i>Professor Abdel Latif Ashmaig</i>	
Co-chair: <i>Dr Elbushra Herieka</i>	
<b>08:30-08:50</b>	<b>Arrival and registration</b>
<b>08:50-09:00</b>	<b>Introduction</b> Professor Abdel Latif Ashmaig <i>President of the Obstetrical and Gynaecological Society of Sudan</i>
<b>09:00-09:20</b>	<b>An overview of the existing maternal services dedicated to preventing mother-to-child transmission of HIV infection in Sudan</b> Professor Mohamed Ahmed Ali El Sheikh <i>University of Khartoum</i>
<b>09:20-09:40</b>	<b>The current strategy for preventing mother-to-child transmission of HIV infection in Sudan</b> SNAP representative <i>Sudan National AIDS Control Programme (SNAP)</i>
<b>09:40-10:00</b>	<b>The burden of maternal HIV infection in Sudan</b> Dr Zahir Osman Eltahir Babiker <i>North Manchester General Hospital</i>
<b>10:00-10:30</b>	<b>Breakfast</b>

<b>Second session</b>	
Chairperson: <i>Professor Mohamed Ahmed Ali El Sheikh</i>	
Co-chair: <i>Dr Nur Elhouda Ata Alla Alla Gabo</i>	
<b>10:30-11:00</b>	<b>Personal experiences of HIV-infected women</b> <i>Association of Sudanese People Living with HIV/AIDS</i>
<b>11:00-11:30</b>	<b>Outlines of the clinical management of HIV-infected pregnant women</b> Dr Elbushra Herieka <i>Royal Bournemouth Hospital</i>
<b>11:30-12:00</b>	<b>Case-based discussion</b> Dr Zahir Osman Eltahir Babiker <i>North Manchester General Hospital</i>
<b>12:00-12:10</b>	<b>Transfer of Knowledge Through Expatriate Nationals (TOKTEN)</b> UNDP representative <i>United Nations Development Programme (UNDP)</i>
<b>12:10-12:30</b>	<b>Tea/Coffee break</b>
<b>Third session</b>	
Chairperson: <i>Dr Mohamed Ahmed Abdelhafiz</i>	
Co-chair: <i>Dr Salah Ahmed Ibrahim</i>	
<b>12:30-12:50</b>	<b>Preventing mother-to-child transmission (PMTCT) of HIV infection in Sudan: Omdurman AIDS Care Unit (OMACU) experience</b> Dr Nur Elhouda Ata Alla Alla Gabo <i>Omdurman Teaching Hospital</i>

12:50-13:10	<p><b>Preventing mother-to-child transmission (PMTCT) of HIV infection in Sudan: Kassala state experience</b></p> <p>Dr Abdalla Ali Mohammed</p> <p><i>Kassala New Maternity Hospital</i></p>
13:10-13:40	<b>Break for Dhuhr prayers</b>
<p><b>Fourth session</b></p> <p><b>Chairperson:</b> <i>Professor Mohamed Ahmed Ali El Sheikh</i></p> <p><b>Co-chair:</b> <i>Dr Abdalla Ali Mohamed</i></p>	
13:40-14:00	<p><b>Developing an integrated service model for preventing mother-to-child transmission of HIV: challenges and opportunities</b></p> <p>Dr Elbushra Herieka</p> <p><i>Royal Bournemouth Hospital</i></p>
14:00-14:30	<p><b>Open floor discussion</b></p> <p>Delegates</p>
14:30-14:45	<p><b>Summary and Recommendations</b></p> <p>Professor Mohamed Ahmed Ali El Sheikh</p> <p><i>University of Khartoum</i></p>
14:45-15:00	<b>Closing remarks</b>
<b>End of symposium</b>	

**(ii) Training Workshop on the Prevention of mother-to-child transmission of HIV Infection, February 27-28, 2011, Kassala, Sudan**

**Day 1:**

**First session:**

<b>09:00-09:05</b>	<b>Holly Quran</b>
<b>09:05-09:10</b>	<b>Organising committee speech</b>  Dr Awadia Khojali  <i>University of Kassala &amp; Kassala New Maternity Hospital</i>
<b>09:10-09:20</b>	<b>SHAWG representative speech</b>  Dr Elbushra Herieka  <i>Royal Bournemouth Hospital</i>
<b>09:20-09:40</b>	<b>Academic host speech</b>  Professor Mohamed Kheir Abdelrahman  <i>Vice chancellor, University of Kassala</i>
<b>09:40-10:00</b>	<b>Speech of the state minister of health</b>  <i>Dr Mohammed Saeed Terkai</i>  <i>State Minister of Health</i>
<b>10:00-10:30</b>	<b>Breakfast</b>

**Second session:**

**Chairperson:** *Dr Ikhlas Suliman Elkheir*

**Co-chair:** *Dr Motaz Abdalla Abdelhadi*

<b>10:30 - 11:00</b>	<b>Overview of HIV/AIDS</b>  Dr Elbushra Herieka  <i>Royal Bournemouth Hospital</i>
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<b>11:00 - 11:30</b>	<b>Preventing mother-to-child transmission (PMTCT): why does it matter?</b> Dr Zahir Osman Eltahir Babiker <i>North Manchester General Hospital</i>
<b>11:30 - 12:00</b>	<b>The current strategy for preventing mother-to-child transmission of HIV infection in Sudan</b> SNAP representative <i>Sudan National AIDS Control Programme</i>
<b>12:00 - 12:30</b>	<b>Developing an integrated service model for preventing mother-to-child transmission of HIV: challenges and opportunities</b> Dr Elbushra Herieka <i>Royal Bournemouth Hospital</i>
<b>12:30-13:00</b>	<b>Break for Dhuhr prayers</b>

**Third session**

**Chairperson:** *Dr Mahgoub Ali Adam*

**Co-chair:** *Dr Mahgoub Hassan Elnour*

<b>13:00 - 13:30</b>	<b>Antiretroviral therapy (ART): the basics</b> Dr Zahir Osman Eltahir Babiker <i>North Manchester General Hospital</i>
<b>13:30 - 14:00</b>	<b>Clinical management of HIV during pregnancy part I</b> Dr Elbushra Herieka <i>Royal Bournemouth Hospital</i>
<b>14:00 - 14:30</b>	<b>Clinical management of HIV during pregnancy part II</b> Dr Elbushra Herieka <i>Royal Bournemouth Hospital</i>

14:30-15:00	<b>Case-based discussion</b> Dr Zahir Osman Eltahir Babiker <i>North Manchester General Hospital</i>
15:00-15:30	<b>Participants' feedback and evaluation of the day's events</b>

End of Day1

**Day 2:**

**First session:**

**Chairperson:** *Dr Yassir Mohamed Ahmed*

**Co-chair:** *Dr Mohamed Farouk Siddig*

09:00-09:30	<b>Management of neonates born by HIV-infected mothers</b> Dr Zahir Osman Eltahir Babiker <i>North Manchester General Hospital</i>
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09:30-10:00	<b>Case-based discussions</b> Dr Elbushra Herieka <i>Royal Bournemouth Hospital</i>
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10:00-10:30	<b>Breakfast</b>
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**Second session:**

**Chairperson:** *Dr Elbushra Herieka*

**Co-chair:** *Dr Badreldin Badawi*

10:30-10:50	<b>PMTCT: Gedaref experience</b> Mr Mohamed Ali Abdelrahman Ali
10:50-11:10	<b>PMTCT: Red sea experience</b> Mr Hawyatalla Mohammed Hawyatalla
11:10-11:20	<b>Tea/Coffee break</b>

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**11:20-11:40**

**PMTCT: Kassala experience**

Dr Abdalla Ali Mohammed

*Kassala New Maternity Hospital*

**11:40-12:00**

**PMTCT: Greater Manchester experience**

Dr Zahir Osman Eltahir Babiker

*North Manchester General Hospital*

**12:00-12:30**

**Discussion**

**12:30-13:00**

**Break for Dhuhr prayers**

**Third session:**

**Chairperson:** *Dr AbdelAzim Abdalla Mohamed Ali*

**13:00-13:30**

**Workshop evaluation by participants and facilitators**

**13:30-13:45**

**Summary and recommendations**

Dr Awadia Khojali

*University of Kassala & Kassala New Maternity Hospital*

**13:45-14:00**

**Certificates of attendance**

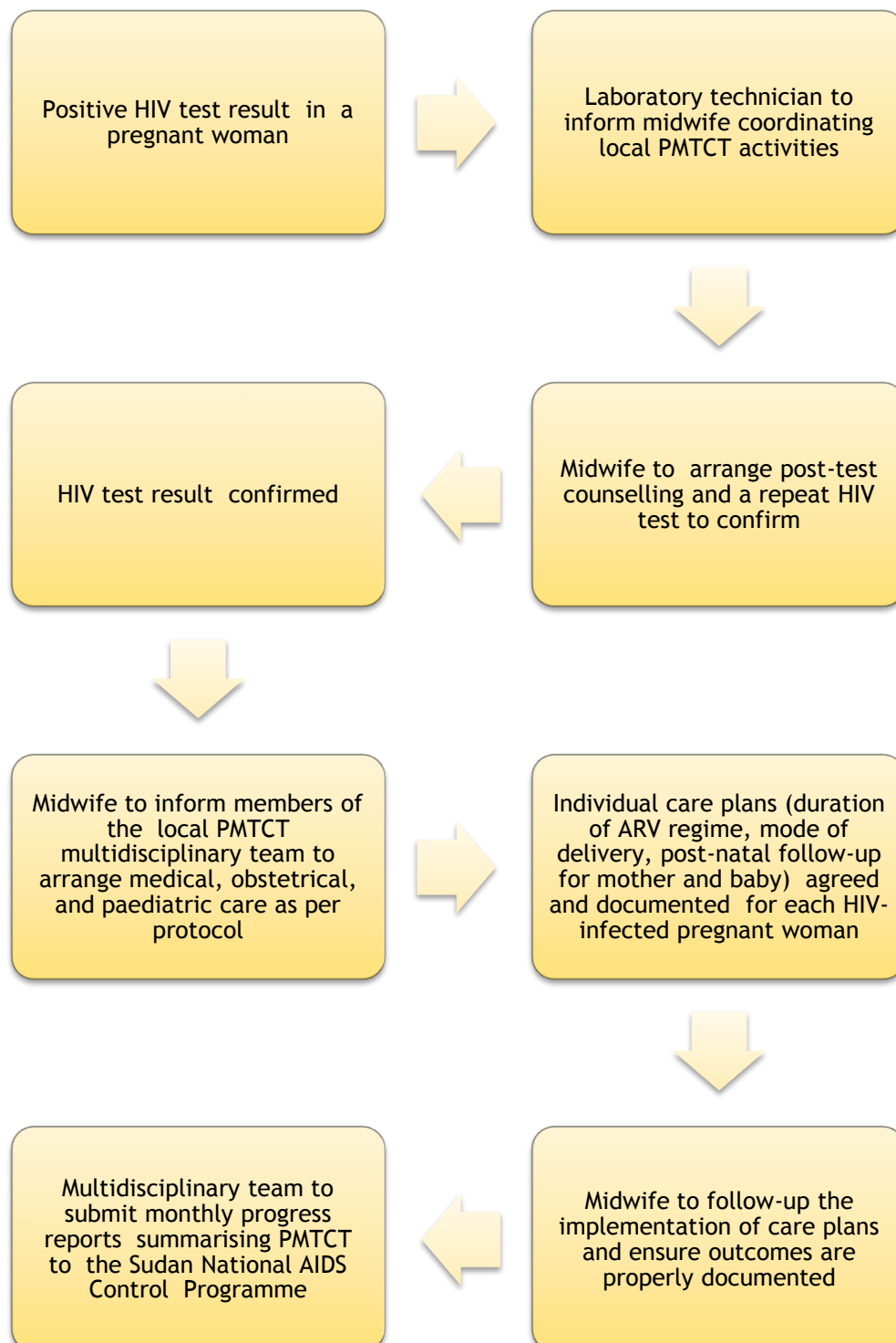
**End of workshop**

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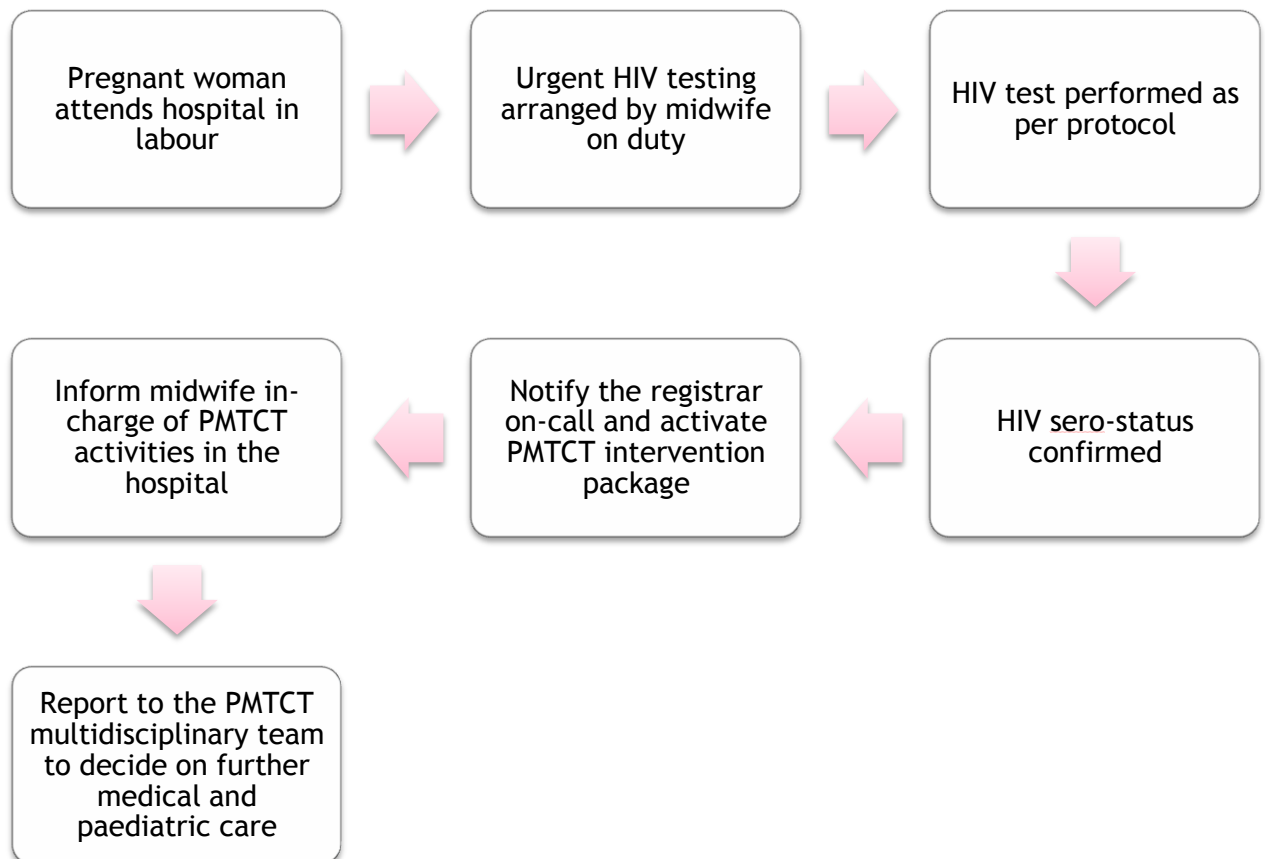
**(iii) Satellite symposium for midwives and health visitors on prevention of mother-to-child transmission HIV infection, 1<sup>st</sup> March 2011, Kassala, Sudan**

<b>08:00-08:15</b>	<b>Arrival and registration</b>
<b>08:15-08:30</b>	<b>Welcome and introduction</b>  Dr Awadia Khojali  <i>University of Kassala &amp; Kassala New Maternity Hospital</i>
<b>08:30-09:00</b>	<b>HIV in pregnancy: the basics</b>  Dr Zahir Osman Eltahir Babiker  <i>North Manchester General Hospital</i>
<b>09:00-09:30</b>	<b>The role of midwives and health visitors in preventing mother-to-child transmission of HIV</b>  Dr Elbushra Herieka  <i>Royal Bournemouth Hospital</i>
<b>09:30-10:00</b>	<b>Open floor discussion</b>
<b>10:00-10:15</b>	<b>Certificates of attendance</b>
<b>End of symposium</b>	

## Appendix 2: Proposed flowchart for integrated PMTCT activities in hospital settings



### APPENDIX 3: Proposed PMTCT flowchart for women with unknown HIV sero-status presenting to the labour ward



**APPENDIX 4: Framework for an integrated approach for implementing prevention of mother-to-child transmission (PMTCT) activities in Eastern Sudan.**

	Activities	Outputs	Verifiable indicators	Means of verification	Assumptions
<b>Goal</b>					
1. To Reduce Mother-to-child transmission of HIV in Sudan	<p>1.1 Build adequate capacity in the healthcare system to allow expansion of HIV clinical and diagnostic services</p> <p>1.2 Engage local communities in the fight against HIV</p>	<p>1.1 Improved access and utilization of HIV screening services among pregnant women</p> <p>1.2 Improved HIV awareness among local communities</p>	<p>1. 1 All antenatal clinics have adequate capacity to provide HIV screening services</p> <p>1.2 Referral pathways for HIV medical, obstetrical and neonatal care established</p> <p>1.3 At least 65% uptake of HIV screening services among pregnant women attending antenatal clinics</p>	<p>1.1 Antenatal clinic records</p> <p>1.2 Medical clinical records</p> <p>1.3 Neonatal clinical records</p> <p>1.4 Records of multi-disciplinary team meetings</p> <p>1.5 Field visits</p>	<p>1. Political commitment secured</p> <p>2. Leadership from FMOH provided</p> <p>3. Continued technical, scientific and clinical support by HIV experts</p>

Objectives					
1.1 Increase the uptake of HIV screening among pregnant women attending antenatal care clinics	1.1 Introduce routine HIV screening for all antenatal care attendees on an opt-out basis	1.1 HIV screening offered at all antenatal clinics on an opt-out basis	1.1 100% of pregnant women attending antenatal clinics offered HIV test  1.2 At least 75% of antenatal attendees undergo HIV testing	1.1 Audit of antenatal records  1.2 Audit of clinical records of female HIV patients	1.1 Rapid HIV test kits made available at all antenatal clinics  1.2 Key members of antenatal care staff trained on HIV screening
2. Improve clinical management of HIV in pregnant women	2.1 Provide intra-partum single-dose Nevirapine to women who do not require ART for their own health  2.2 Provide pre-partum ART to HIV positive pregnant women with low CD4 counts	2.1 pregnant mothers with positive HIV serology identified  2.2 HIV-positive pregnant women receive ART at the appropriate gestational age  2.3 Care plans for delivery are formulated by the multidisciplinary teams	2.1 100% of all HIV-positive women offered ART.  2.2 100% of HIV-positive women receive appropriate ART according to CD4 criteria  2.3 100% of neonates born by HIV-positive mothers receive post-exposure prophylaxis & follow-up	2.1 Audit of antenatal, medical and neonatal and paediatric records	2.1 Antenatal screening services up and running

		2.4 Multi-disciplinary team approach developed and maintained throughout	2.4 100% of HIV-positive mothers receive appropriate advice on breastfeeding  2.5 At least 99% of HIV-positive women give birth to HIV-negative babies		
3. Transfer HIV knowledge to frontline healthcare workers in Sudan	3.1 Organise regular training workshops on HIV for doctors, midwives and other allied professionals  3.2 Establish HIV clinical mentorship schemes for doctors and other allied professionals	3.1 HIV training workshops, with emphasis on PMTCT, held regularly.  3.2 Long-term clinical mentorship schemes involving Sudanese and British HIV units launched by mid 2013.	3.1 Quality of HIV workshops educational materials as assessed by facilitators and participants  3.2 Quality of mentorship schemes as assessed by mentors and mentees	3.1 Attendance records of HIV training workshops  3.2 Workshop evaluation forms  3.3 Mentorship evaluation forms	3.1 Adequate funding secured for training  3.2 Expatriate HIV specialists continue to provide input into knowledge transfer  3.3 UK-based HIV specialist units agree to engage in clinical mentorship schemes

<p>4. Raise awareness regarding availability of HIV testing as well as care and treatment facilities</p>	<p>4.1 Conduct assertive, far-reaching, and sustained information, education &amp; communication (IEC) campaign using prime time broadcasts at Sudanese radio and television stations.</p> <p>4.2 Actively involve patients living with HIV (PLWH) in running the IEC campaign</p>	<p>3.2.1 Increased awareness of the Sudanese public regarding the nature of HIV as well as locally available services for diagnosis, treatment and prevention</p>	<p>3.2.1 Frequency and quality of health education messages</p>	<p>3.2.1 Public surveys on HIV-related knowledge, attitudes and practices.</p>	<p>3.2.1 Political willingness and commitment secured</p>
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