Dissatisfactory Measures for the Prevention of Vertical Transmission of Human Immunodeficiency Virus in Resource-Limited Settings

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Despite vast improvements in the Prevention of Mother-to-Child Transmission of Human immunodeficiency virus (HIV) measures, the current efforts for eliminating the vertical transmission of HIV in most developing countries, especially African nations, are inadequate and dissatisfactory. HIV-1, first recognized in 1982, has had an immense impact on economies, life expectancies, number of orphans worldwide and the impact of secondary epidemic infections, such as Tuberculosis, in the world. Mother-to-child transmission (MTCT) is the vertical transmission of HIV from a mother to her child during pregnancy, during birth or succeeding birth through breastfeeding. In 2008, an alarming 430,000 children were infected with HIV, 90% of whom contracted the virus through MTCT and 50% of whom will die before they are two years of age (Cohen et al. 2008). This figure could have been reduced to below 20,000 infections if current preventative strategies, such as antiretroviral therapy, were provided to more pregnant women and neonates living in isolated areas at cost or free of charge, cultural and social obstacles to prevention of MTCT through infant feeding practices and the lack of participation of male partners in interventions were challenged through education, more people were made aware of available PMTCT services, counselling sessions were more effective and the spread of HIV was reduced in the general population by universal access to antiretroviral therapy, determining one’s status and other measures. Therefore, national and global commitments to better the current interventions need to be made to all those areas to see a further reduction in paediatric HIV cases in resource-poor settings.

HIV-1 killed 2.1 million people in 2007, estimated to have killed 25 million people since it’s discovery and is currently estimated to infect more than 33 million people worldwide (Sharif and Noroozi 2010), the majority of whom reside in Africa (Cohen et al. 2008). Sub-Saharan Africa alone, with 10% of the world's population is home to 60% of all HIV infected individuals (Chen et al. 2007). The rates of HIV infection in women of childbearing age strongly correlate with paediatric HIV cases so both issues need to be confronted simultaneously to be able to measure a decline in the rates of vertical transmission of HIV. Women in general, are more biologically susceptible to acquiring HIV infection; it has been demonstrated that 57% of HIV infections occur in women (Raisler and Cohn 2005), which is also exasperated by gender inequalities, economic dependence, lack of education and absence of power in sexual relationships (Israel and Kroeger 2003). Other studies have
established that up to 37% of pregnant women are HIV positive in some parts of Africa, such as Botswana (Raisler and Cohn 2005). Infants can acquire HIV from their infected mothers in a number of ways. Some methods of transmission include the infection of the fetus through infected amniotic fluid, contact with vaginal secretions during delivery and contact with the mother’s blood at the time of birth. Without intervention, the rate of MTCT could be as high as 20-45%, but it has been demonstrated to be less than 2% in developed countries with appropriate interventions (WHO 2010 report, PMCTC Strategic Vision 2010-2015).

The most essential element of Prevention of Mother-to-Child transmission of HIV (PMTCT) services includes the dispensing of antiretrovirals to the HIV-positive mother, child, or both. HIV transmission from mother-to-child is significantly impaired by the administration of antiretroviral therapy (ART) to the expecting mother. One option is to provide one dose of the antiretroviral, nevirapine (200 mg), a nonnucleoside reverse transcriptase inhibitor, to the mother at onset of labour and to provide a single dose within 3 days to the neonate, resulting in a low MCTC rate of 2%, as also demonstrated in developed countries, if breast feeding is avoided (which can also result in MTCT). This regime costs about $4.00 US per pregnancy in most low-income countries (Sherman et al 2004). The inclusion of a short course of zidovudine, another antiretroviral drug, at 28 weeks gestation, followed by nevirapine at labour further reduces the risk of MTCT (Chalermchockcharoenkit et al. 2009), although this regimen is more costly. Not all HIV infected pregnant women who require ART actually have access to them and despite challenges, there is no justification for why coverage should not be made available to all HIV-positive pregnant women to reduce the number of children born unnecessarily with HIV each year. MTCT is further reduced if ARV’s are provided to treat the mother’s infection for her own health as well, as demonstrated by the Drug Resource Enhancement against AIDS and Malnutrition (DREAM) program (Paintsil and Andiman 2009).

The annual cost of treating HIV is typically around $150 in low income countries (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector), so PMTCT strategies are a much more cost-effective method of tackling HIV mortality and transmission rates. But these medicines are not always universally attainable in resource-poor settings, especially African nations, where it has been illustrated that in some areas, only 15% of clinics actually provided all of the essential components of PMTCT services (Mbonye et al. 2010) which include short term ART. And in 2008, 34% of developing countries reporting running out of antiretrovirals at least once in that year (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector), despite the importance of obtaining these drugs within a specific time frame to prevent MTCT.

Furthermore, studies have demonstrated that despite improvements to universal access of ART, the majority of individuals who require medicines for HIV are unable to attain it, which includes infected pregnant women. In 2004, only 10% of pregnant HIV-positive women were receiving antiretrovirals (ARV’s) in low- and middle-income countries to assist
in the prevention MTCT. This number fortunately grew to 45% by 2008 (WHO 2010 report, PMCTC Strategic Vision 2010-2015) which is a significant improvement. Nevertheless, that still leaves over 50% of children at risk of contracting this virus from their mothers. This could be exasperated by the fact that nevirapine and zidovudine have been patented in 24 and 17 out of 53 African countries (Attaran and Gillespie-White 2001), respectively, including South Africa, where up to 28% of pregnant women can be HIV-positive (Raisler and Cohn 2005) which could have further hindered access to these essential antiretrovirals to prevent MTCT. In 2001, the United Nations General Assembly’s goals were that 80% of HIV infected pregnant women accessing antenatal care should be provided with ART (WHO 2010 report, PMCTC Strategic Vision 2010-2015). However, in 2007, only 12% of pregnant women who tested positive for HIV were followed up on to assure that antiretroviral therapy is received in Sub-Saharan Africa, where the majority of infections reside (Chen et al. 2007). Improvements have been made since 2007 but very few African countries to date have achieved the UN General Assembly’s goal of 80% coverage of ART to HIV infected pregnant women (Millennium Development Goals 2009 report).

And although the statement made by the United Nations General Assembly is very reassuring, one obstacle confronting that goal is that many women living in poverty in Africa and other resource poor settings do not give birth at clinics and do not receive antenatal care, so would not be included in that 80% coverage. For example, in sub-Saharan Africa, it has been shown that 54% of women do not give birth at a clinic or hospital (Raisler and Cohn 2005) and many do no receive antenatal care (Patel et al. 2004). A study in South Africa by Peltzer et al. showed that the majority of pregnant women would be forced to walk to the nearest hospital or clinic if in need of assistance, which was at least 1 hour away in most cases, and that 85% of the women either could not afford the fare for the bus or were not satisfied with public transport and taxi services (2007). The same study demonstrated that only 1 out of 3 families actually had any knowledge of PMTCT services so nevirapine or other ARV’s should be distributed to women living in hard to reach settings, their families or their traditional birth attendants to be able to meet the goals set in 2001 by the UN General Assembly. Furthermore, more needs to be done by the governments of endemic countries to bring HIV diagnostic tools to infected pregnant women who are not able to afford the transportation to clinics, for those who do not receive antenatal care for cultural, social or economic reasons and to those who live in rural areas and are not familiar with services that can protect their child.

Additionally, following birth, HIV-negative children can acquire HIV from their mothers through infected breast milk. Breast feeding without ART for the mother or child poses a risk of 5-20% of MTCT (Raisler and Cohn 2005). One obvious way to bypass this tragedy is to avoid breastfeeding altogether, although women in resource limited settings and those who live in culturally sensitive areas concerning infant feeding practices can face major challenges. As the cost of formula is an obvious obstacle when avoiding breastfeeding, free formula was distributed to HIV-positive mothers for a short period of time in some clinics by The United Nations Children’s Fund (UNICEF). Unfortunately, in 2003, UNICEF suspended its free formula program in PMCTC clinics of 8 countries after observing that inadequate amounts of formula, delayed deliveries and the lack of running water lead mothers to practice
Mix feeding behaviour, which puts the child at a higher risk of MTCT than exclusive breastfeeding would have (Raisler and Cohn 2005). So for mothers who are unable to afford formula or the refrigeration, clean water, fuel and accessories needed to safely prepare the formula for the child, it has been suggested that exclusive breastfeeding is the next best method, even though it does pose some risk of MTCT if it is not practised in combination with ART. But The World Health Organization’s (WHO) guidelines that either exclusive breastfeeding during the first 6 months in conjunction with ART or complete cessation of all breast feeding be followed (Saloojee and Cooper 2010), both require access to resources that are not attainable by many families living in poverty. The logic behind exclusive breastfeeding is that greater HIV specific antiviral interferon-gamma responses were observed in HIV-uninfected children exclusively breastfed by HIV-positive mothers which resulted in lower rates of HIV infection. Mix-feeding (both breast milk and solids) is discouraged as gastrointestinal inflammation resulting from the solid can increase the chances of HIV transmission to the infant (Payne et al. 2009). As exclusive formula feeding will not be a suitable option for those living in poverty and those who are living in culturally sensitive settings where breast feeding is the norm, the option of offering mothers ART or the infants ART prophylaxis is essential to reduce MTCT rates when exclusive breastfeeding is practiced. This would include having the child remain on daily nevirapine until breast feeding ceases, or for women who received highly active antiretroviral therapy (HAART) during pregnancy, continuing to do so until breast feeding ceases. Breast milk is also a source of nutrition and protection against other fatal and common childhood diseases (Kuhn et al. 2008) and exclusively formula fed HIV-negative infants may suffer higher mortality rates from other diseases (Shapiro and Lockman 2010). But in 2008, only 35% of breast fed infants of HIV infected mothers were receiving prophylaxis (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector), so many of these infants continue being exposed to HIV with no form of medical protection, on a daily basis, long after birth.

Furthermore, current PMTCT programs, which incorporate a counselling component such as the advice of nurses and lay peer counsellors (Saloojee and Cooper 2010), need to be dramatically improved. These sessions are meant to provide information about the disease, the risk associated with MTCT and preventative measures that can be practised prior to and following birth, such as ART and infant feeding behaviours. But this regimen has not always demonstrated to be effective in resource poor settings, despite the fact that they constitute such a vital component of PMTCT services. For instance, a study in South Africa exposed that fewer than half of the mothers stopped exclusive breastfeeding by 6 months of age as recommended (Goga et al. 2009). The unaffordability of formula could be a reason for their decision but a study in Botswana, Kenya, Malawi and Uganda showed that fewer than 50% of counselling sessions even involved commenting on infant-feeding options for HIV infected mothers and that up to 70% of counsellors were unable to correctly recall the transmission rate of HIV due to breastfeeding, whether training in PMTCT was received or not (Chopra and Rollins 2008).
Thus, these counsellors, who can play such a vital role in the reduction of MTCT, need to be further educated on a regular basis to be able to retain existing information and to obtain information on the newest strategies concerning preventative measures. Other contributing factors to their lack of influence could include the fact that there are severe shortages of health care workers and human resources in developing countries, especially in African countries, where the salary and conditions, and therefore the motivation to be as efficient and effective as possible, can be low (McCoy et al. 2008) and health care worker’s migration to wealthier countries is now a normal occurrence (Kuehn 2007). Additionally, there is general discrimination towards people living with HIV/AIDS and even health care workers are hesitant to treat infected patients due to the scarcity of protective gloves, goggles, sharps containers, and impermeable gowns that have resulted in the risk of contracting HIV even higher for health care workers than the general population in some countries. Furthermore, it is exceedingly difficult to obtain any privacy for counselling sessions in the hospitals and clinics of resource limited areas due to overcrowding and the lack of physical space (Raisler and Cohn 2005), which can reduce the quality and effectiveness of counselling sessions so the privacy and comfort of those participating in the PMTCT should be improved to be able to notice a greater success rate from these programs.

In addition, cultural factors can have a considerable impact on the compliance of PMTCT strategies. For instance, it has been observed that women are more prone to adopting the instruction of nurses and counsellors following these sessions when they receive support and encouragement from their partner and family members, so cultural beliefs discouraging male participation in pregnancy has reduced the uptake of PMTCT strategies (Raisler and Cohn 2005). Moreover, cultural factors can prevent the implementation of ruling out breast feeding for HIV infected mothers even if ART is not accessible. One study demonstrated that although economic factors contributed to the ability of being able to follow the advice provided by counsellors, mothers first considered other factors, such as the exposure of their HIV status due to their infant-feeding practices (Desclaux and Alfieri 2009) to avoid discrimination and the violation of cultural norms regarding breastfeeding (Fletcher et al. 2008). These barriers can only be overcome through educating not only those infected by HIV/AIDS, but also the general population who can contribute to greater suffering by infected individuals by assigning stereotypes and discriminating against those who test positive and those who do not practice rigid cultural rituals due to their status.

And again, the discrimination towards people living with HIV/AIDS can also discourage a woman to determine her status for the sake of her unborn child. But the number of pregnant women tested for HIV needs to dramatically increase, as only 21% of pregnant women in low- and middle-income countries were tested for HIV in 2008 (WHO 2010 report, PMCTC Strategic Vision 2010-2015), a major improvement from previous years, but still inadequate to identify all HIV-pregnant women for ART prior to delivery, as more than half of HIV-infected individuals in the world are unaware of the fact that they are HIV-positive (WHO 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector). Reasons contributing to this figure could be due to the fear of determining one’s status, especially when ART would not be attainable by the individual even if they do test positive, the degree of confidentiality of the results, the lack of education about the
disease and the lack of knowledge concerning services that can provide HIV testing and treatment. Other women have indicated that they expect the progression of disease to be worse if they are aware of their status and some have refused to participate in PMTCT services, such as HIV testing, if there is no ART provided to them for their own health (Peltzer et al. 2007), if they are in fact HIV-positive. Another study by the WHO in 2008 showed that only 15% of infants born to HIV-infected mothers were tested for HIV in the first 8 weeks of life in developing countries (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector) and that only 38% of children received paediatric antiretroviral therapy when in need (WHO 2009), which could again be due to the discrimination that follows disclosure (Wong et al. 2009), when accessing HIV treatment and HIV testing.

Moreover, to see a further decline in MTCT cases, WHO suggests that unintended pregnancies should be avoided in HIV infected women and that extra attention should be focused on this issue to prevent new HIV infections in women of child bearing age. In 2007, 69% of people (5 million HIV positive individuals) who needed treatment for HIV did not have access to the ART (The Millennium Development Goals 2009), even though the Millennium Development Goal, number 6, states that universal access to ART should be provided to all those who need them by 2010. And only 2% of those on ART were on second line drugs (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector), which although more expensive since the majority are still patented, can prove to be more effective in patients undergoing therapy for a number of years who develop resistance to the more accessible first line drugs who’s prices have declined due to generic competition. This is an important issue relating to the prevention of new infections as ART reduces the viral load in the body and slows the sexual transmission of this virus (Attia et al. 2009), to women of child bearing age through infected males. The practice of male circumcision has also demonstrated a 60% reduction of HIV transmission from women to men through sexual contact (Williams et al. 2006), which can eventually result in a decline of new female infections. Other means of reducing the infection rates of women is to provide clean needles to injecting drug users and to assess the safety of blood banks in developing countries. Only 30 countries reported providing clean syringes and needles to users in 2008, which is far below the recommended quantity required to keep them safe from contracting HIV. And in 2008, 25% of all countries were unable to screen all blood donated for at least one transfusion-transmissible infection, including HIV (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector) which contributes to further spread of HIV in the population and will greatly affect the more susceptible female population and their children. Measures to halt the transmission of HIV in the world will also significantly improve the quality of life of millions of people who will be able to become productive individuals, paying taxes and contributing to their society. Efforts by the G8, the European Commission, other donor governments, the World Bank, UNITAID, the Bill & Melinda Gates Foundation and the William J. Clinton Foundation towards HIV relief are applauded but the reality is that there is still at least $6 billion US needed to be able to reach everyone in need of HIV related treatment and assistance (WHO Progress Report 2009: Towards universal access: scaling up priority HIV/AIDS interventions in the health sector), when not considering other barriers such as conflict and social factors.
The Millennium development goal, number 4, states that a reduction of $\frac{2}{3}$ in under-5 child mortality is aimed for by 2015 (WHO 2010 report, PMCTC Strategic Vision 2010-2015), which includes the 193,500 HIV positive children infected in 2008 who are expected to die by 2010. To be able to observe a dramatic decline in paediatric HIV and therefore, child mortality, efforts to bring ART to women in rural and urban areas, more effective counselling practices, greater involvement of males in PMTCT services, education about available services and infant-feeding practices, greater confidentiality of HIV test results and further efforts to reduce new HIV infections in the general public by treating those who are currently infected and by other methods, will need to be implemented with greater global and national commitments made to assist in the prevention of mother-to-child-transmission of HIV in resource-limited settings.
References


