

Embracing a family-centred response to the HIV/AIDS epidemic for the elimination of pediatric AIDS

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There are 2.1 million children under the age of 15 living with HIV/AIDS, and 290,000 children died of AIDS in 2007. Despite recent increases in the number of adults on antiretroviral therapy (ART), the number of children receiving treatment remains inappropriately small, and prevention of mother to child transmission (PMTCT) efforts have been grossly inadequate. In sub-Saharan Africa, 14% of those in need of treatment are children, but only 6% of those are receiving treatment. Globally, only 23% of HIV-positive pregnant women have access to PMTCT programmes, which led to 420,000 new pediatric infections last year. Countries with comprehensive, integrated family-centred care programmes are better equipped to prevent and treat pediatric HIV/AIDS. True family-centred care offers prompt maternal and pediatric HIV diagnosis, antiretroviral prophylaxis, cotrimoxazole prophylaxis, and long-term ART for the entire family, as appropriate. Simple child health interventions, prompt treatment of opportunistic infections, nutritional supplementation and infant replacement feeding, as well as malaria treatment and prevention have been proven to synergistically improve pediatric HIV care and increase service uptake. To eliminate pediatric HIV/AIDS, national governments must embrace family-centred care, implement pediatric-friendly infrastructure, and train healthcare workers to treat children.

Keywords: family-centred care; pediatric HIV/AIDS; PMTCT

Introduction

The world is well aware of the ravages of the AIDS epidemic. The direct effect of the disease on the world's children, however, has been neglected by the media and, more importantly, the world's governments. There are 2.1 million children under the age of 15 living with HIV/AIDS, and 290,000 children died of AIDS in 2007. Despite recent increases in the number of adults on antiretroviral therapy (ART), the number of children receiving treatment remains inappropriately small, especially given the scale of the pediatric problem in comparison to adult AIDS cases. Whereas children represent just 8% of all people infected with HIV/AIDS, they constitute 17% of new infections and 16% of all AIDS-related deaths (WHO/UNAIDS 2007a). Regrettably, of the approximately two million people currently on ART, only 127,300 of these are children. In addition, prevention of mother to child transmission (PMTCT) efforts to eliminate pediatric AIDS have been grossly inadequate in developing countries.

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Nearly all children in developed countries benefit from PMTCT efforts, while over three out of four children in developing countries do not (UNICEF 2008). Gender inequalities and poor access to women's health services in many countries contribute to the failure to enrol more pregnant women in PMTCT programmes. One thousand children die every day in developing countries as a result of this entirely preventable disease. In sub-Saharan Africa, where almost all HIV-positive children live, children represent 14% of those in need of treatment, but they are only 6% of those currently receiving ART (WHO/UNAIDS 2007b).

Previously, the dearth of pediatric drug formulations was the largest hurdle to the widespread treatment of children. With the advent of pediatric triple therapy combination drugs, national governments' lack of political will and reluctance to commit financial resources are the principal reasons for the failure to successfully combat pediatric AIDS. As a result of this double standard for children, only 15% of the global need of pediatric AIDS treatment is being met, as compared to 28% of the global need of adult AIDS (WHO/UNAIDS 2007b). In the current global paradigm, the proportion of new infections that are children and the proportion of deaths due to AIDS that are children increased from 2006 to 2007 (WHO/UNAIDS 2007a, 2007b).

However, new models of service delivery now ensure that prevention efforts are emphasised, along with pediatric treatment, in a cost-effective illustration of multidisciplinary care. Family-centred care, which offers HIV/AIDS prevention, testing, care, and treatment to the whole family at one location, has been shown to increase case finding of women and children, and also increases treatment service uptake. The research demonstrates that national programmes that adopt free, family-centred care have the greatest chance of reaching populations in need and ensuring long-term treatment compliance (Sherer *et al.* 2002, Braitstein *et al.* 2006). The bundled package of services decreases vertical transmission, reduces infant AIDS mortality and decreases malnutrition while increasing uptake of testing and treatment for HIV-positive mothers (George *et al.* 2007, Okubamichael *et al.* 2007). Family-centred programmes are able to locate infections at earlier disease stages and decrease AIDS-related morbidity for all members of the family (El-Sadr *et al.* 2004, Violari *et al.* 2007). Family-centred care can also function as the service delivery mechanism for basic healthcare services that have been previously unavailable to women and children in many developing countries. Developing country programmes that have successfully prevented and treated pediatric AIDS utilise a family-centred model of care where the family, not the individual, is the unit requiring medical and social interventions (Nogueira *et al.* 2001). To eliminate pediatric AIDS globally, national family-centred programmes should be the gold standard for the prevention and treatment of HIV/AIDS in countries with generalised epidemics.

Rationale for a family-centred response

In order to reach the 780,000 children in need of ART, treatment programmes must embrace a more holistic approach. The pediatric AIDS epidemic has continued unchecked in developing countries, in part because segmented service delivery attempts to address problems within the epidemic separately. The current service delivery model in most developing countries' programmes includes clinics that

specialise only in one aspect, such as PMTCT, adult AIDS treatment, pediatric AIDS treatment, or maternal and child health (MCH) services. Additionally, pediatric ART and PMTCT services are often only available at urban tertiary care centres.

Family-focused programmes integrate comprehensive HIV/AIDS services within the broader framework of the primary healthcare system. Families in developed countries have better access to services than family-centred care would provide, such as MCH services, adequate nutrition, and good healthcare in general. Many families in developing countries lack access to any of these services, and national programmes must decentralise their delivery to increase access. Ultimately, family-centred programmes may benefit all families in developing countries, regardless of HIV status, by bundling comprehensive health services at primary care clinics.

A minimum package of services is required for comprehensive family-centred care. In one location, family-centred care offers prompt maternal and pediatric HIV diagnosis, antiretroviral (ARV) prophylaxis, opportunistic infection prophylaxis, long-term ART for the entire family, nutritional supplementation, and optimal infant feeding support. Complete care of the family should also include psychosocial support and community-based support groups. Offering simple child health interventions, prompt treatment of opportunistic infections, and even malaria prevention and treatment will improve pediatric HIV care and likely increase service uptake as a result. Truly family-focused care should also offer MCH interventions for women, such as antenatal care, sexual and reproductive health services, voluntary counselling and testing, and PMTCT services at the same site. MCH services for children, such as routine vaccinations, integrated management of childhood illness, and micronutrient supplementation should also be part of family-centred programmes. WHO, UNICEF, and UNAIDS recommend that, at a minimum, family-centred programmes should include PMTCT, ART, improved case finding and diagnosis of HIV-positive women and children, family planning, and optimal infant feeding support (WHO/UNAIDS 2007b). Now, the challenge is that the governments of the world must act to achieve these recommendations.

The efficacy of segregated treatment programmes in the absence of family-centred care is questionable at best. Some programmes offer PMTCT services to a mother without the capability to diagnose the infant until 18 months of age, even though 40% of infected infants die before this age (Newell *et al.* 2004). Globally, 11% of HIV-positive mothers received ARVs for PMTCT prophylaxis in 2005, but only 8% of HIV-exposed infants received ARV prophylaxis (Office of Global AIDS Coordinator 2008). This means that there are tens of thousands of mothers enrolled in PMTCT programmes whose infants are not receiving ARV prophylaxis and demonstrates the failure of stand-alone PMTCT programmes to reach children. In many PMTCT programmes, HIV-positive mothers are not assured that they can get ART when the time comes. This may affect their willingness to get tested (dePaoli *et al.* 2004, Sripipatana *et al.* 2007) and has also contributed to the large number of AIDS orphans, as parents die without treatment. In addition, many treatment programmes counsel mothers on family planning and infant feeding practices, but do not distribute methods of family planning and do not provide a safe replacement formula. Unfortunately, counselling is only as valuable as a family's financial and social capacity to apply the recommended interventions.

As more adults receive ART, and children are left behind, the proportion of children's deaths due to AIDS actually increased in the last year, from 13 to 17% (WHO/UNAIDS 2007a, 2007b). Pediatric treatment, or even strong linkages to pediatric treatment services, is not available in many PMTCT or adult ART programmes. PMTCT-plus programmes often offer ART to enrolled mothers and their infants but do not provide testing or treatment to older siblings. PMTCT-plus programmes often do not include reproductive and sexual health services, MCH services, and other basic healthcare services that are necessary to treat families living with chronic illness. Since many of these basic healthcare services are not widely available in developing countries, women and children living with HIV are key target populations with whom governments can begin rolling out these services.

Clinical trials on the efficacy of complete family-centred care versus segmented delivery of only ART or PMTCT are virtually non-existent. Research suggests that for children on ART having at least one parent on ART may be protective against mortality for the child (Reddi *et al.* 2007). However, most research has been confined to proving that individual interventions that comprise family-centred programmes decrease vertical transmission or pediatric AIDS mortality (Krasovec 1991, Cooper *et al.* 2002, Villamor *et al.* 2002, Chintu *et al.* 2004, dePaoli *et al.* 2004, Mermin *et al.* 2006, Bolton-Moore *et al.* 2007, Walker *et al.* 2007). In the same way that adding individually proven medications to a heart failure treatment regimen improves survival, this article will argue that combining each additional family-centred intervention decreases vertical transmission and pediatric AIDS mortality. Since each intervention is independently validated, programmes that do not offer these services are not truly family-centred, and are not doing enough for their patients.

Decentralising family-centred services

The key to successful implementation of family-centred programmes is increasing access by decentralising care and training more healthcare workers in pediatric care. In order to extend access to all families, developing countries need larger numbers of healthcare workers than there are doctors and nurses available. Cadres of community health care workers must, therefore, be trained to recognise opportunistic infections and malnutrition in children, and other possible signs of HIV within families. Zambia has had success in treating children without doctors by training nurses and physician assistants in pediatric clinical HIV care (Bolton-Moore *et al.* 2007).

Family-centred programmes that provide PMTCT services and ART, combined with strong linkages to child health services, drastically increase case identification and reduce treatment lag time (Okubamichael *et al.* 2007). Almost half of HIV-positive children who present to treatment clinics are already severely ill (George *et al.* 2007), and half of all HIV-positive children in Africa die undiagnosed and untreated before their second birthdays (Newell *et al.* 2004). In addition, many of the largest pediatric AIDS cohort studies have a median age of five years (Bolton-Moore *et al.* 2007; Bong *et al.* 2007, Reddi *et al.* 2007). These figures indicate a failure of the current developing country healthcare systems to identify at-risk children and diagnose HIV-positive children so that treatment may be initiated before serious illness occurs. Research demonstrates that mortality is reduced 75% when ART is started before 12 weeks of age (Violari *et al.* 2007). In order to achieve this, aspects

that family-centred care can deliver, such as stronger programmatic linkages, and earlier case identification and treatment initiation are required.

Testing families

In order to treat families, case finding and diagnosis of families living with HIV through family-based testing programmes must improve. Much like existing tuberculosis-control programmes, the diagnosis of HIV in one family member should be an automatic indication for testing of the entire family. In contrast, where testing is not offered as part of family-centred services, 58% of the older siblings of a new infant in stand-alone PMTCT programmes were not tested for their HIV status (Khan 2007a).

Family-centred programmes should also include a focus on women's health and diagnosing HIV in mothers, as soon as possible, through routine HIV screening. In previous studies, 70% of women in India (Khan 2007a) and 82% in Swaziland (Khan 2007b) were first tested during antenatal care. Since women are most often tested during antenatal care, offering PMTCT services at the same site would serve as an entry point for HIV care and would likely increase PMTCT service uptake. A study in Lesotho found that initiating routine testing in a family-focused setting increased the number of women tested, from 22 to 95%, in less than a year. Furthermore, the number of women started on ART doubled, and the lag time for receiving treatment decreased from nearly two months to less than two weeks (Okubamichael *et al.* 2007). In addition, offering long-term ART to PMTCT programme participants and their children increases the acceptability of testing (dePaoli *et al.* 2004, Sripipatana *et al.* 2007). Offering ART and PMTCT services at a single site, therefore, not only decreases AIDS mortality but also enhances prevention efforts through early case recognition of HIV-positive women.

Family-based programmes must also be equipped to diagnose infants under 18 months of age because of the high mortality in younger children. Viral diagnostic tests, such as DNA or RNA polymerase chain reaction (PCR), can diagnose children at six weeks of age, instead of traditional antibody tests that cannot definitively diagnose HIV in infants until they reach approximately 18 months. Dried blood spot (DBS) samples on filter paper can be sent to regional laboratories for virological testing. DBS sampling extends infant testing capabilities to primary care clinics in rural areas without the expense of purchasing multiple sets of diagnostic equipment or training of local personnel. Programmes cannot be considered complete family-centred care without the capability to send DBS samples to regional laboratories for rapid diagnosis of HIV-exposed children. This is in contrast to stand-alone PMTCT services or ART centres that may not have any linkages to laboratories with viral diagnostic capabilities and must send HIV-exposed children to specialised centres which may increase loss to follow up and mortality. Studies have shown that infant survival improves with early detection of paediatric HIV, and that is only possible when viral diagnostic testing is used (Berk *et al.* 2005, Violari *et al.* 2007). Unfortunately, most developing countries do not have virological testing and DBS sampling nationally, and they fail to reach children outside of large urban areas. Countries with complete viral diagnostic infrastructures, such as Botswana and Thailand, notably have stronger family-based paediatric treatment programmes.

Prevention of mother to child transmission (PMTCT)

While treating HIV-positive children, the ultimate goal has to be the elimination of pediatric HIV through early case finding of HIV-positive women and comprehensive PMTCT. PMTCT programmes provide the first point of entry for diagnosis, treatment, and care of children living with HIV. The current expansion of PMTCT and ART programmes offers a tremendous opportunity to implement single-site, family-centred clinics from the ground up.

The proportion of new infections that are children actually increased last year, from 12 to 16%, which demonstrates the current failure to reach families with PMTCT services (UNICEF 2007, WHO/UNAIDS 2007a). According to UNICEF, widespread, effective PMTCT programmes will prevent 315,000 pediatric infections annually (Walker 2004). However, only 10% of HIV-positive pregnant women globally, and 6% in sub-Saharan Africa have access to PMTCT programmes (UNICEF 2007), a shortfall that led to 420,000 new pediatric infections last year (WHO/UNAIDS 2007a). This shows an appalling lack of action by the global health community, especially given that short ARV courses can cut transmission rates by 40% and extended prophylactic courses of ARVs can lower transmission to less than 2% (DeCock *et al.* 2000, Cooper *et al.* 2002). Fortunately, hopeful examples of rapid expansion of PMTCT coverages do exist. Botswana went from 12% coverage of mothers with ARV prophylaxis to 95% in only two years, resulting in a drop in transmission rates from 35 to only 4% (Office of Global AIDS Coordinator 2008).

To increase PMTCT services enrolment, widespread family-focused programmes should also include comprehensive women's health services. Family-centred care that bundles PMTCT with testing and HIV care has been shown to improve rates of service utilisation (Sherer *et al.* 2002). Multidisciplinary approaches to PMTCT that include education, HIV care, and sexual and reproductive health services have demonstrated ARV prophylaxis compliance rates of over 93% (Nogueira *et al.* 2001). Multinational studies have demonstrated that among family-based PMTCT programme participants, one third of women enrol a partner and two thirds enrol a child, and morbidity was decreased as most enrolled at earlier disease stages (El-Sadr *et al.* 2004). This demonstrates that family-centred PMTCT services provide an entry point to HIV care for all members of a family, including men. Men have been considered difficult to reach in a family-based setting, but they must be involved if families are to overcome stigma and receive treatment together.

Family-centred PMTCT programmes can play a significant role in improving women's health by providing basic women's health interventions that were previously unavailable. Offering family planning decreases the number of unintended pregnancies and, therefore, rates of vertical HIV transmission. Implementing PMTCT services at antenatal care, MCH or reproductive health centres improves the quality of all types of services offered. For example, sites that added PMTCT services to existing reproductive health programmes noted increased uptake of family planning and sexually transmitted disease (STD) services (Rutenberg *et al.* 2003, Potter *et al.* 2007).

Opportunistic infection prophylaxis for families

Family-centred programmes could save many more lives by distributing the cheap and effective antibiotic cotrimoxazole. All children born to HIV-positive mothers

should receive cotrimoxazole for prophylaxis against opportunistic infections as part of HIV care, or until they are proven HIV-free. Because of better case finding of families living with HIV, family-centred clinics are able to locate HIV-exposed children earlier, so they can receive cotrimoxazole sooner. Given in this fashion, cotrimoxazole prophylaxis can reduce mortality by up to 50% at an average cost of just \$3–5 per child per year (Chintu *et al.* 2004, Walker *et al.* 2007). Moreover, it is also an effective prophylaxis against malarial coinfections (Mermin *et al.* 2005) and can actually decrease malaria transmission within families with several HIV-positive members (Mermin *et al.* 2005, Mermin *et al.* 2006). Furthermore, as part of family-centred PMTCT, giving cotrimoxazole prophylaxis to HIV-positive women during pregnancy has been shown to significantly reduce preterm deliveries, neonatal mortality, and clinical chorionamnionitis in women (Walter *et al.* 2006).

Unfortunately, only 4% of children in need are receiving this lifesaving antibiotic (UNICEF 2007), and this failure contributes to approximately 250,000 child deaths annually (Chintu *et al.* 2004). Cotrimoxazole benefits the entire family living with HIV, and more members of the family have access to it through family-centred programmes than through piecemeal PMTCT services, and adult and pediatric treatment programmes that have failed to reach millions in need up to now.

Nutritional support

Nutrition can be as important as medication for families living with HIV, and family-focused programmes have an obligation to ensure adequate nutrition for both pregnant women and their children. The World Food Programme recommends that nutrition and food assistance be integrated into family-centred care, but so far, few have heeded the call. Programmes that do provide nutritional assistance to families have shown lower rates of loss to follow up, demonstrating that the intervention is beneficial for treatment as well as nutritional status (Nash *et al.* 2008). HIV-positive women living in poverty frequently have poor nutritional status, which is further eroded by maternal HIV infection, numerous pregnancies, and subsequent breastfeeding (Krasovec 1991). HIV has been associated with nutritional deficits and weight loss, and malnutrition has been associated with reduced survival in HIV-positive children (Walker *et al.* 2006, Bong *et al.* 2007, WHO 2007). Research has shown that growth is significantly retarded, and disease progression is more rapid without additional nutritional support (Becquet *et al.* 2006). When ART is given along with nutritional supplementation, malnourished children have shown significant weight gains (George *et al.* 2007). Other simple interventions, such as quarterly vitamin A supplementation, reduce diarrheal episodes by as much as 92% and significantly reduce all cause mortality (Villamor *et al.* 2002). Nutritional support must be provided for HIV-positive children if they are to grow into healthy adults, and, at a cost of only 73 cents per patient per day, it is a cost-effective intervention (World Food Programme 2006).

Optimal infant feeding support is another aspect of prevention that is a basic requirement of family-focused programmes. In order to decrease postpartum transmission, WHO and UNICEF recommend exclusive breastfeeding for the first six months of life, unless replacement feeding is 'affordable, feasible, acceptable, sustainable, and safe' (WHO 2006a). Infant feeding practices is an extremely complex issue, and a complete discussion of it is beyond the scope of this article. In

the many areas where it is not yet possible to provide secure access to replacement formula, family-centred programmes could counsel mothers to exclusively breast-feed for the first six months of life. However, Thailand, Brazil, Senegal, and Botswana successfully provide replacement formula to all infants enrolled in national PMTCT programmes and demonstrate that it is feasible in resource-poor settings. While infants can best be protected by counselling for exclusive breast-feeding until national programmes are fully implemented, the ultimate policy goal must be universal access to safe and sustainable exclusive replacement formula for all children of HIV-positive mothers.

Family-centred programmes are ideally suited to distribute nutritional and optimal feeding support to women and their children. Food security and proper nutrition are issues that affect the entire family and, therefore, should be addressed from that perspective. Family-focused programmes can ensure the transition from replacement formula to nutritional support that may not be possible in strictly PMTCT programmes, whose role ends soon after birth. As infants progress to eating solid food, there is also a continuity of counselling services, from optimal feeding support to nutritional services. Furthermore, independent pediatric treatment programmes can neglect the mother that is HIV-positive and in need of nutritional support. In addition, many pediatric HIV care programmes do not distribute micronutrient supplementation because it may be considered a 'child health' intervention that is outside their scope of work. By combining PMTCT programmes, HIV care, and MCH nutritional services, women and children will have better access to more complete nutritional support.

Challenges to family-centred services

There are significant obstacles to global scale-up of family-centred services. Comprehensive services are considerably more expensive than simply providing ART to individuals of a family. Even the minimum set of services that WHO and UNICEF recommend is more expensive than the sole provision of ART. However, most funding spent on family-centred HIV care could double as MCH, sexual and reproductive health, or integrated management of childhood illness funding. In addition, there have been substantial increases in AIDS funding recently, and it is likely that more will become available as donor countries increase their focus on global health.

Implementing the wide array of family-centred services will be impossible without massive expansion of the healthcare infrastructure in many developing countries. Millions of healthcare workers will need to be trained in pediatric care, and hospitals and clinics will have to be expanded. In rural areas, primary care clinics may need to augment their laboratory and diagnostic capabilities and staff more personnel. Expanding infrastructure and human resources will improve general health services in developing countries, and the AIDS epidemic can provide the incentive for improvements that have not yet been made. Ultimately, infrastructural obstacles can be overcome by a political and financial commitment by both donor and developing national governments to implement the necessary changes.

Family-centred models might still fail to reach certain populations with all services. Children orphaned by AIDS, who are cared for by families that are not living with HIV, may still not be identified and, therefore, will not receive the services

they need. Unmarried men and women without children will also likely not be reached and will still have trouble accessing HIV care and ART services. The fathers of families living with HIV may be difficult to reach with services, especially if the emphasis is placed on the health of women and children. Traditional testing and treatment programmes will have to continue to expand in order to cover those that family-centred programmes cannot reach.

Following the example of non-governmental organisations

Non-governmental organisations (NGOs) have had considerable success when implementing family-centred care, and national programmes should emulate the broad array of services packaged together. NGOs that have not been successful in reaching children cite the lack of healthcare workers trained in pediatrics as the most common reason for failure (DeGennaro 2006).

One NGO, the Haitian Study Group of Kaposi's Sarcoma and Opportunistic Infections (GHESKIO), has been successful in providing family-based HIV care in difficult socio-political conditions in Haiti. The GHESKIO medical team for HIV-positive children seen in clinic consists of pediatricians, a nurse, a psychologist, a pharmacist, and community health workers. The children are transitioned from GHESKIO's PMTCT clinics directly into their pediatric treatment programmes instead of referring them to outside providers. All children received cotrimoxazole, were tested using virological tests, and, when necessary, received nutritional support and tuberculosis treatment. GHESKIO noted a 60% decrease in mortality for those on ART and 93% of patients were still in treatment after three years (George *et al.* 2007).

In order to boost uptake of family-focused PMTCT services, some NGOs, such as Columbia University's International Centre for AIDS Care and Treatment Programmes (ICAP), guarantee participating mothers access to long-term ART. By guaranteeing ART to women in PMTCT clinics, the number of pregnant women on ART doubled, and those receiving cotrimoxazole increased five-fold (Okubamichael *et al.* 2007). Their family-centred programmes offer comprehensive services that include testing, malaria and TB treatment, vaccinations, and nutritional supplementation (Abrams 2007). ICAP's experience also demonstrates that it is possible to offer a wide breadth of services to large numbers of people. More than 166,000 HIV-positive people in Africa and Asia are currently receiving HIV care through ICAP programmes. There are also more than 77,000 people receiving life-saving ART, of which 10% are children under the age of 15 (Nash *et al.* 2007).

Given the overall failure to prevent and treat pediatric AIDS to date, the global health community needs to find innovative new approaches to integrating pediatric treatment services into existing health systems. One example is the Family Planning Association of Kenya, which offers voluntary counselling and testing, PMTCT, and ART at centres that usually provide sexual and reproductive health services (UNAIDS 2006). Another example is ICAP, which is able to decrease loss to follow up among pregnant women and children and streamline care by offering treatment for families through several different entry points: MCH clinics, PMTCT programmes, under-five health clinics, and adult HIV treatment clinics (Costa 2007). In Uganda, the AIDS Support Organisation uses community health workers to deliver HIV treatment along with a host of other preventive health interventions, including

mosquito nets, clean-water tablets, tuberculosis treatment, and cotrimoxazole directly to families' homes (UNICEF 2008).

Mobilising political will in national programmes

Several examples of national scale-up of comprehensive family-centred services exist, but these are unfortunately exceptions to the rule. Once again, the lack of a trained pediatric healthcare workforce limits the capability of national programmes more than any other factor (DeGennaro 2006). While there is no single service delivery model that will work everywhere, poor countries across several continents have had success in implementing different models of family-based national programmes.

National governments that have made the commitment of financial and human resources to family-centred care have had success in dealing with pediatric AIDS, even in countries that previously did not have the infrastructure for basic health services (Nogueira *et al.* 2001, Bolton-Moore *et al.* 2007). These countries demonstrate that a minimum package of family-based HIV services is feasible in resource-poor settings. One successful model of family-centred care in Kenya has pediatricians specially trained in adult HIV care providing treatment for entire families. Another model, in Mozambique, involves weekly conferences with the entire family, a pediatrician, an internist, nurses, and a nutritionist, where they discuss issues regarding treatment compliance and opportunistic infections. In Botswana, 95% of 40,000 women giving birth last year received antenatal care; 95% of women in antenatal clinics were tested for HIV; and 80% of HIV-positive women received ARV prophylaxis (Creek 2006). In Senegal, all women giving birth in government facilities receive long-course ARVs as part of PMTCT. HIV-exposed infants are given short-course ARVs, cotrimoxazole prophylaxis, vitamin A supplements, and all infants are tested using viral diagnostics.

Brazil and Thailand provide the strongest examples of nationwide, family-centred HIV care. In Thailand, 92% of HIV-positive women and 99% of HIV-exposed infants received ARV prophylaxis, and 90% of HIV-exposed infants received replacement formula (Kanshana and Simonds 2002). At least 76% of the infants of HIV-positive mothers were definitively diagnosed, from 2001–2003, as a result of Thailand's extensive viral diagnostic infrastructure (Plipat *et al.* 2007). Brazil has had similar success since the programme's inception, in 1995, with over 7000 children currently on ART. Brazil tests infants with viral diagnostics and provides all infants with replacement formula. Mothers receive prenatal and STD care, and the entire family receives psychosocial counselling (Nogueira *et al.* 2001). As a result of these services, the vertical transmission rate in Brazil has decreased, from 39% in 1996 to 3.7% in 2006, with the goal of achieving 1% by 2008 (Dourado *et al.* 2006). Both of these middle-income countries were able to implement effective family-focused HIV care, despite the fact that there were large areas of both countries where the health systems were inadequate or non-existent. With the provision of basic child health services, partly through HIV care programmes, Brazil has seen a decrease in pediatric AIDS mortality (Matida *et al.* 2004), overall infant mortality, and the proportion of malnourished children (Alcantara and Ribas 2006).

In contrast, India has a large pediatric epidemic – from 120,000 to 300,000 cases. Many Indian states' pediatric treatment programmes do not offer comprehensive pediatric treatment services, and most offer limited services only at independent

pediatric treatment clinics instead of as part of family-centred care. Not surprisingly then, the Indian government has largely failed to prevent, diagnose, and treat pediatric AIDS. India now has plans to place 10,000 children under treatment, but this will only represent 5% of all those in treatment by the end of 2010 (NACO 2006). On the prevention side, less than 4% of HIV-positive mothers are receiving testing and counselling and less than 2% receive ARV prophylaxis to prevent transmission (UNAIDS 2006).

Countries with successful pediatric treatment programmes often have superior PMTCT services and employ more family-centred programmes. As shown in Figure 1, the numbers suggest an association between the provision of PMTCT programmes and ART from a family-based perspective and higher coverage rates, and those countries without family-centred programmes often fail to provide for both. Brazil, Thailand, Botswana, and Cambodia cover over 95% of the children in need of ART, proving that pediatric treatment is feasible in large numbers in developing countries. Brazil and Botswana provide ARVs to more than 50% of HIV-positive mothers for PMTCT, and Thailand provides ARVs for more than 90% (WHO/UNAIDS 2007b). Many of the family-centred PMTCT centres in these countries offer adult and pediatric treatment as well. India and Nigeria, on the other hand, are covering less than 3% of children in need, and less than 2% of HIV-positive women received ARVs for PMTCT last year (WHO/UNAIDS 2007b).

Global financing of family-centred care

Family-centred care provides a new service delivery mechanism that may be more attractive to donor countries, and it may provide an incentive to increase healthcare-earmarked aid to developing countries. The lack of political will from donor governments to holistically address pediatric AIDS contributes to the failure to reach families living with HIV. Large donors, such as the US President's Emergency Plan for AIDS Relief (PEPFAR) and the Global Fund for AIDS, Tuberculosis, and Malaria often separate the streams of funding into PMTCT, and adult and pediatric treatment programmes, preventing more integrated approaches in individual clinics on the ground.

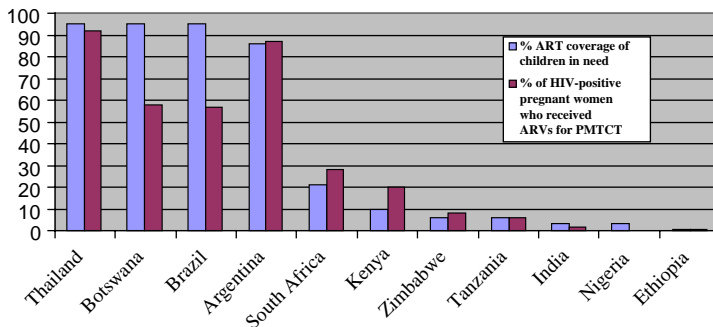


Figure 1. National PMTCT and pediatric treatment.
Sources: WHO/UNAIDS (2007b) and UNAIDS (2006).

The Global Fund for AIDS, Tuberculosis, and Malaria has not done enough to proactively advocate for family-centred care in their grant process. In the most recent round of funding, eight countries applied for, and received, separate PMTCT and pediatric treatment grants. However, the funding might be more efficiently used if these 16 grants were streamlined into eight family-centred grants. Instead of building two separate clinics, and training two sets of personnel for PMTCT and pediatric treatment, combined family-centred grants might enhance the use of available funding to build family-focused infrastructure from the start.

PEPFAR supports family-centred care through programmes such as Columbia University's ICAP, and the Elizabeth Glaser Pediatric AIDS Foundation, but it has been slow to help scale-up comprehensive services in the majority of the national programmes it supports. Most PEPFAR-funded PMTCT clinics do not offer ART to infants born into their programme, their siblings, or the mother, should she require ART after the birth. Families at most PEPFAR-funded PMTCT clinics cannot get family planning, nutritional supplementation, or replacement formula (Office of Global AIDS Coordinator 2008). Mothers and children could be reached simultaneously, and the scale-up of treatment programmes could be accelerated through combined funding streams and infrastructure.

Innovative new funding mechanisms, like UNITAID, are supporting programmes that embody comprehensive family-centred care. With UNITAID funding, the Clinton HIV/AIDS Initiative supplies viral diagnostic testing, first and second-line ARVs, cotrimoxazole, and nutritional supplements at single site clinics. The Clinton HIV/AIDS Initiative intends to support the treatment of 100,000 children in 40 countries by the start of 2008 at a cost of \$50 million (Clinton HIV/AIDS Initiative 2006). UNITAID also recently awarded UNICEF and WHO \$21 million over two years to support the acceleration of family-centred care in eight high HIV-burden countries in Africa and Asia. Funding will support PMTCT services, cotrimoxazole for mothers and infants, reagents for virological testing of infants, CD4 testing of mothers, and ART for mothers and children (UNITAID 2007).

Conclusions

Since HIV can be transmitted between members of a family, the problem can be better addressed from a family-based perspective in countries with generalised epidemics. The Millennium Development Goal to reverse the spread of AIDS does not go far enough and should include calling for the complete elimination of pediatric HIV. Momentum began at the Global Partners Forum in Abuja, Nigeria in December 2005, where partners recognised that mother to child transmission is 99% preventable and called for the elimination of pediatric HIV/AIDS (Global Partners Forum 2005). The WHO has stated that 10–15% of all those on ART should be children (WHO 2006b). UNICEF recently launched the 'Unite for Children, Unite against AIDS' campaign, which calls for the elimination of pediatric AIDS. Bold leadership is needed from international agencies and national governments to echo this call and commit the financial resources to enact these policy goals.

Despite some progress, the likely number of children on treatment will still pale in comparison to the several million adults on treatment at the end of 2008. The proportion of new infections and AIDS deaths that are children actually increased over the last year as a result of the failure of the current service delivery models. To

go to scale with pediatric treatment and prevention, national governments should embrace family-centred programmes and should implement pediatric-friendly infrastructure and human-resource capacity. The most effective way to reach HIV-positive children and also eliminate pediatric HIV infection is to integrate comprehensive family-centred programmes that include PMTCT, ART, MCH, and preventive services for the whole family at primary care clinics. The first necessary step in this fight is mobilising the political and financial will, in all countries, for the elimination of pediatric AIDS.

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