

# IAPSM Position Paper on Vertical Transmission of HIV from Mother to Child

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## Abstract

Human immunodeficiency virus (HIV) can be transmitted through vertical route from the mother to her child during the period of pregnancy, process of childbirth, or through the breastfeeding. This is still a worldwide health issue, especially in environments with low resources. Without intervention, the transmission rate ranges from 15 to 45%, influenced by breastfeeding practices. Effective interventions, including antiretroviral therapy (ART), can reduce the transmission likelihood to about 2% with breastfeeding and 1% without breastfeeding. A further expansion of access to prevention of mother-to-child transmission of HIV (PMTCT) services was made possible by the year 2011 through the Global Plan toward the Elimination of New HIV Infections among Children and Keeping their Mothers Alive. By 2022, there were 130,000 new HIV infections in children under five, down from 310,000 in 2010. Nevertheless, the Joint United Nations Programme on HIV/AIDS (UNAIDS) Global Strategy to End AIDS's 2025 targets cannot be met with the current level of progress. To prevent new infections in children, pregnant and breastfeeding women with HIV must receive faster medical attention. This position paper discusses the primary prevention of HIV and the healthcare system's role in providing comprehensive care to HIV-positive women and their families. The continuum of care includes antenatal, intrapartum, post-delivery, and pediatric services, addressing the unique needs of each woman and her family. Individual-level interventions highlight the importance of partner selection, consistent condom use, avoiding needle sharing, and reducing risky sexual behaviors. Overcoming barriers to medication adherence, such as stigma and discrimination, is crucial for effective prevention and treatment. Community-level interventions are equally important in reducing stigma and discrimination and fostering healthcare-seeking behavior. The paper emphasizes a multi-faceted approach, involving healthcare systems, individuals, and communities, to accomplish the objective of an HIV-free generation by stopping HIV from spreading through the vertical route. Collaboration across these levels is essential to realizing this vision and ensuring optimal health outcomes for HIV-infected individuals, their children, and families.

**Keywords:** HIV, prevention of parent-to-child transmission, vertical transmission

## BACKGROUND

Human immunodeficiency virus (HIV) vertical transmission is still a serious global health concern, particularly in developing nations with inadequate resources. Vertical transmission of HIV is described as HIV transmission from mother to child at various stages of pregnancy which include in utero, intrapartum, and during lactation. If no intervention is conducted, the HIV transmission rate is between 15% and 45%.<sup>[1-3]</sup> Breastfeeding has an impact on the rate of vertical HIV transmission. In the non-breastfed group, the estimated rate of HIV transmission from mother to child, in the absence

of intervention, was between 15 and 20%, whereas the vertical transmission rates would vary depending on the length of breastfeeding, ranging from 20 to 45%.<sup>[4]</sup> With intervention, with three antiretroviral (ARV) drugs, the likelihood of vertical transmission is around 2% if breastfeeding is conducted and around 1% if breastfeeding is not given.<sup>[5]</sup>

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2011 saw the launch of the Global Plan toward the Elimination of New HIV Infections among Children and Keeping their Mothers Alive. As a result, more people had access to services linked to prevention of mother-to-child transmission of HIV (PMTCT). Although this reduced the number of new HIV infections among under-five children from 310,000 [210,000–490,000] in the year 2010 to 130,000 [confidence bounds: 90,000–210,000] in 2022, the rate of progress is insufficient to meet the Joint United Nations Programme on HIV/AIDS (UNAIDS) Global Strategy to End AIDS's 2025 targets. Therefore, to eliminate new HIV infections in children, the medical treatment given to pregnant and breastfeeding mothers who are HIV-positive needs to be expedited.<sup>[6]</sup>

Across the world, there are differences in the regional access to antiretroviral treatment (ART) for expectant and lactating women which ranges for pregnant women from 93 [77–>95] % in Eastern and Southern Africa to 38 [32–43] % in Middle East region and North Africa region.<sup>[6]</sup> World Health Organization (WHO) has committed toward the global effort to address vertical transmission of other communicable diseases. WHO encourages nations to concurrently commit to eliminating mother-to-child transmission (EMTCT) of HIV, syphilis, and HBV through the triple elimination initiative which requires integrated service delivery.<sup>[7]</sup>

### Epidemiology

Pregnant women with HIV were expected to number 13,00,000 [970,000–16,00,000] worldwide in 2020.<sup>[5]</sup> Over 80% of mothers worldwide have taken precautions against HIV transmission to their offspring, and in 2022, around one in nine newborns exposed to HIV contracted the virus.<sup>[6]</sup> About 50% of pediatric HIV infections occur each year because of HIV transmission through breastfeeding.<sup>[8]</sup>

In India, vertical transmission is a significant pathway for the transmission of HIV infection in children which is responsible for almost 4% among all HIV infections. In India, it has been estimated that 81,430 children were living with HIV (2020) of total 23,18,738 people living by HIV (PLHIV) which accounts for 3.5% of the estimated figures. The National AIDS Control Programme (NACP) implements the prevention of parent-to-child transmission (PPTCT) program. The goal is to achieve EMTCT of HIV.<sup>[5]</sup> Under the NACP, the PPTCT services for HIV provide no-cost services for counseling and testing, identifying HIV-positive status, offering ART to all women who are pregnant and diagnosed with HIV, providing ARV prophylaxis to their infants to avert the vertical transmission of HIV.

Early infant diagnosis (EID) program has related to infants born to mothers who are HIV-positive (HIV-exposed infants (HEIs)) for confirmation of HIV diagnosis and followed by the commencement of ART.<sup>[9]</sup> Despite the efforts made toward PPTCT, approximately 20% of women in India lacked the opportunity for HIV testing during the year 2019–2020.<sup>[10]</sup> Based on the 2020 HIV estimation, EMTCT progress is still far from reaching its target.

Between 2010 and 2020, there was an approximately 55% reduction in annual new HIV infections among children. The final mother-to-child transmission (MTCT) rate in India for 2020, inclusive of the period of lactation, was approximately 27.4% (20.3%–33.5%), marking a significant decrease from 40.2% in 2010. However, the MTCT rate remains elevated, surpassing the targeted 5%<sup>[5,11]</sup> Hence, the gap in PPTCT services impedes the diagnosis of HIV in infants.<sup>[12]</sup> Given the NACP's dedication to achieving the EMTCT goal through an ART coverage target for pregnant women of  $\geq 95\%$ , the challenge is substantial.

### Parent-to-child HIV transmission

**Terminology:** HIV can get transmitted during pregnancy, during the process of giving birth, and via breastfeeding from mother to baby. HIV infection has a considerable stigma in the society, and these terms may be considered further stigmatizing as they mention mother but not the father. The first prong of preventing infection to babies is to prevent infection in their mothers who often receive HIV from their husbands. Therefore, in India, the NACP adopted the term parent-to-child transmission (PTCT) in place of MTCT. PPTCT has therefore a component to minimize the spread of HIV from HIV-positive man to HIV-negative woman (a sero-discordant couple). The term PPTCT does not fixate blame and stigma to mother. The term PPTCT is both gender-sensitive and gender-responsive.

### Barriers to uptake of PPTCT services

For PPTCT program to succeed, it becomes imperative to know the barriers for PPTCT and navigate these barriers. Persistent fear, stigma, and denial act as barriers, dissuading women from undergoing HIV testing. Delay in HIV diagnosis leads to delay linkage to ART services. Starting and adhering to triple-drug ART decreases HIV transmission risk from mother to child (MTCT) by reducing the mother's viral load (VL) during pregnancy, labor, and lactation<sup>[13–15]</sup> After a HIV is diagnosed, it is critical to promptly connect to HIV services, engage, and retain patients in treatment, and start complying up on ART.<sup>[16–18]</sup> In the critical postnatal period, insufficient service provision is a contributing factor to the low rates of maternal retention and undermines PPTCT efforts, which creates a barrier to care and follow-up for both infants and mothers. Addressing these service gaps is essential for ensuring comprehensive PPTCT and promoting long-term maternal and child health. Populations living in hard-to-reach areas are a challenge to the healthcare system as these geographical barriers limit access to essential services and timely interventions. Establishing a robust supply chain is crucial for ensuring the availability and accessibility of ART and PPTCT resources. A well-managed supply chain involves efficient procurement, storage, distribution, and logistics to guarantee a continuous and reliable flow of ARV medications, diagnostics, and related commodities, ultimately supporting the successful implementation of ART and PPTCT programs in healthcare systems. Weak health systems hinder the effective implementation of PPTCT programs by limiting access to essential services, timely interventions, and comprehensive

care, thereby impeding efforts to reduce the vertical transmission of HIV. Inadequate infrastructure, insufficient trained personnel, and limited resources contribute to the barrier, compromising the success of PPTCT initiatives in regions with weak health systems.<sup>[6,19]</sup> Travel challenges during and after pregnancy pose barriers to accessing PPTCT services, limiting pregnant women's ability to attend prenatal check-up appointments, receive timely interventions, and adhere to follow-up care. Stigma and discrimination significantly hinder the success of PPTCT programs by deterring pregnant women from seeking HIV testing and treatment. Fear of judgment and social ostracism may lead to reluctance in accessing PPTCT services.<sup>[20,21]</sup>

### Research, strategies, and interventions for HIV vertical transmission

India is committed to achieving the goal of preventing the vertical transmission of HIV and syphilis, that is, elimination of vertical transmission of HIV and syphilis (EVTHS), assuring that all children are born HIV-free, and promoting the health of mothers. The following targets have been established for EVTHS's validation-related process indicators<sup>[22]</sup>:

1. More than 95% of all estimated pregnant women are enrolled in prenatal care programs and receive at least one prenatal care check-up;
2. more than 95% of all estimated pregnant women have an HIV test; and
3. more than 95% of all pregnant women with HIV are receiving ART.

Under the National EVTHS programme, the four broad elements integral are identified for halting the transmission of HIV in women and children. These include the following

Prong 1: Primary prevention of HIV, especially among women of childbearing age

Prong 2: Prevention of unintended pregnancies among women living with HIV

Prong 3: Prevention of HIV transmission from pregnant women infected with HIV to their children

Prong 4: Provide care, support, and treatment to women living with HIV and to their children and families.

Regardless of CD4 level or clinical stage, all pregnant women with HIV, including those who are in labor and lactation, are initiated on a lifelong triple-drug ART under NACP. The Treat All strategy is being used to stop MTCT. For HIV-positive women who are pregnant or nursing, the NACP advises a triple ART regimen. Tenofovir (TDF), lamivudine (3TC), and dolutegravir (DTG) (TLD) make up the regimen. The risk of perinatal HIV transmission was considerably decreased by a lower maternal HIV VL following ART combined with ARV prophylaxis among newborns exposed to HIV.<sup>[5]</sup> HEIs undergo a range of care, encompassing immediate care at birth, feeding of infant, administering ARV prophylaxis, cotrimoxazole prophylaxis (CPT), childhood immunization,

supplementation with vitamin A, growth monitoring, monitoring of developmental milestones, EID, and services for follow-up.<sup>[9]</sup> If HIV gets transmitted to newborn babies, the illness advances swiftly in many young children, particularly during the initial months of life, frequently resulting in mortality in the absence of confirmed HIV diagnosis and ART.

The WHO has suggested global implementation of EID of HIV and treatment among infants infected with HIV. The Government of India started implementing EID through the NACP in 2010 and has been scaled up subsequently. EID is based upon HIV testing at age of 6 weeks and onward by DNA polymerase chain reaction (PCR), so that ART can be started early. The National AIDS Control Organization (NACO) has set up a network comprising seven Regional Reference Laboratories (RRL) to which peripheral Integrated Counseling and Testing Centers (ICTCs) are linked where infants are reported for giving sample of dried blood spot for molecular testing. After establishing confirmed HIV diagnosis among these babies, they are linked with ART.

The current standard treatment for HIV infection among children prescribes triple-drug ARV medications to suppress viral replication. The selection of medications is contingent on how old the child is and the body weight. Currently, the preferred nucleoside reverse transcriptase inhibitor (NRTI) is abacavir (ABC) for initiating treatment in children under 10 years old and with a body weight below 30 kg. For all children whose age is  $\geq 10$  years and body weight  $> 30$  kg, the recommended ARV for initiation is tenofovir (TDF). Triple-drug ARV medications for children less than aged 6 years and with a body weight below 20 kg, the prescribed combination includes abacavir, lamivudine, and lopinavir/ritonavir (AL+LPV/r). The recommended regimen for children who are 6–10 years of age with a body weight ranging from 20 to 30 kg is abacavir, lamivudine, and dolutegravir (ALD). Older children, aged  $> 10$  years, with a body weight  $> 30$  kg are prescribed tenofovir, lamivudine, and dolutegravir (TLD)<sup>[5,23]</sup>

Without health care, over one-third of infants with HIV do not live into infancy, and almost half of HIV-positive children pass away before turning two. Administering suitable ARV prophylaxis to HEI will diminish the likelihood of HIV transmission during labor, intrapartum period, and the lactation period. One of the main risk factors for HIV transmission during pregnancy is a high HIV VL in the final trimester. Consequently, it is recommended that VL test be conducted for all pregnant women who are HIV-positive between 32 and 36 weeks of pregnancy, irrespective of the ART duration. Infants whose mothers had a suppressed VL (less than 1000 copies/ml), tested anytime between 32 weeks of pregnancy and delivery, are categorized as low-risk infants. For infants at low risk, the choice of ARV includes syrup nevirapine (NVP) or syrup zidovudine (if NVP is deemed ineffective). ARV prophylaxis is initiated after birth and continued until the infant reaches 6 weeks of age.



HIV-positive mothers who are not on ART, whose VL is not suppressed from 32 weeks of pregnancy until birth, or whose HIV status is identified within 6 weeks of delivery, infants born to such mothers are considered to have high risk. High-risk infants are prescribed a dual ARV regimen, combining NVP and syrup zidovudine. The dual ARV prophylaxis is given from birth to 6 weeks of age in the case of exclusive replacement feeding (ERF). The recommended dual ARV prophylaxis is indicated from birth until the infant reaches 12 weeks of age if exclusive breastfeeding (EBF) is followed.<sup>[24]</sup>

Commonly used antibody-based blood tests have had trouble diagnosing HIV infection in infants delivered to HIV-positive mothers. Among offspring born to mothers with HIV, it poses a challenge to determine whether these antibodies are of maternal origin received by baby during delivery or breastfeeding or these antibodies are developed by the baby because of acquisition of HIV infection. In this scenario, the HIV diagnosis is confirmed after 18 months of age till vanishing of maternal HIV antibodies. Therefore, detection of virus with the help of molecular diagnostic technique is confirmatory and more reliable in such cases for earlier diagnosis at the age of 6 weeks and onward. With diagnosis being available earlier, HIV-positive infants can now be diagnosed as early as 6 weeks rather than 18 months which means that initiating treatment early is also an option for HIV-positive children. There is global evidence that conducting EID and promptly commencing ART play a crucial role in significantly reducing HIV-related morbidity and mortality.<sup>[5]</sup>

To effectively lower the rate of HIV transmission to less than 5%, PPTCT efforts around the world have shifted in recent years from administering NVP (a single dosage) to both the mother and the infant to using multiple ARVs. It has been demonstrated that giving ART and sd-NVP/Sy NVP to mother-child pairings can effectively reduce MTCT to as low as 10%. Although the use of sd-NVP at the onset of the intrapartum period considerably lowers the pre-partum HIV transmission, it is not as effective as other ARV prophylactic approaches. Notably, sd-NVP does not offer protection against the risk of HIV transmission, while a woman is pregnant or nursing. Additionally, there is a chance that NVP resistance and possible cross-resistance to efavirenz (NNRTIs) will develop. Taking these factors into account, WHO (2010) suggested two more effective regimens, Option A and Option B, to further reduce the risk of vertical HIV transmission. Since September 2012, India has gradually implemented the Option B+ method, which offers lifelong multidrug ART to all pregnant women with HIV, irrespective of their CD4 status. Subsequently, NACP implemented the test and Treat All approach, which involves starting ART for all HIV-positive individuals, regardless of their CD4 count. The primary goal of the ART Center is to offer individuals living with HIV/AIDS (PLHIV) a comprehensive package of care, support, and treatment services.<sup>[25,26]</sup>

As per the WHO guidelines, every infant born to HIV-positive mothers should be administered ARV drugs as a preventive

strategy to bring down PMTCT of HIV.<sup>[6]</sup> The NACO guidelines recommend engaging in breastfeeding alongside simultaneous ARV intervention for HIV-exposed infants in India which offers greatest chance of living a life without HIV. This is in concurrence with the WHO guidelines<sup>[5,27]</sup> Hence, it is recommended to EBF all HIV-exposed infants until their age is 6 months. At 6 months of age, introducing complementary foods and continued breastfeeding are advised.<sup>[5]</sup> Pregnant mothers should be informed about alternate infant feeding choices, (EBF or ERF), outlining their benefits and drawbacks in comparison with breastfeeding, since breastfeeding carries a risk of HIV transmission.<sup>[5]</sup> The knowledge that maternal ART also reduces the risk of postnatal HIV transmission when mixed feeding is taken into consideration could reassure mothers in circumstances where EBF is not practical due to factors, such as maternal mortality, illness, or having twins. The risk of HIV transmission is increased by mixed feeding and should be avoided. ART to the mother and ARV prophylaxis to the baby makes breastfeeding safe.<sup>[5]</sup> Do not stop Breast-feeding abruptly.<sup>[9]</sup> NACP recommends lifelong ART (TLD is the preferred regimen) for all pregnant and breastfeeding women living with HIV with a 'Fixed Drug Combination (FDC)' regardless of CD4 count or clinical stage.<sup>[5]</sup> The cessation of breastfeeding should occur once the child can be provided with a diet that is nutritionally adequate and safe and not relying on breastmilk. Breastfeeding for at least 12 months and up to 24 months is advised for mothers living with HIV. Strong support is necessary during this prolonged lactation phase to ensure adherence to ART. Consideration for ERF is appropriate solely in circumstances where breastfeeding is not feasible due to maternal sickness or death, having twins, or based on the individual mother's choice but this choice should only be taken if all the requirements for replacement feeding are satisfied i.e. AFASS conditions are met (A – Affordable F – Feasible A – Acceptable S – Sustainable S – Safe).<sup>[5,9]</sup>

In the US and Europe, the risk of perinatal HIV transmission has been reduced to 1% or less through the use of HIV medications and other strategies. The majority of HIV-positive pregnant women can give birth vaginally. A planned cesarean delivery, also known as a C-section, can lower the risk of perinatal HIV transmission if the mother has a high viral load (more than 1,000 copies/mL) or an unknown viral load close to the time of delivery. The risk of perinatal transmission of HIV is reduced to < 1% when the viral load is undetectable during pregnancy and throughout the period of lactation. As an alternative, pasteurized donor human milk from a milk bank and appropriately prepared formula remove the possibility of HIV transmission to a baby after birth. Furthermore, infants shouldn't consume food that has been previously chewed by an HIV-positive individual.<sup>[28]</sup>

According to Debnath D *et al.*'s<sup>[29]</sup> study published in 2013, among 222 pregnancies, HIV testing was not conducted in 74.3% (165) of cases. Of the 30 pregnancies (13.5%) where mothers tested positive for HIV, only 50%<sup>[15]</sup> received PPTCT. The study additionally revealed that among the

27 pregnancies where mothers initially tested negative for HIV, one child (3.7%) was born HIV-positive. Subsequent testing identified the mother of this HIV-positive child as HIV-positive. This discovery carries significant implications. The occurrence of initially negative HIV test results during pregnancy followed by later positive results might be attributed to the mother being in the window period during the initial testing or acquiring HIV infection in the later stages of pregnancy. Consequently, the study recommends a dual voluntary HIV testing approach for all pregnant women, with the second test being advised in the later stages of pregnancy to enhance detection accuracy. Additionally, a rapid test kit may be used to do voluntary HIV testing during labor, together with pre-test and post-test counseling, if an HIV test was not performed during pregnancy and a woman arrives in labor.<sup>[29]</sup> According to the study, 100% of pregnant women should get tested for HIV at the ICTC, and 100% of mothers and children should receive PPTCT. To drastically lower the vertical transmission of HIV infection, this all-encompassing strategy is essential.<sup>[29]</sup>

In their 2023 publication, Kamble S *et al.*<sup>[12]</sup> underscored the challenges in accessing, ensuring timeliness, and retaining individuals in the HIV testing cascade within India's EID services. This study represents the inaugural nationwide evaluation of EID services. The findings emphasized that the universality of access to EID services across healthcare facilities was not yet realized, with the HIV testing accessibility rate being reported at 78% for infants exposed to HIV. Merely 50% of infants undergoing the test received it within the recommended 8 weeks, categorized as "early" diagnosis, and over a third of them were lost to follow-up. The study underscores the imperative for universal testing among pregnant women. The National Health Mission (NHM) plays a pivotal role in maternal healthcare provision. The NACP and NHM need to work together to improve their synergies in order to improve coverage and testing. Interestingly, the study found that one in five babies had trouble getting HIV testing, even among pregnant women with HIV who were known to the NACP.

The study findings of Potty R S *et al.*<sup>[30]</sup> suggest that age of the mothers above 30 years and continuing breastfeeding their child more than 26 weeks were associated with increased rates of vertical transmission. Only 67.8% of the initially recorded live births could be traced at 18 months, according to Mukherjee S *et al.*'s research,<sup>[31]</sup> which analyzed a cohort of live births exposed to HIV. Of those who were discovered alive, 71.3% were able to undergo testing, and 18.6% of them tested positive for HIV. This emphasizes how important and difficult it is to provide PPTCT services, with the most important component being the tracking of infants exposed to HIV. The success of the program hinges on obtaining HIV test results for these HEIs.

### **Factors and social context affecting vertical transmission of HIV and the approach**

The NACP in India has implemented measures to reduce the

rates of vertical HIV transmission. A comprehensive, integrated approach that includes family planning, HIV services for all individuals and families impacted by HIV, and mother and child health is required to achieve the objective of eliminating podiatric HIV. It is imperative that women with HIV have access to high-quality healthcare services so they can make educated decisions about when to give birth.<sup>[32]</sup> There are four prongs of prevention of MTCT of HIV namely:

- a. Primary prevention-preventing HIV infection in women: Predominant route of HIV transmission to women is heterosexual route, and often, the exposure is through husbands. HIV-positive men may or may not share their HIV status with their spouses. Although the HIV Act now allows healthcare providers to share results of PLHIVs with their partners, the societal gender norms and HIV-related stigma often delay the spousal communication posing the vulnerable spouse to HIV infection. Men living with HIV who access ART need to be counseled for disclosure to their partners, use of barrier contraception, and periodic testing of their partners for HIV. Women can prevent HIV infection by careful selection of partner, condom use if spouse is investigated as HIV-positive, or has known high-risk behavior, refusing to share needles, and eliminating risky sexual behavior (such as anal intercourse).<sup>[33]</sup>
- b. Preventing unintended pregnancies in HIV-positive women: The prevalence of unwanted pregnancies among women living with HIV is concerning.<sup>[34]</sup> Patriarchy, gender inequities are at the root of domestic violence which limits contraceptive use.<sup>[35]</sup> Gender norms also consider fertility central to existence of women, and preference for male child pushes them to more pregnancies which the women do not want but are forced upon. Review of African studies found that nearly half of the pregnancies among women living with HIV are unintended and a study from India found similar pattern. Deficient provisioning of family planning services accentuates the pregnancy risk. Integrating family planning services at the ART center for women living with HIV is an important step.<sup>[36-38]</sup> Some HIV-positive women had been using some kind of contraception at the time of conception, and the majority reported that their most recent pregnancies were unplanned.<sup>[39-43]</sup> Concurrent use of implants and efavirenz reduces the effectiveness of contraception, according to available clinical evidence; however, implants are still more successful in preventing pregnancy than most other hormonal contraceptive techniques.<sup>[43]</sup>
- c. Preventing the vertical transmission of HIV: For prevention of transmission to baby, it is essential that the diagnosis of HIV and initiation on ART happens early in pregnancy and that the adherence to treatment among pregnant women remains good. Systematic reviews reiterate stigma as a prominent barrier at the community level.<sup>[44,45]</sup> Access to healthcare services is often limited by patriarchy-determined restrictions on autonomy and

depriving women of decision-making power. Fear of disclosure and lack of social support were factors that limited access to treatment; spousal involvement in treatment was found to be beneficial but uncommon. Access is also negatively influenced by deficits on the supply side both due to lack of decentralization forcing women to travel large distances, often beyond their districts for availing HIV care and the staff attitudes reinforcing stigma and discrimination. Following the identification of pregnant women with HIV, the PPTCT guidelines and infant feeding guidelines for the prevention of vertical transmission of HIV from mother to child must be followed, as there is substantial evidence of the effectiveness of ARV medication. This will significantly reduce perinatal MTCT. ART needs to be given during the antenatal period, during delivery, and in the early postnatal and breastfeeding period. These treatment practice patterns are frequently restricted in poor nations due to severe shortages of medical experts. a) There is growing evidence that assigning community healthcare workers to handle primary care and preventative duties might enhance population health outcomes at a fair cost.<sup>[46]</sup> When ART was provided by community health professionals, the clinical results were comparable to those of standard, professionally driven health care.<sup>[47]</sup> All pregnant and lactating women with HIV should get lifelong ART (triple medication regimen), irrespective of their clinical stage of illness according to WHO or their CD4 count. TDF + 3TC + DTG (TLD) is the recommended regimen.<sup>[5]</sup> In high-income countries, women with more than 400 HIV RNA copies/ml at the time of delivery may be eligible for cesarean section<sup>[48,49]</sup> to lower the risk of intrapartum HIV transmission.<sup>[48-51]</sup>

- d. Providing HIV-positive women, their children, and their families with care, support, and treatment: Infant feeding is crucial to infant survival but the best food, breastfeeding poses risk of transmission. The risk is substantially minimized with the use of ARV by nursing mothers. However, both use of ARV and EBF are determined by social and health system factors.<sup>[52]</sup> Social support and positive coping assist in better nutrition for the baby. Access to diagnostics and treatment for infants exposed to HIV is also limited by both societal factors and health system factors in India.<sup>[32,53]</sup>

To summarize, there are both community-level factors and health system-level factors that affect service delivery for each of the four prongs. Therefore, interventions are needed on both fronts especially the stigma reduction measures and structural approaches, such as decentralization and women-centric services.<sup>[54]</sup>

### **IAPSM position**

Despite efforts made, the vertical transmission of HIV continues to pose a substantial public health challenge. This position paper outlines comprehensive strategies and

interventions across healthcare system, and individual and community levels to mitigate the risks and bring down the vertical transmission of HIV.

### **Healthcare system-level interventions**

#### **A. Preventing HIV infection (primary prevention):**

The healthcare system plays a pivotal role in primary prevention of HIV transmission risks through counseling services for both adolescents and adults. Healthcare providers can inform people about the dangers of HIV transmission and encourage preventative behaviors by offering easily accessible and thorough counseling services. Healthcare providers must set up special sessions on safe lifestyle practices in schools and colleges. These sessions should cover topics, such as lowering the risk of HIV transmission, addressing HIV-related stigma and discrimination in society, and showing empathy for adults and children living with HIV. In particular, the healthcare system's adolescent health clinics are essential venues for providing focused interventions. These clinics can establish secure settings where adolescents can get age-appropriate HIV prevention information, assistance, and counseling. These clinics might also provide services, including confidential HIV testing, instruction on safe behaviors, and advice on strategies to reduce risk for HIV prevention. All things considered, the healthcare system can play a significant role in raising awareness, educating the public, and implementing preventive measures to stop the spread of HIV among adults and adolescents by providing counseling and education services, as well as by bolstering specialized women's and adolescent health clinics.

#### **B. Healthcare system support for careful planning of pregnancies and preventing unintended pregnancies:**

Through the implementation of numerous policies and interventions, the healthcare system must play a critical role in preventing unwanted pregnancies among women living with HIV. First and foremost, medical professionals must provide complete family planning services that are customized to meet the requirements of women living with HIV. Primary health center (PHC) medical officers and other healthcare professionals must receive training on how to advise patients about safe, effective contraception that is compatible with ART. Giving HIV-positive women access to a variety of contraceptive options enables them to make knowledgeable family planning decisions. Additionally, regular HIV testing and counseling in family welfare clinics can reinforce the connection between HIV care and family planning services by offering a window of opportunity to address family planning requirements. This covers advice regarding fertility goals, the use of dual protection benefit methods (such as condoms) to avoid HIV transmission and unwanted births, and the significance of using contraceptives correctly and consistently. In addition to improving the general health of women living with HIV, putting these strategies into practice helps reduce the risk of vertical transmission. Their children's health will improve as a result. Healthcare professionals who get regular training and education are guaranteed to remain current on



the most recent recommendations and best practices for preventing unwanted pregnancies in the setting of HIV. To effectively address the reproductive health requirements of HIV-positive women and advance their general health and well-being, the healthcare system must adopt a thorough and integrated strategy.

### C. Reducing the vertical transmission of HIV:

To safeguard infants from HIV transmission from infected mothers, a comprehensive and coordinated approach within the healthcare system is crucial. Medical officers and healthcare providers of PHCs and secondary as well as tertiary levels of health care play a pivotal role. Efforts are required to be directed toward achieving over 99% of all estimated pregnant women are registered early before 12 weeks of gestation for antenatal care. The vital components are provision of adequate antenatal care check-up and treatment with nationwide coverage >99% of pregnant women for voluntary testing of HIV and for testing syphilis and hepatitis B and achieving that >99% of all HIV-positive pregnant women are on ART. The healthcare provider needs to offer twice voluntary testing for HIV during the pregnancy, in which the second test for HIV is advised in late pregnancy. Further, if an HIV test was not conducted during pregnancy and woman presents in labor, voluntary HIV testing needs to be conducted during labor. It is advisable to adhere to the recent guidelines as updated from time to time by NACO and WHO, as extensively detailed in the section on Strategies, Interventions for Vertical Transmission of HIV, and Research. For women who are pregnant or breastfeeding, not considering their CD4 count or WHO clinical stage, lifelong ART should be given with the preferred regimen of tenofovir (TDF), lamivudine (3TC), and dolutegravir (DTG) (TLD) or as per the latest recommendation. Promotion of institutional delivery of HIV-positive women is an important component. Reduced maternal HIV VL after ART in addition to ARV prophylaxis among HEIs significantly reduces the likelihood of vertical transmission.

Pregnant mothers should be informed about the infant feeding choices (EBF or ERF), outlining their benefits and drawbacks. Mothers may consider EBF for all HIV-exposed infants until the age of 6 months. At the 6 months age, introducing complementary foods and continued breastfeeding for at least 12 months and up to 24 months for mothers living with HIV is advised. HEI receives various types of care and services which includes immediate care of newborn at birth, proper infant feeding advice to mother guided by trained healthcare provider, tracking the child and providing ARV prophylaxis as per guidelines, cotrimoxazole prophylaxis therapy (CPT) as indicated, 100% immunization coverage, vitamin A supplementation, growth monitoring, checking for any development delays, EID, and follow-up services. Appropriate ARV prophylaxis for HEI will reduce the risk of HIV transmission during labor, delivery, and the lactation period. The mother's HIV VL in the third trimester of pregnancy is one of the primary risk factors for HIV transmission during labor, delivery, and lactation. Therefore, regardless of the length of ART, all pregnant women with HIV should have access to VL

testing between weeks 32 and 36 of their pregnancy. Low-risk babies are those born to mothers who have a suppressed VL  $\leq$  (1000 copies/ml) at any point after 32 weeks of pregnancy till delivery. NVP or syrup zidovudine (if NVP is not thought to be effective) are the ARV options for these low-risk infants. After birth, ARV prophylaxis is started and lasts for 6 weeks. Infants born to HIV-positive mothers who have not received ARV medication (ART), who have not suppressed their VL from 32 weeks of pregnancy until birth, or who have been diagnosed with HIV within 6 weeks of delivery are considered high-risk. The dual option for ARV is administered as a mix of syrup zidovudine and NVP for these high-risk infants. Decision on infant feeding practices by the mother needs to be taken carefully with full information provided by the healthcare provider to the mother regarding the risk benefits of type of feeding choices. In case of ERF, this dual ARV prophylaxis is provided from birth till 6 weeks of age. In case of EBF, the dual ARV prophylaxis is recommended from birth till 12 weeks of age.

With the availability of earlier diagnosis, HIV-positive infants can now be identified as early as 6 weeks, rather than waiting until 18 months. This early detection allows for the initiation of treatment in HIV-infected children at an earlier stage. Evidence from around the world shows that EID and starting ART early can greatly reduce HIV-related morbidity and mortality. EID is based upon HIV DNA PCR testing at 6 weeks of age and onward, so that ART can be started early. After establishing confirmed HIV diagnosis among these babies, they need to be linked with ART. The current standard treatment for HIV infection among children prescribes triple-drug ARV medications to suppress viral replication which have been discussed in the section Strategies, Interventions for Vertical transmission of HIV and Research.

The coordination between the NACP and the NHM is vital to strengthen this multi-faceted approach and enhance the effectiveness of preventing vertical transmission of HIV. It is necessary to track the pregnant mother for providing PPTCT range of services throughout pregnancy, intrapartum period. Following delivery, tracking both the mother with her newborn is a challenging but very essential task. Addressing transportation difficulties during and after pregnancy is crucial for ensuring continuity of care and improving the effectiveness of PPTCT programs in promoting maternal and child health. Ensuring 100% immunization coverage to the child is vital. Ensuring accessibility to healthcare facilities, especially in hilly, underserved, and difficult-to-reach areas is difficult since these geographical barriers can hinder regular clinic visits and obtaining prescribed medications. Mobile clinics with ICTC facility, trained doctors, and healthcare workers for providing ART can be of immense benefit to the community so that the continuum of care is maintained across hard-to-reach populations. Beyond medical care, the healthcare system also needs to address psychosocial needs by offering counseling and support services to help cope with the emotional challenges associated with HIV.

Strategies to overcome barriers to ART medication adherence, such as stigma and lack of social support, need to be addressed for ensuring treatment success. The healthcare provider should ensure a medication adherence of >95%. Medication reminders can increase the medication adherence. Innovative strategies can be developed which address the issues faced by PLHIV and CLHIV to acquire the ART medications and then adhere to the prescribed regimen.

Collaboration between the NACP and other healthcare initiatives for maternal and child health is required for strengthening the overall response to HIV, fostering coordination, resource-sharing, and a more holistic approach to care.

In summary, the healthcare system's role in providing medical care to HIV-positive women and their families involves a continuum of care, from antenatal services, intrapartum care, after delivery care and pediatric care, addressing the unique needs of each individual woman and her family affected by HIV.

### *Individual level*

Ensuring a careful selection of a partner is of paramount importance in the prevention of HIV transmission within a relationship. Open communication becomes a crucial aspect, especially if either partner is living with HIV. In such cases, where the husband is infected and wife is not infected by HIV, it is essential for the husband to inform his wife about his HIV status, fostering trust and enabling informed decisions. Consistent condom use is advisable, particularly if either partner is HIV-positive or has a history of sexually transmitted infections (STIs), or engages in high-risk behavior. Refraining from sharing needles is a vital precautionary measure to prevent HIV transmission among couples, especially those involved in substance use. Ultimately, couples should collectively strive to eliminate risky sexual behaviors, embracing a collaborative approach to safeguard their sexual health and well-being. Careful planning of pregnancies and prevention of unintended pregnancies in HIV-positive women is a vital component. Overcoming stigma, seeking, and engaging with family welfare services is a critical step in preventing unintended pregnancies among HIV-positive women and, consequently, reducing the risk of vertical transmission of HIV. Overcoming societal barriers related to stigma and discrimination is difficult but very important and by seeking family welfare services, HIV-positive women can access comprehensive information about various contraceptive options, empowering them to make informed choices to prevent unintended pregnancies. This proactive approach not only safeguards the well-being of the mother but also significantly contributes to the broader strategy of reducing the likelihood of vertical transmission, thereby enhancing the overall health outcomes for both mothers living with HIV and their children. The HIV-positive pregnant woman should seek antenatal care services and adhere to the prescribed ARV regimen during the antenatal period, intrapartum, and post-delivery, as advised by the

medical officer/healthcare provider. Lack of social support can exacerbate feelings of isolation, making adherence challenging. It is vital to overcome the barriers to medication adherence and addressing issues, such as stigma and discrimination that may result in reluctance to take medications openly. Seeking financial support for transportation or loss of wages can help mitigate these obstacles. Furthermore, active engagement with healthcare providers is essential in the decision-making process regarding infant feeding options. Seeking necessary support and guidance ensures that the best-suited infant feeding choices are made. Additionally, adherence to EID of HIV infection and adherence to PPTCT guidelines, as advised by healthcare providers, is critical in caring for the infant. By addressing these various aspects, a holistic approach is taken to support HIV-positive women, their children, and families, promoting optimal health outcomes and effectively managing the complexities associated with HIV care and prevention. Health-seeking behavior is an essential component in providing a comprehensive care to women who are HIV-infected and their families. Fostering a health-conscious environment for her children involves routine healthcare visits, vaccinations, and adherence to preventive measures. Extending support to the spouse in adopting health-seeking behavior is equally crucial, emphasizing regular screenings and preventive measures to safeguard their own health, prolong life, continuing occupation, and thus maintaining the overall economic support for the family. Education and awareness play key roles in instilling a culture of health consciousness, empowering each family member to actively participate in their healthcare journey.

### *Community-level intervention*

Community-level interventions to prevent HIV infection in women involve targeted initiatives aimed at raising awareness regarding the prevention of HIV transmission and addressing high-risk behaviors, especially among adolescents and young adults. These initiatives often include community awareness campaigns, educational programs, and outreach efforts designed to inform individuals about safe practices, the importance of HIV testing and knowing HIV status of self, and methods to reduce risky behaviors. Community-based organizations and local health services can play a crucial role in organizing workshops, distributing informational materials, and conducting awareness sessions to empower adolescents and young adults with the knowledge needed to make informed decisions about their sexual and reproductive health. By fostering a culture of openness, understanding, and empowerment, these interventions contribute to building a resilient community that actively engages in preventing new HIV infections among women and promoting overall public health.

Community-level interventions to prevent unintended pregnancies in women go beyond conventional family planning methods and include efforts to address the unique challenges faced by HIV-positive women. These interventions focus on reducing stigma and discrimination, creating an environment that encourages health-seeking



behavior among HIV-positive women. A crucial aspect is the provision of need-based support to pregnant women, extending through intrapartum and the postnatal period. This support may manifest in various forms, including ensuring adequate nutrition, offering transportation for healthcare visits, and actively working to eliminate stigma and discrimination affecting HIV-positive women and their families. Nutrition counseling and psychosocial support are integrated components of these interventions, promoting overall well-being and empowering women to make informed choices about family planning while navigating the complexities of living with HIV. By fostering a supportive community environment, these interventions aim to enhance the quality of care and positively impact the reproductive health outcomes of women living with HIV.

Interventions at the community level play a vital role in averting the HIV transmission from infected mother to their children, focusing on comprehensive strategies that address various aspects of maternal and child health. These interventions often involve raising awareness within the community about the importance of early antenatal care, HIV testing during pregnancy, and adherence to ART by pregnant women. Neighbors, relatives, and the community can play a key role in promoting institutional delivery, and encouraging regular health check-ups. Additionally, community-based initiatives may offer support to HIV-positive mothers, addressing challenges, such as stigma and discrimination, and providing essential resources, such as transportation for healthcare visits. By fostering a supportive community environment, these interventions can contribute to the success of PPTCT programs, ensuring that both mothers and infants receive the necessary care and support to lead healthy lives in the context of HIV.

Community-level initiatives targeting the care, support, and treatment of women living with HIV and their families involve a range of pivotal strategies. A fundamental element involves fostering community support to create a stigma and discrimination-free environment for HIV-positive women, their children, and families. This can be achieved through community awareness campaigns, educational programs, and initiatives that promote empathy and understanding. By engaging the community, individuals are encouraged to challenge stigmatizing attitudes and provide a supportive atmosphere for those affected by HIV. Moreover, nutritional support is a critical aspect which can be addressed through collaborations with non-governmental organizations (NGOs). These organizations can play a crucial role in providing vital nutritional support to women living with HIV and their families, particularly when it is required. Access to proper nutrition is vital for the overall health and well-being of both mothers and children affected by HIV. By partnering with NGOs, community-level interventions can ensure that HIV-positive individuals receive the necessary support to maintain good health, adhere to treatment plans, and enhance their overall quality of life.

This position paper emphasizes the importance of a multi-faceted approach to prevent vertical transmission of HIV, addressing the healthcare system, individual, and the community. By implementing these strategies, we can contribute to the broader goal of creating a healthier and HIV-free generation. The collaboration of healthcare systems, individuals, and communities is paramount in achieving this vision.

### Author contributions

D.J.D. conceptualized the study, wrote concept note, edited the article, and revised the first draft of the position paper; D.J.D., S.K., and N.G. involved in content addition to the first draft; D.J.D., S.K.R., S.K., N.G. M.T., P.G., and S.S.J. reviewed the position paper.

[Note: These guidelines, formulated by experts with considerations for feasibility, are broad recommendations that serve as advisories. They are founded on expert opinions and existing scientific evidence. Individual patient management may vary based on the specific condition, and such decisions should be made by the treating physician. It is important to note that there is no indemnity for direct or indirect consequences arising from the implementation of these guidelines.]

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There are no conflicts of interest.

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