A Safe Motherhood project in Kenya: assessment of antenatal attendance, service provision and implications for PMTCT

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Summary

OBJECTIVES To investigate uptake and provision of antenatal care (ANC) services in the Uzazi Bora project: a demonstration-intervention project for Safe Motherhood and prevention of mother-to-child transmission of HIV in Kenya.

METHODS Data were extracted from antenatal clinic, laboratory and maternity ward registers of all pregnant women attending ANC from January 2004 until September 2006 at three antenatal clinics in Mombasa and two in rural Kwale district of Coast Province, Kenya (n = 25,364). Multiple logistic and proportional odds logistic regression analyses assessed changes over time, and determinants of the frequency and timing of ANC visits, uptake of HIV testing, and provision of iron sulphate, folate and single-dose nevirapine (sd-NVP).

RESULTS About half of women in rural and urban settings (52.2% and 49.2%, respectively) attended antenatal clinics only once. Lower parity, urban setting, older age and having received iron sulphate and folate supplements during the first ANC visit were independent predictors of more frequent visits. The first ANC visit occurred after 28 weeks of pregnancy for 30% (5894/19,432) of women. By mid-2006, provision of nevirapine to HIV-positive women had increased from 32.5% and 11.7% in rural and urban clinics, to 67.0% and 74.6%, respectively. Equally marked improvements were observed in the uptake of HIV testing and the provision of iron sulphate and folate.

CONCLUSION Provision of ANC services, including sd-NVP, increased markedly over time. While further improvements in quality are necessary, particular attention is needed to implement evidence-based interventions to alter ANC utilization patterns. Encouragingly, improved provision of basic essential obstetric care may increase attendance.

KEYWORDS nevirapine, prenatal care, maternal health services, HIV, Kenya

Introduction

Antenatal care (ANC) in high-income countries is characterized by a large number of visits, often from early in pregnancy. (Wildman et al. 2003) By contrast, low ANC coverage, few visits and late attendance at first antenatal visit are common throughout sub-Saharan Africa, both in rural and urban settings (Westaway et al. 1998; Addai 2000; Adamu & Salihu 2002; Abou-Zahr & Wardlaw 2003; Jimoh 2003; Myer & Harrison 2003; Magadi et al. 2007). This makes it difficult to deliver the World Health Organization (WHO) recommended antenatal visit schedule, which is four goal-oriented antenatal visits, in the absence of risk factors that necessitate special care (Villar et al. 2001; Abou-Zahr & Wardlaw 2003).

Current patterns of ANC attendance also pose substantial challenges to implement initiatives to prevent mother-to-child transmission of HIV-1 (PMTCT) (Perez et al. 2004a; Manzi et al. 2005; Nuwagaba-Biribonwoha et al. 2007). The 2006 WHO guidelines recommend that zidovudine prophylaxis be given to HIV-positive women without indications for antiretroviral treatment (ART) from 28 weeks of pregnancy or as soon as possible thereafter, in addition to lamivudine and single-dose NVP (sd-NVP) intrapartum followed by a 1-week antiretroviral (ARV) tail of zidovudine and lamivudine. At birth, the infant is given sd-NVP followed by 1 week of daily zidovudine prophylaxis. (World Health Organization 2006a) WHO does, however, recognize that in settings that do not currently have the capacity to deliver the
recommended prophylactic regimen, it may be necessary – as an absolute minimum – to implement a sd-NVP regimen. Further, zidovudine-containing prophylactic regimens should only be initiated after severe anaemia (haemoglobin (Hb) < 7 g/dl) has been corrected. For women who require ART for their own health, a combination of zidovudine, lamivudine and nevirapine starting as soon as practicable in pregnancy is recommended. Early attendance at ANC, several visits to the clinic and functioning health systems are clearly necessary to reduce HIV infection in children through ARV prophylaxis for PMTCT or ART for pregnant women.

This study investigated health-seeking patterns during pregnancy and ANC attendance, coverage of HIV and syphilis testing, and the provision of sd-NVP, iron sulphate and folate in the Uzazi Bora project, a European Commission funded Safe Motherhood and PMTCT demonstration-intervention project. Although the national guidelines for antiretroviral drug therapy in Kenya moved away from sd-NVP towards more complex combination ARV prophylactic regimens based on zidovudine and sd-NVP during the time period of the Uzazi Bora project, in most Kenyan ANC facilities, mothers and infants received only sd-NVP.

Implications of observed trends in the frequency and timing of ANC visits, together with Uzazi Bora process indicators are discussed in light of the global effort to scale-up PMTCT (Inter-Agency Task Team on Prevention of HIV Infection in Pregnant Women Mothers and their Children 2007).

Methods

Uzazi Bora interventions

The Uzazi Bora (Swahili for Better Motherhood) initiative was implemented in Mombasa and the adjacent Kwale districts of Coast Province, Kenya by the International Centre for Reproductive Health (ICRH) in collaboration with the Kenyan Ministry of Health between June 2002 and November 2006. The overall goal was to improve the health status of women and children in the Province. To achieve this, the project aimed to integrate interventions for PMTCT within ANC and intrapartum services and to strengthen antenatal, intrapartum and postpartum care.

The Kenya National HIV/AIDS Strategic Plan 2005/06-2009/10 set targets of 80% ANC coverage, 80% of ANC facilities offering PMTCT and 80% uptake of ARV prophylaxis among infected pregnant women who are offered PMTCT services by 2010 (National AIDS Control Council 2005). In line with the pursuit of these targets, PMTCT interventions within the Uzazi Bora project included implementing an opt-out approach to antenatal testing for HIV (rapid HIV tests in series) and provision of sd-NVP. Other activities were syphilis testing (Rapid Plasma Reagin test), strengthening of anaemia testing (using the Coulter machine), provision of intermittent preventive treatment for malaria with sulphamethoxazole-pyrimethamine, and securing supplies of HIV test kits, nevirapine, iron sulphate and folate in 12 public health care facilities. In addition, community outreach and mobilization activities were organized to motivate women to attend ANC, improve birth preparedness and to encourage men to support safe motherhood. Health care workers received refresher on-site training in HIV testing and counselling; steering committees were established to strengthen the coordination of PMTCT; and the monitoring and evaluation capacity was enhanced through quarterly monitoring meetings and monthly feedback of process indicators to health care workers in each supported facility.

Data management

For this analysis, five of the 12 health care facilities were chosen, aiming to represent the different levels of care, and both rural and urban settings. The facilities selected were a provincial referral hospital (Coast Province General Hospital in Mombasa), two district facilities (urban Port Reitz hospital and rural Msambweni hospital), and an urban (Tiwi clinic) and rural (Likoni clinic) primary health centre. Data from all pregnant women attending ANC at these sites between January 2004 and September 2006 were extracted from antenatal clinic, laboratory and maternity wards registers which were used to record gestational age, visit number, haemoglobin concentration (g/dl), HIV status, and distribution of nevirapine, iron sulphate and folate (among other variables) at each ANC visit. Initially, data were entered from photocopies of these registers, but from November 2004 digital photographs were taken of these registers each month. After data were single-entered in a Microsoft Access 2003 database, they were cleaned and analysed with sas version 9.1.3 (SAS Institute, Cary, NC, USA) and R version 2.8.1 (R Foundation for Statistical Computing, Vienna, Austria).

Individual records were linked through an identification code, consisting of the year of the first visit, the code for the health care facility and an ANC number allocated to each pregnancy per health care facility and per year. Because we suspected duplicate ANC numbers allocated within the same year and within the same health care facility (as a result of incomplete and truncated ANC numbers), the records for each identification code were sorted by date and three consistency checks were performed to determine whether matching of records had been performed correctly. Identification codes for which
the visit number [5631 (15.6%)] or the gestational age [3137 (8.7%)] did not ascend over time were excluded for the analysis. Identification codes were also excluded if the reported age varied by more than 1 year between records [1899 (5.3%)]. Accordingly, data for 10 667 women (29.6%) were excluded from the analysis and the remaining records of 25 364 women (representing 37 241 antenatal visits) were linked. Women with more than one pregnancy in the study period were considered new individuals.

Indicators of ANC attendance and service provision

We employed internationally recognized and utilized indicators of ANC attendance and the provision of ANC services, including PMTCT. (UNICEF/UNAIDS/WHO 2000; World Health Organization 2006b, Stringer et al. 2008) Indicators of ANC attendance included the number of ANC visits per woman, gestational age at first ANC visit and the proportion of late attendance at first ANC visit (first visits occurring after 28 weeks of gestational age). Provision of ANC services was assessed through the measurement of the following: coverage of HIV and syphilis testing (respective percentage of women with non-missing HIV and syphilis test results), provision of nevirapine tablets to women identified as HIV infected (percentage of HIV-infected women having received nevirapine), and dispensing of iron sulphate and folate supplements (an indicator of basic essential obstetric care) (World Health Organization 1997).

Statistical analysis

We used multiple logistic regression models to assess the association of time (calendar year), age, parity and geographical location (urban vs. rural) with (i) late attendance at first ANC visit, (ii) coverage of HIV testing, (iii) provision of basic essential obstetric care and (iv) provision of maternal sd-NVP. A fifth multiple logistic regression model assessed whether time (calendar year), age group, parity and geographical location were associated with HIV prevalence. Analysis of the number of ANC visits attended was performed using a proportional odds logistic regression model. For this model, we also considered basic essential obstetric care as an explanatory variable, as possibly women receiving essential services would perceive ANC attendance as beneficial and be more likely to attend further visits. A stepwise approach was adopted in all analyses to obtain the most parsimonious yet accurate explanatory model (Hocking 1976). The type I error rate was set at 0.05, unadjusted for multiple comparisons.

Results

About half the 25 364 pregnant women had attended an urban ANC clinic (11 917/25 364; 47.0%). Their age ranged from 11 to 48 years, with a mean (SD) of 24.2 (5.0) years, while the parity ranged from 0 to 9 with a median (IQR) of 1 (0–2).

Uptake of ANC

In 2004, the mean number of pregnant women receiving ANC in any of the five health care centres under study was 808 per month (SD = 226). Similar frequencies were observed in 2005 (776 women per month; SD = 20) and 2006 (794 women per month, SD = 139). Both in rural and urban settings, about half of the women (52.2% and 49.2% respectively) visited antenatal clinics only once. Although small, the proportion of women who made four or more visits to the antenatal clinic was consistently higher ($\chi^2 = 148.7, P < 0.001$) in urban (13.6%; 1625/11 917) than in rural clinics (8.8%; 1185/13 447).

Multiple proportional odds logistic regression showed that the number of ANC visits per pregnancy fell slightly over time (Table 1). In 2004, 12.9% attended four or more ANC visits, compared to 11.3% in 2006 ($\chi^2 = 8.7, P = 0.003$). Further, higher parity was associated with fewer ANC visits, while urban residents were more likely to visit ANC more frequently than rural residents. Lastly, even after adjusting for parity and other factors, older women were more likely to attend more often than younger women. Importantly, women who received iron sulphate and folate supplements during the first ANC visit were about 15% more likely to attend subsequent visits.

Fully 30% (5894/19 432) of pregnant women had their first visit to the antenatal clinic after 28 weeks of gestation and the proportion of late first visits did not change over time (2105/7231, 29.1% in 2004; 2450/7765, 31.6% in 2005; 1139/4436, 30.2% in 2006; time trend in logistic regression: $P = 0.50$). After controlling for other covariates, urban women were less likely to attend ANC before 28 weeks than rural women [adjusted odds ratio (AOR) = 0.85; 95% CI = 0.79–0.90]. Parity was also associated with late ANC attendance (AOR of attendance before 28 weeks = 0.87 per additional previous birth (95% CI = 0.84–0.89). Again, after adjusting for parity, older women were more likely to have their first ANC visit earlier.

Prevalence of HIV, syphilis and anaemia

The HIV prevalence remained relatively stable over the study period. No trend over time was noted in overall HIV
prevalence \((P = 0.47)\), but prevalence of HIV in different age groups varied considerably (Figure 1). HIV prevalence in urban women (10.5%) was higher than in rural women (8.5%; \(P = 0.003)\), while women aged 25–35 were most likely to be infected both in urban (12.6%) and rural (11.6%) areas \((P < 0.001)\).

The syphilis prevalence was 1.0% in 2004, 1.9% in 2005 and 2.1% in 2006. Throughout the study period, the overall prevalence of anaemia (Hb < 11 g/dl) at the first ANC visit remained stable: 84.2% in 2004, 86.6% in 2005 and 84.1% in 2006. Marked differences were, however, noted between rural and urban women. About four in five rural women (7461/9441; 79.0%) and two in three (2822/4248; 66.4%) urban women had a haemoglobin between 7 and 11 g/dl \((P < 0.001)\). An additional 10.2% of rural and 9.8% of urban women were severely anaemic (Hb < 7 g/dl).

**Uzazi Bora process indicators**

While urban ANC clinics outperformed the rural clinics in proportion of women with a known HIV status at all time points, both settings improved over the course of the project. By mid-2006, 74.7% of rural and 76.9% of urban ANC attendees had tested for HIV. In comparison, in 2004 these rural and urban proportions were 34.6% and 46.2%. Parity was not associated with having an HIV test and excluded from the multivariate model. Older age (expressed in 5-year age groups), however, was weakly associated (AOR = 1.04; 95% CI = 1.02–1.07) with accessing HIV testing. There were marked declines in HIV testing in January and in July 2005. In rural ANC clinics,
this indicator was 22.4% in January 2005 (87/388) and 24.2% in July 2005 (101/417), compared with 40.4% in the other months of the year (1811/4488). In urban clinics, this discrepancy was even larger: 31.4% in January and 35.2% in July vs. an average of 54.7% for the remainder of 2005. These drops coincided with staff shortages owing to inadequate replacement of staff during end-of-year annual leave and a mid-year industrial action by health workers.

Syphilis testing rates only increased markedly in the rural clinics (from 61.9% in 2004 to 81.1% by mid-2006; \( P < 0.001 \)) while in urban settings, syphilis testing remained around 50% (ranging 50.1% in 2004 to 51.8% in 2006; time trend in logistic regression: \( P = 0.27 \)). Similar to HIV testing, syphilis testing rates declined in January and July 2005.

Provision of nevirapine prophylaxis rose considerably over time. In 2004, nevirapine was given to 32.5% and 11.7% of women who tested HIV positive in rural and urban clinics, respectively, but by mid-2006 this had increased to 67.0% in rural and 74.6% in urban clinics (Figure 2). Initially, nevirapine was mainly provided to HIV-infected pregnant women of at least 30 weeks gestational age. However, as monitoring reports showed that many women did not return for follow-up visits and/or delivered outside of the hospital, the ANC clinics adapted their guidelines to provide nevirapine irrespective of gestational age. Hence, the discrepancy in provision of nevirapine between ‘early presenters’ (at or before 28 weeks of gestational age) and ‘late presenters’ (after 28 weeks of gestational age) shrank over time: among HIV-positive women who only attended the ANC clinic once, 20.5% of late presenters received nevirapine in 2004 vs. 9.2% of early presenters. In 2005, these rates were 33.3% and 25.6%, respectively, and in 2006 they had become 69.2% and 66.3%. As more than half of rural women in Kenya (about 25% of urban women) give birth with traditional attendants, nevirapine syrup was given to women in a Luer lock syringe for administration to their newborns. From mid-2005, the nevirapine suspension for newborns was given at the first ANC visit, regardless of gestation.

Equally marked improvements were observed in indicators of basic essential obstetric care (Figure 2). It is not possible to determine whether this nutritional supplementation impacted on anaemia in women, because of the low proportion of women visiting ANC facilities more than once and infrequent retesting of haemoglobin.

**Discussion**

Early, repeated ANC attendance and high-quality ANC services are critical for improving the outcomes of safe motherhood initiatives, especially PMTCT (Delva et al. 2006a; Freedman et al. 2007; Say & Raine 2007; Brown et al. 2008; Delvaux et al. 2009). In this project, while the frequency and timing of antenatal visits did not improve over time, provision of ANC services, including sd-NVP, for those who did attend ANC facilities, increased markedly. The finding that obstetric and PMTCT indicators improved in tandem in this study concurs with that of Delvaux et al. (2008) who reported improved quality of antenatal and delivery care services in Côte d’Ivoire after the introduction of a comprehensive PMTCT programme. There is presently widespread acknowledgement that the increased resources accompanying PMTCT programmes present vital opportunities for strengthening comprehensive ANC services in under-resourced settings (Horizons Program 2002; Perez et al. 2004b; Doherty et al. 2005, Behets et al. 2006; Druce & Nolan 2007; Fowler et al. 2007). Previous studies also reported that interventions which strengthen health systems are able to increase the quality and provision of antenatal and intrapartum care.

![Figure 2](image-url)  
**Figure 2** Indicators of antenatal care service delivery during the Uzazi Bora project: (a) provision of single-dose NVP to HIV-positive women; and (b) provision of iron sulphate and folate supplements.
services (Gloyd et al. 2007; Bhutta et al. 2009). It can well be argued that ultimately the effectiveness of PMTCT is contingent on the overall quality of ANC, and – in high HIV-prevalence settings – also vice versa.

Although it was anticipated that improved quality of services and community-based promotion of ANC would lower the proportion of late attendance of ANC, we did not observe improvements in this indicator. Of most concern, throughout the project, only around 10% of women completed the WHO recommended four-visit schedule. It appears that the community outreach and mobilization activities, although lively and with active community participation, had limited impact on clinic attendance. Exploratory field work among women of reproductive age in the project communities suggested that financial and transport constraints hampered more frequent ANC visits. In addition, multiparous women expressed less need for ANC as they reported to know what to do in pregnancy. User fees for ANC in Kenya were removed in 2007, which may remove some of these barriers (Anonymous 2007, Lagarde & Palmer 2008).

These study findings have important implications for the scale-up of PMTCT in resource-constrained settings. First, ANC service delivery could be tailored to more closely reflect actual health-seeking patterns. More flexibility in providing nevirapine tablets and infant syrup is one example of this and is successfully implemented in this study and described elsewhere (Temmerman et al. 2003). Other adaptations to be considered are providing more than 4 weeks’ worth of iron sulphate at each visit, and ensuring that the results of HIV and syphilis testing are given during comprehensive post-test counselling on the same day as clinic visits (Delva et al. 2006b).

As the second implication, we contend that there is a need for initiatives that reduce sociocultural and financial barriers to accessing ANC and further emphasize the benefits for a woman of early and regular ANC visits. While the cancellation of user fees may lower the financial threshold to attend ANC (Gharoro & Okonkwo 1999), better uptake of ANC and PMTCT services requires broad-based poverty reduction, socio-economic empowerment and sensitization of communities (Adamu & Salihu 2002; Kone-Pefoyo & Rivard 2006; Gage 2007; Bhutta et al. 2009; Gies et al. 2009; Msuya et al. 2009). The Uzazi Bora project invested relatively more in health systems strengthening than in the general uplift and health education of the community. This may explain the disparity between improvements in the provision of ANC services and the lack of change in ANC attendance.

Integrating couple counselling and HIV testing in ANC, making ANC facilities more male-friendly, offering evening or Saturday clinics and providing men with personal invitations from the ANC facilities to join their partners at the clinics have been suggested as ways to improve male involvement in ANC and PMTCT, which in turn has been associated with greater acceptance of and adherence to PMTCT interventions (Bolu et al. 2007; Msuya et al. 2008; Waiswa et al. 2008; Theuring et al. 2009).

Integration of HIV treatment and care within ANC may be an important incentive to early, repeated ANC attendance as well. The fact that provision of basic essential obstetric care at first ANC visit was associated with increased ANC attendance is consistent with this notion. Qualitative studies with pregnant women and PMTCT health workers in Uganda and Botswana found that freely available ARV treatment for a woman and her family is vital for drawing people to the PMTCT programme (Kebaabetswe 2007; Nuwagaba-Biribonwoha et al. 2007). Moreover, perceived lack of benefits for HIV-infected women has been described as a barrier to participation in the Ugandan PMTCT programme (Karamagi et al. 2006). By the closure of Uzazi Bora, increased efforts were made to strengthen referral linkages between ANC clinics and a comprehensive HIV care centre (clinic for ART and HIV care) in Mombasa. The project also contributed to the establishment of a comprehensive HIV care centre in Kwale district. Implementation of a more elaborate and effective PMTCT prophylaxis regimen consisting of daily ARV prophylaxis initiated at first ANC visit from as early as the second trimester could further motivate users to return for subsequent visits. Such regimens are recommended by WHO in their revised 2009 guidelines and require local adaptation and subsequent implementation at the country level (World Health Organization 2009).

Conclusion

Monitoring of process indicators provided actionable information, and service quality improved over time. While further improvements in quality are necessary, particular attention must be paid to implementing evidence-based interventions to alter ANC uptake patterns. These likely necessitate broad-based poverty reduction, socio-economic empowerment and sensitization of communities. Encouragingly, better provision of basic services may raise attendance rates.

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References


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