

ORIGINAL RESEARCH ARTICLE

Assessment of Peer-Based and Structural Strategies for Increasing Male Participation in an Antenatal Setting in Lilongwe, Malawi

Steve M. Mphonda*¹, Nora E. Rosenberg^{1,2}, Esmie Kamanga¹, Innocent Mofolo¹, Gertrude Mwale¹, Edson Boa³, Mwawi Mwale³, Francis Martinson^{1,2}, Irving Hoffman^{1,2} and Mina C. Hosseinipour^{1,2}

¹Community facilitator, UNC Project, Tidziwe Centre, 100 Mzimba Road, Kamuzu Central Hospital Private Bag A-104, Lilongwe; ²University of North Carolina, Chapel Hill, NC, USA Lilongwe District Health Office, Lilongwe, Malawi; ³Lilongwe District Health Office, Ministry of Health, Malawi

* **For Correspondence:** E-mail: smphonda@unclilongwe.org; Phone: +265 999 272 759

Abstract

In sub-Saharan Africa, although male involvement in antenatal care is associated with positive outcomes for HIV-infected women and their infants, men rarely accompany female partners. We implemented a project to increase the number of male partners attending an antenatal clinic at Bwaila Hospital in Lilongwe, Malawi. We evaluated changes in the proportion of women who came with a partner over three periods. During period 1 (January 2007 – June 2008) there was didactic peer education. During period 2 (July 2008 – September 2009) a peer-led male-involvement drama was introduced into patient waiting areas. During period 3 (October 2009 – December 2009) changes to clinical infrastructure were introduced to make the clinic more male-friendly. The proportion of women attending ANC with a male partner increased from 0.7% to 5.7% to 10.7% over the three periods. Peer education through drama and male-friendly hospital infrastructure coincided with substantially greater male participation, although further gains are necessary. *Afr J Reprod Health* 2014; 18[2]: 97-104.

Keywords: HIV, antenatal, male involvement, HIV counseling and testing, disclosure, prevention of mother to child transmission, couple

Résumé

En Afrique subsaharienne, bien que la participation des hommes aux soins prénatals soit associée à des résultats positifs pour les femmes atteintes du VIH et leurs nourrissons, les hommes accompagnent rarement les partenaires féminins. Nous avons mené un projet qui vise à augmenter le nombre de partenaires masculins fréquentant une clinique prénatale à l'hôpital Bwaila à Lilongwe, au Malawi. Nous avons évalué les changements dans la proportion de femmes qui sont venues avec un partenaire au cours des trois périodes. Au cours de la période 1 (janvier 2007 - juin 2008) il y avait l'éducation didactique destiné aux pairs. Au cours de la période 2 (juillet 2008 - septembre 2009) une pièce de théâtre qui engageait les hommes et dirigé par les pairs a été introduit dans les zones d'attente des patients. Pendant la période 3 (octobre 2009 - décembre 2009) on a apporté des changements au niveau de l'infrastructure clinique pour rendre la clinique plus respectueuse des hommes. La proportion des femmes fréquentent la CPN avec un partenaire masculin a augmenté de 0,7% à 5,7 % à 10,7 % au cours des trois périodes. L'éducation des pairs à travers le théâtre et l'infrastructure de l'hôpital qui est soucieux des hommes coïncidait avec une plus grande participation des hommes, bien que de nouveaux gains soient nécessaires. *Afr J Reprod Health* 2014; 18[2]: 97-104.

Mots-clés: prénatals, participation des hommes, conseil et dépistage du VIH, divulgation, prévention de la transmission de la mère à l'enfant, couple

Introduction

Mother to child transmission (MTCT) is the second most common form of HIV transmission in sub-Saharan Africa¹ and in Malawi, MTCT accounted for an estimated 16,000 infants being born HIV-positive in 2010². Prevention of mother

to child transmission (PMTCT) of HIV is one important component of antenatal services. Men generally do not participate in antenatal care (ANC) services but they make many crucial health decisions in the family.

Male involvement in PMTCT and other HIV settings has been associated with many positive

outcomes, including increased uptake of interventions to prevent vertical and sexual HIV transmission^{3,4}. Male involvement also facilitates communication about HIV serostatus, thereby reducing one of the major barriers to acceptance of ARV prophylaxis by mothers for themselves and their newborns, as well as encouraging adoption of preventive behaviors within couples to reduce HIV incidence during pregnancy⁵. Additionally, antenatal settings provide an opportunity for testing the whole family for HIV, including male partners. There is evidence of high prevalence of HIV serodiscordance among couples^{6,7}, low rates of disclosure of HIV serostatus by women, particularly in ANC settings^{8,9}, and low rates of male testing in Malawi¹⁰. Thus involving men in ANC could have benefits for the HIV-infected woman, her male partner, and their infant.

In spite of the benefits of involving men, the optimal strategies for recruiting men to ANC settings or involving them in care remain unknown. Giving invitation letters or leaflets to women presenting for ANC¹¹⁻¹³ or to community members who may have family members going to ANC are methods that have been attempted^{14,15}. However, these strategies may not address the perceptions that antenatal services are not for men, and that the antenatal clinic environment is not welcoming¹⁶⁻¹⁸. They also do not involve changes to the infrastructure itself. Noting that male participation in antenatal care in Malawi was low but important, male involvement was promoted and monitored as a component of the PMTCT process at Bwaila Maternity Hospital in Lilongwe, Malawi starting in 2007. The male involvement program sought to address some of the barriers to care through peer education and changes to the design of the antenatal clinic. Peer Education is an approach to health promotion, in which lay persons are supported to promote health-enhancing change among their peers. Peer educators are not professionals, but they are trained to assist people who need health information and services. Peer educators bring information to hard-to-reach groups in a manner that is often perceived as acceptable and understandable. Peer education can be didactic, simply relying on peers to deliver educational messages, or it can be participatory, using creative means and cultural vehicles to

deliver messages in a culturally relevant manner. Changes to infrastructure, such as having rooms for couple counseling, spacious waiting area, toilets for men, and delivery rooms which can accommodate a male partner can make a clinic more male-friendly.

The aim of the project was to increase the number of couples attending antenatal clinic and accessing PMTCT services at Bwaila hospital. The objective of the paper is to describe the nature of the male involvement program and highlight the effects of peer education and a male friendly hospital infrastructure on male participation and HIV testing in the ANC setting.

Methods

Study setting

The study took place at the antenatal clinic of Bwaila Hospital in Lilongwe, the capital city of Malawi. This hospital is a maternity district hospital under the Malawi Ministry of Health. The maternity structure at this hospital was built for the population in 1936 under English colonial rule, at a time when the Lilongwe population was considerably smaller. By early 2000s it could not meet the demands of the population in this high fertility setting¹⁰. Currently, 12,000 babies are delivered at Bwaila each year, an average of 33 per day, but sometimes as many as 60¹⁹.

In response to the high burden of MTCT in this population, The Elizabeth Glaser Pediatric AIDS Foundation (EGPAF) was funded through the United States Agency for International Development (USAID) to implement the Call to Action (CTA) project aimed at integrating HIV-related services at Bwaila. The CTA Project has been providing PMTCT services at Bwaila hospital since April 2002.

During this time period, the PMTCT package at the clinic included: group education, group HIV pre-test counselling in wait areas, opt-out HIV testing for all pregnant women, HIV post-test counselling, including infant feeding options, family planning discussions, nutritional support, and antiretroviral prophylaxis for HIV-positive mothers and babies. It also included a partner involvement component, which consisted of couple counselling and testing.

Peer Education Interventions

In 2006, as part of the CTA Project, 50 couples who went through the PMTCT program were trained to be peer educators with the aim of promoting PMTCT among their peers. They were approached by Bwaila clinical staff and asked to volunteer to provide information and support to their peers. All those who agreed were trained on basic HIV/AIDS information, including PMTCT. Since these peer educators had gone through the PMTCT process themselves they had real-life experience with PMTCT. Additionally, involving peer educators was a form of task shifting that allowed health personnel to address other activities. From January 2007 through June 2008 (period 1), the peer educators gave health talks in the morning at the antenatal clinic, talking to the mothers and the few men who were present on the importance of male participation in PMTCT. These talks emphasized the importance of involving a male partner, antenatal care and hospital delivery, and HIV prevention. All discussions were didactic. In July 2008 (the start of period 2), a drama which was educative, participatory, and entertaining was introduced into wait area as another way of delivering the same messages. Key messages in the drama included, importance of couples counseling, and how to deliver health messages, including disclosure of HIV status to husbands and male partners. Five peer educator couples and one clinic nurse formed the cast of the play. All the antenatal mothers at the clinic were also involved in the play by answering questions posed by the cast members and singing songs. Men in the wait areas also had an opportunity to express their opinions and concerns. The play was performed at the antenatal clinic every Monday and Tuesday. Monday and Tuesday are days with the largest attendance at the clinic. In addition, starting in this period, leaflets encouraging male partner recruitment were distributed.

Structural Interventions

In July 2006 (before period 1), a change in scheduling was made to address male participation. Previously, women were seen on a

first-come, first-serve basis. But starting at this time, all women who brought their partners were attended to first. This was done so that men should not be at the clinic for long, a barrier noted in several settings. It was thought that this might incentivize women to invite their male partners to ANC and for their male partners to attend. This policy was in place during periods 1, 2, and 3.

In October 2009 (the start of period 3) a new maternity wing, funded by the Irish charity the Rose Project, was opened (19). This building was constructed primarily to make space for the growing volume of antenatal patients. Unlike the old building, the new building was explicitly designed with the goal of involving men. There was more space in waiting areas, rooms large enough for HIV couple counseling and testing, modern delivery rooms which could accommodate a partner, and toilets for men. The purpose was to make men feel comfortable coming to this facility.

Study design and Data collection

We collected data for male participation at 3 different time periods (Figure 1) for number of women attending ANC for an initial visit, number of men receiving an HIV test, and the proportion of women presenting with a male partner. We also assessed characteristics of male partners and couples, including male age, male HIV status, and partnership HIV status. In all three time periods, all males and all females presenting for antenatal care were entered into separate registries at the time of presentation. Both males and females were entered only once per pregnancy. Data were entered into the male and female registries in the antenatal clinic by the clinic nurses. At the end of period 3, the number of entries in the male and female registers was counted for each period. Data from the male registry were entered into an Excel database by a researcher. Data entered included client number, date of presentation, age, HIV-status (HIV-positive or negative), and couple HIV status (HIV-concordant positive, HIV-concordant negative, or HIV-discordant). Because these couple-level variables were recorded in the male registry, linkage to the female registry was not necessary.

Overview of Study Interventions

Time Period 1 (January 2007-June 2008)	Time Period 2 (July 2008-September 2009)	Time Period 3 (October 2009-December 2009)
<ul style="list-style-type: none"> • Women with partners attended to first • Simple peer education • Original building 	<ul style="list-style-type: none"> • Women with partners attended to first • Peer education with drama • Original building 	<ul style="list-style-type: none"> • Women with partners attended to first • Peer education with drama • New building with male-friendly infrastructure

Caption: Figure 1 summarizes the interventions in the three time periods.

Data analysis

To calculate the number of couples, in each time period, the number of males in the male registry was divided by the number of females in the female registry. This calculation was used as the proportion presenting with a male partner. This proportion was available in all three time periods. In the second and third time periods, descriptive statistics were calculated. Descriptive data were not available from the first time period. We calculated the mean and median age of men, the proportion of men who were HIV-positive and HIV-negative, and the proportion of couples who were HIV-concordant-positive, HIV-concordant-negative, and HIV-discordant. We also calculated the proportion of HIV-discordant couples in which the male was the HIV-positive partner by dividing the number of HIV-positive men by the number of HIV-discordant couples.

Use of these data was approved by the Malawi National Health Sciences Research Committee and the University of North Carolina Institutional Review Board.

Results

There were 30,066 women who attended an initial antenatal visit during the three time periods: 14,585 during period 1, 12,700 during period 2, and 2,781 during period 3. Of these women, 0.7% presented with a male partner in period 1, 5.7% presented with a male partner in period 2, and 10.7% presented with a male partner in period 3 (Table 1).

During time period two, 732 males presented to the clinic. The mean age of these males was 29 years and the median age was 28 years with an

interquartile range of 25 to 32 years. Of these males, 615 (84%) had a negative HIV test result and 117 (16%) had a positive HIV test result. Of the 732 couples, 78.1% were HIV-concordant negative, 13.3% were HIV-concordant positive and 8.6% were HIV-discordant. Of the 63 HIV-discordant couples, 34% had an HIV-positive male partner and 66% had an HIV-positive female partner.

Table 1: Characteristics of Couples

	Period 1	Period 2	Period 3
Number of pregnant females	14,585	12,700	2,781
Number of males	96	732	300
Percentage of pregnant females presenting as couple	0.7	5.7	10.7
Mean Age of male partners		29	28
Male HIV status			
HIV-positive	NA	16%	16%
HIV-negative	NA	84%	84%
Couple HIV status			
HIV-concordant positive	NA	13%	13%
HIV-concordant negative	NA	78%	81%
HIV-discordant	NA	9%	6%
HIV-discordant couple status			
Male HIV-positive	NA	34%	50%
Female HIV-positive	NA	66%	50%

Caption: Table 1 shows total number of antenatal women presenting for at least one antenatal visit, the number of women presenting at least once as a couple, the percentage of women presenting as a couple at 3 different time periods, male HIV status, couple HIV status, and HIV-discordant couple status.

During time period three, 300 males presented to the clinic. The mean age of these males was 28 years and the median age was also 28 with an inter quartile range of 24 to 32 years. Of the 300 males, 253 (84%) had an HIV-negative test result and 47 (16%) had an HIV-positive test result. Of the couples, 81.3% were HIV-concordant negative, 12.7% were HIV-concordant positive and 6% were HIV-discordant. Of the 18 HIV-discordant couples, 50% had an HIV-positive male partner and 50% had an HIV-positive female partner.

Discussion

We have shown that in this urban setting with very low initial uptake of male participation, the introduction of peer education through drama coincided with a substantial increase in male attendance. With the addition of male-friendly hospital infrastructure, an additional increase in male participation was seen. These findings suggest that intervening through strategies at different levels may increase male participation in the antenatal process.

Our findings are consistent with other research underscoring the need to intervene at many different levels. In a systematic review from the region, multiple individual, dyad, social, and systems facilitators were identified which promote male involvement¹⁸. At the systems level, offering couple counseling and testing was identified as important in many settings^{3, 20-21}. Sensitization was also considered an important facilitator¹³, as was increasing male knowledge about the benefits of PMTCT²².

However, many aspects of the strategies used in this setting were novel. We are not aware of other assessments of peer educators using drama to promote male antenatal involvement. We hypothesized that engaging peer educators in PMTCT would significantly increase referral of men into ANC care due to the similarity of peer educators to the patients. However, it was not until period two, when drama was used with relevant language, messages, and scenarios that men began to present in higher numbers. We consider this strategy not only to be culturally appropriate, but also to be cost effective, as it only required minimal training and supervision. Nonetheless,

peer educators need to be selectively recruited, adequately trained, supervised, and supported²³. Those in decision making positions should encourage peer counseling programs, especially those that are participatory and culturally-relevant, and not simply educational.

During time period 3, the new infrastructure was constructed with an emphasis on family involvement. This coincided with additional increases in male participation. However the reality on the ground is that most resource limited countries like Malawi cannot afford new facilities. Nonetheless, aspects of these programs can be adopted, even without the construction of a new building. For example, it is possible to reorganize existing space to make room for couple HIV counseling and testing, or to add less costly outdoor tents for this purpose. Similarly, it is possible to make clinic-level decisions to prioritize women presenting with men. Essentially, management and staff need to take initiative to make their health facilities male friendly using the available resources.

Our findings suggest that the drama and changes in infrastructure led to the increased male involvement that was seen. However, given our study design which lacked a comparison group, some gains in male participation over time may be due to other factors such as education campaigns or programs by other organizations within the district. It also may be due to a general scale-up of HIV-related services during this time period¹⁰.

Traditionally sexual and reproductive health services that include PMTCT have focused mostly on women, but male involvement has been associated with many benefits for mother-infant pairs. In other sub-Saharan African countries, male participation in PMTCT may enhance safe sex, treatment adherence, infant feeding, and maternal nutrition^{11, 24}. In Malawi, antenatal male involvement has been associated with facility delivery and completion of the PMTCT cascade²⁵. Understanding if male participation is associated with uptake and retention in Option B+, Malawi's new program for same-day ART initiation for all HIV-infected and breastfeeding women²⁶, is an important area for future research.

Involving men in antenatal settings can also have substantial benefits for the men themselves,

especially when HIV counseling and testing is offered. In this setting, a substantial proportion of the men tested for HIV learned that they were HIV-infected. This HIV diagnosis is a necessary first step for linkage to HIV care and treatment services. In addition, many men learned that they were in HIV-discordant partnerships. Regardless of which partner is infected, mutual awareness of HIV-discordance within a partnership has been associated with very high uptake of consistent condom use^{4,27} and this knowledge presents an opportunity for antiretroviral treatment as prevention within the couple²⁸.

Of note, our analysis underestimated the proportion of females who brought male partners to antenatal care. First, we included *all* antenatal women in the proportion's denominator, even though some of these women may not have had ongoing partnerships. Second, we did not capture all male partners presenting to the Bwaila antenatal clinic, only those who received HIV counseling and testing. If males already knew they were HIV-infected, had documentation of a recent HIV-negative test, or refused testing they were not captured in this study, even if they presented to the clinic. Third, some women may have divided their antenatal care between Bwaila and another health facility. They may have brought their male partners to these other facilities, an activity that would not have been captured in our study. This suggests that the male involvement program was more successful than what is reported here.

Despite our gains in male involvement, uptake remained sub-optimal and additional strategies are needed to address barriers to male involvement. We did not assess *why* men did not present for care, but research from other settings may be relevant. HIV-infected women may be afraid to present with male partners for fear that disclosure will lead to divorce, something expressed in other Malawian settings²⁹. In Mpwapwa District in Tanzania, some barriers to male involvement included lack of information, fear of HIV-test results, and limited time to spend at clinics³⁰. Other barriers often cited are social and religious norms that prohibit males from attending female health services and the widespread attitude that female reproductive health is not a male responsibility¹⁸. Adding to these reasons, men in

Malawi have expressed the attitude of midwives and health workers to be unsupportive²². We believe future strategies to improve maternal and child health should therefore be community-based as a complement to any facility-based component³¹.

Overall, we showed that development of multi-level male involvement programs appeared to improve recruitment of male partners and identification of new HIV infections and HIV-discordant couples. We recommend expansion of peer counseling programs with drama and consideration of family-friendly structural changes to all health facilities in Malawi.

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Contributions of Authors

We declare that this work was done by the author(s) named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. SM conceptualized the study, in collaboration with EK, GM, IM, EB, FM, IH, MM, and MH. EK, GM, MH, IM oversaw data collection. Data analysis and interpretation were performed by SM and NER. SM prepared the initial draft manuscript and revisions were made by NER, MH, and IM. All authors reviewed and approved the final draft.

References

1. UNAIDS. *Global Report: UNAIDS Report on the Global Epidemic* 2012.
2. WHO/UNAIDS/UNICEF. *Global Response to HIV/AIDS: Epidemic Update and Progress towards Universal Access* 2011.

3. Farquhar C, Kiarie JN, Richardson BA, Kabura MN, John FN, Nduati RW, et al. Antenatal couple counseling increases uptake of interventions to prevent HIV-1 transmission. *J Acquir Immune Defic Syndr* 2004; 37(5):1620-6.
4. Rosenberg NE, Pettifor AE, Bruyn GD, Westreich D, Delany-Moretlwe S, Behets F, et al. HIV Testing and Counseling Leads to Immediate Consistent Condom Use Among South African Stable HIV-Discordant Couples. *J Acquir Immune Defic Syndr* 2013; 62(2):226-33.
5. Mbonye AK, Hansen KS, Wamono F, Magnussen P. Barriers to prevention of mother-to-child transmission of HIV services in Uganda. *J Biosoc Sci* 2010; 42(2):271-83.
6. Lingappa JR, Lambdin B, Bukusi EA, Ngure K, Kavuma L, Inambao M, et al. Regional differences in prevalence of HIV-1 discordance in Africa and enrollment of HIV-1 discordant couples into an HIV-1 prevention trial. *PLoS One* 2008;3(1):e1411.
7. Dunkle KL, Stephenson R, Karita E, Chomba E, Kayitenkore K, Vwalika C, et al. New heterosexually transmitted HIV infections in married or cohabiting couples in urban Zambia and Rwanda: an analysis of survey and clinical data. *Lancet* 2008; 371(9631):2183-91.
8. Maman S, Mbwapo J, Hogan NM, Kilonzo GP, Sweat M. Women's barriers to HIV-1 testing and disclosure: challenges for HIV-1 voluntary counselling and testing. *AIDS Care* 2001;13(5):595-603.
9. Medley A, Garcia-Moreno C, McGill S, Maman S. Rates, barriers and outcomes of HIV serostatus disclosure among women in developing countries: implications for prevention of mother-to-child transmission programmes. *Bull World Health Organ* 2004; 82(4):299-307.
10. National Statistical Office and ICF Macro. Malawi Demographic and Health Survey 2010. Zomba, Malawi and Calverton, Maryland, USA: 2011.
11. Becker S, Mlay R, Schwandt HM, Lyamuya E. Comparing couples' and individual voluntary counseling and testing for HIV at antenatal clinics in Tanzania: a randomized trial. *AIDS Behav* 2010;14(3):558-66.
12. Byamugisha R, Astrom AN, Ndeezi G, Karamagi CA, Tylleskar T, Tumwine JK. Male partner antenatal attendance and HIV testing in eastern Uganda: a randomized facility-based intervention trial. *J Int AIDS Soc* 2011;14:43.
13. Mohlala BK, Boily MC, Gregson S. The forgotten half of the equation: randomized controlled trial of a male invitation to attend couple voluntary counselling and testing. *AIDS* 2011;25(12):1535-41.
14. Wall K, Karita E, Nizam A, Bekan B, Sardar G, Casanova D, et al. Influence network effectiveness in promoting couples' HIV voluntary counseling and testing in Kigali, Rwanda. *AIDS* 2012;26(2):217-27.
15. Wall KM, Kilembe W, Nizam A, Vwalika C, Kautzman M, Chomba E, et al. Promotion of couples' voluntary HIV counselling and testing in Lusaka, Zambia by influence network leaders and agents. *BMJ Open* 2012;2(5).
16. Early end for FEM-PrEP HIV prevention trial. *AIDS Patient Care STDs* 2011;25(6):383.
17. Auvinen J, Kylma J, Suominen T. Male Involvement and Prevention of Mother-to-Child Transmission of HIV in Sub-Saharan Africa: An Integrative Review. *Curr HIV Res* 2013;11(2):169-77.
18. Morfaw F, Mbuagbaw L, Thabane L, Rodrigues C, Wunderlich AP, Nana P, et al. Male involvement in prevention programmes of mother to child transmission of hiv: a systematic review to identify barriers and facilitators. *Systematic Reviews* 2013;2(1):5.
19. The Rose Project, accessed 04/23/2013. Available from: <http://www.roseproject.org/>.
20. Msuya SE, Mbizvo EM, Hussain A, Uriyo J, Sam NE, Stray-Pedersen B. Low male partner participation in antenatal HIV counselling and testing in northern Tanzania: implications for preventive programs. *AIDS Care* 2008;20(6):700-9.
21. Desgrees-Du-Lou A, Brou H, Djohan G, Becquet R, Ekouevi DK, Zanou B, et al. Beneficial effects of offering prenatal HIV counselling and testing on developing a HIV preventive attitude among couples. Abidjan, 2002-2005. *AIDS Behav* 2009;13(2):348-55.
22. Aarnio P, Olsson P, Chimbiri A, Kulmala T. Male involvement in antenatal HIV counseling and testing: exploring men's perceptions in rural Malawi. *AIDS Care* 2009; 21(12):1537-46.
23. Kelly JA. Popular opinion leaders and HIV prevention peer education: resolving discrepant findings, and implications for the development of effective community programmes. *AIDS Care* 2004;16(2):139-50.
24. Farquhar C, Mbori-Ngacha DA, Bosire RK, Nduati RW, Kreiss JK, John GC. Partner notification by HIV-1 seropositive pregnant women: association with infant feeding decisions. *AIDS* 2001;15(6):815-7.
25. Kalembo FW, Zgambo M, Mulaga AN, Yukai D, Ahmed NI. Association between Male Partner Involvement and the Uptake of Prevention of Mother-to-Child Transmission of HIV (PMTCT) Interventions in Mwanza District, Malawi: A Retrospective Cohort Study. *PLoS One* 2013;8(6):e66517.
26. Schouten EJ, Jahn A, Midiani D, Makombe SD, Mnthambala A, Chirwa Z, et al. Prevention of mother-to-child transmission of HIV and the health-related Millennium Development Goals: time for a public health approach. *Lancet* 2011;378(9787):282-4.
27. Kennedy CE, Medley AM, Sweat MD, O'Reilly KR. Behavioural interventions for HIV positive prevention in developing countries: a systematic review and meta-analysis. *Bull World Health Organ* 2010;88(8):615-23.
28. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med* 2011;365(6):493-505.

29. Njunga J, Blystad A. 'The divorce program': gendered experiences of HIV positive mothers enrolled in PMTCT programs - the case of rural Malawi. *Int Breastfeed J* 2010;5:14.
30. Brusamento S, Ghanotakis E, Tudor Car L, van-Velthoven MH, Majeed A, Car J. Male involvement for increasing the effectiveness of prevention of mother-to-child HIV transmission (PMTCT) programmes. *Cochrane Database Syst Rev* 2012;10.
31. Rosato M, Laverack G, Grabman LH, Tripathy P, Nair N, Mwansambo C, et al. Community participation: lessons for maternal, newborn, and child health. *Lancet* 2008;372(9642):962-71.