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ROLL-OUT OF PREVENTION OF MOTHER-TO-CHILD TRANSMISSION OF HUMAN IMMUNODEFICIENCY VIRUS IN RURAL KENYA
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ROLL-OUT OF PREVENTION OF MOTHER-TO-CHILD TRANSMISSION OF HUMAN IMMUNODEFICIENCY VIRUS IN RURAL KENYA

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ABSTRACT

Background: **Prevention of mother-to-child transmission of HIV (PMCT) was first introduced in Kenya on a pilot basis in 1999 and scaled up from 2001 as an integrated HIV/AIDS prevention program within maternal child health services (MCH).**

Methodology: **An indigenous professional non-governmental organization (NGO) partnered with 12 District Health management teams (DHMTs) to scale-up integration of prevention of PMCT into MCH services to reach 80% of the pregnant women accessing care. DHMTs were empowered to provide standard training, delivery and support of PMCT services while the NGO partner provided technical support for training, security of critical consumables, support-supervision, commodity management and monitoring and evaluation. Results of the scale-up, uptake of HIV counselling and testing (HCT) and anti-retroviral prophylaxis over a one-year period are presented.**

Results: **PMCT services were provided in 341 facilities including 194 newly initiated sites. A total of 89,393 women found out their HIV status, 94% through antenatal testing and 6% maternity testing. Uptake of antenatal HCT was 73% with four-fifths of the women finding out their status at first antenatal visit. Uptake of HCT was significantly higher at District and sub-District hospitals compared to lower level facilities, and in low HIV prevalence Districts compared to high prevalence Districts ($p< 0.001$). Facilities in high HIV prevalence regions were 18 times more likely to deliver ARV prophylaxis compared to low prevalence Districts.**

Conclusion: **Standardized approaches and partnership with the development partner enhanced PMCT scale-up. Further operational research is required to enhance quality of PMCT services at lower level facilities.**

INTRODUCTION

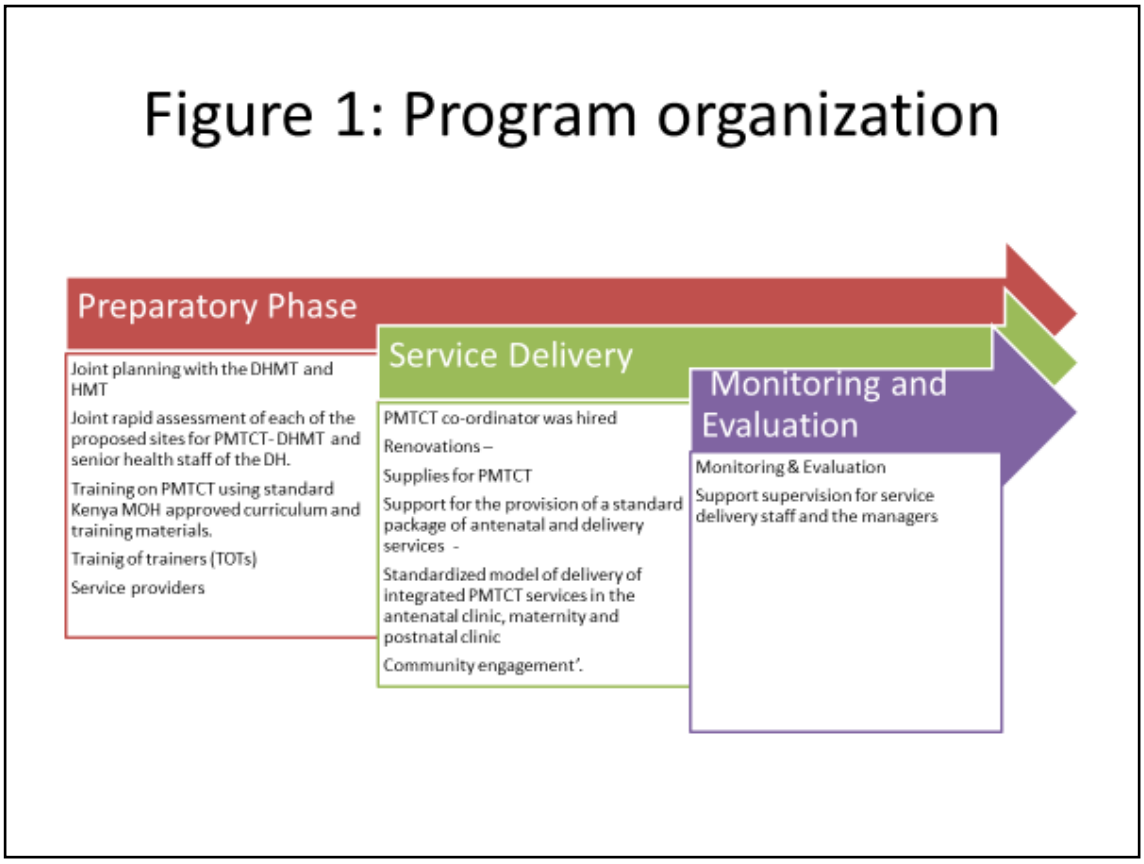
Kenya like other countries in East and Southern Africa is faced with a generalized AIDS epidemic among women of childbearing age and in the 10 years preceding introduction of ARV's for PMCT experienced an increase in child mortality that is partly attributable to the AIDS epidemic[1]. Therefore, one of the new public health programs introduced to try and reverse this increase in child mortality is prevention of mother-to-child transmission of HIV (PMCT). PMCT services were first introduced in Kenya on a pilot basis in 1999, and in 2001 the country embarked on a program of rapid scale up starting with integration of PMCT services at the larger health facilities and gradually cascading down to the lower level facilities[2]. PMCT is provided as an integrated HIV/AIDS prevention program within maternal child health services (MCH) with a four pronged approach that includes, primary prevention of HIV among women of child bearing age, prevention of unintended pregnancies among HIV infected women, PMCT services that include comprehensive pregnancy, delivery and postnatal healthcare, that includes HIV counselling and testing (HCT) and ARV prophylaxis to infected pregnant women, and their babies and the ongoing care, treatment and psychosocial support for the HIV infected woman, and her family[2,3]. At the time, the Kenyan PMTCT program has largely been based on single dose nevirapine (sdNVP) given to the mother at onset of labour and to the infant within 72 hours of delivery[4,5]. Since the sdNVP has only a 50% efficacy in clinical trial settings, very high program coverage is required to have impact on prevention of mother –to child transmission of HIV and especially in a population that would continue to almost universally breastfeed their infants[4,5,6].

The Network of AIDS Researchers in East and Southern Africa (NARESA) a HIV research NGO, subsequently referred to as a Development partner (DP) partnered with the District Health Management teams (DHMT's) and Hospital Health Management Teams (HMTs) of 12 Districts (Kirinyaga, Nyeri, Muranga, Kiambu, Maragua, Kitui, Mwingi, Bondo, Rachuonyo, Homa Bay, Kajiado and Kilifi) in Kenya to upscale PMCT into maternal child health services with the aim of achieving 80% coverage of all government health facilities and reaching at least 80% of the women using antenatal and delivery services with PMCT as part of an integrated maternal child health package. Administratively government health facilities in Kenya are organized into 6 levels, community health structures (level one), dispensaries (level 2), health centres (level 3), District and sub-District hospitals (Level 4), Regional/provincial referral hospitals (level 5) and National referral hospitals (level 6)[7]. During the reporting period, MCH services were fully established up to level 3 while there was variable availability of the same at level 2 facilities. Services for Caesarean section were available at level 4 and above facilities. Health staffs were skilled in delivery of basic antenatal and intrapartum care but the level 2 facilities in particular were not fully equipped to cater for these services. Management of health services is decentralized with DHMT's being in-charge of District health services, and HMT's being responsible for the hospitals. The objective of this paper is to share experiences on the process used to scale-up PMCT to the lowest health institution and to use one year's

routinely collected service statistics to illustrate the program successes and challenges focusing on uptake of HIV counselling and testing HCT and delivery of ARV prophylaxis. Although this work was carried out before the big shift to ARV's for all, and treatment as preventtion the lessons learned, and challenges experienced are still relevant.

METHODS

Implementation of the PMCT program was broadly divided into theee phases, (i) preparatory phase, (ii) a. support service provision b. service provision and (iii) monitoring and evaluation as shown in figure 1. All three phases were conducted simultaneously because in any one district, health facilities were at different points of the implementation.



(i) Preparatory Phase: Key DHMT and HMT members for the 12 Districts were brought together for a joint planning meeting during which current knowledge on PMTCT, Kenya Ministry of health (MOH) guidelines for PMTCT and the goals for the national program were reviewed. The DHMTs and HMT's reviewed their current service delivery statistics focusing on successes and challenges in implementing PMTCT at the antenatal clinic (ANC) and maternity, and then developed strategies to scale-up PMCT within the District, improve service delivery and time lines for implementation. Each District team received peer review for their plan for scaling up and improvement of PMCT services, jointly sharing strategies that had worked well in their various facilities.

The next step in the preparatory phase was a joint rapid assessment of each of the proposed PMCT scale-up sites by the DP, DHMT and senior health staff of the DH. The process included interviews with the

site staff, observations, verification of available essential equipment and supplies using a standard check list as well as exit interviews with clients accessing MCH services. The assessment provided information on the physical infrastructure, number and skills level of the staff, available supplies, quality of the currently offered maternal child health services and client load (new and revisits) in the ANC and maternity as well as the existing gap in PMCT service provision.

The third key input in the preparatory phase was training on PMTCT using standard Kenya MOH approved curriculum and training materials and included training of trainers (TOTs) to provide each District with a team of trainers, followed by training of service delivery staff (SDS)[8]. This strategy enabled simultaneous training of SDS, scale up of services in all 12 Districts, and provided a team of experts for the District. The TOT's were senior nursing and clinical staff, many of whom were members of the DHMT and HMT and therefore also involved in planning and monitoring the services. The DP facilitated training of TOT's on PMTCT using a teach-back training approach.[8] Delivery of PMTCT services requires a health worker with a mix of skills that include; basic knowledge of the biology HIV; prevention strategies; HIIV clinical assessment skills including HIV disease staging; counselling and communication skills including couple counselling skills; lactation and nutrition counselling; on spot rapid HIV antibody testing; collection, collation and reporting of service statistics; and ability to project and order supplies in a timely manner. In order to impart these skills, the training included didactic classroom learning, discussions, role plays, and field visits to existing PMTCT sites. At the end of each training period, participating SDS developed a plan of action for initiating or improving the PMTCT services where they were currently deployed. Selection of staff for training was carried out jointly with the DHMT and hospital teams to ensure that the individuals would be deployed in the MCH or maternity where they would use the newly acquired skills to provide PMTCT services. There was an awareness that it is very difficult for one person to effect change among colleagues and especially after a 7-day training, therefore efforts were made to train health workers from each area as a team and thus providing a critical mass of health providers who understood the process needed to provide PMTCT services. The skills of the SDS staff was further bolstered by regular facility level continuing medical education, and regular updates as new information and guidelines were developed. Job aids were also provided to support the different PMCT care packages.

(ii) a. Support Service Provisions: A District PMTCT co-ordinator was hired to support the office of the MOH integrate PMTCT into MCH services. Positions were advertised for through the office of each of the District Medical Officers of health and interviews carried out jointly with the DP. In all 12 Districts the positions have been filled by newly retired senior nurse midwives or clinical officers (CO) who had held management positions at the DH. These individuals were knowledgeable on maternal child health, health facility management, recognized leaders and most of them experienced in the delivery of PMTCT services. Additional training was provided on PMTCT, TOT, paediatric and adult ARV care and on support supervision for PMTCT to prepare them for their roles as District PMCT co-ordinators.

The second step in support for service provision was to carry out minimum renovations to support confidentiality in PMCT service provision. The MCH clinics in the older health facilities had minimal space for counselling and even when space was available a dividing curtain was used to

provide visual but not verbal privacy. Some of the facilities lacked basic furniture such as chairs, or benches for the staff and patients to sit on. Minimum renovations to ensure confidentiality were carried out and basic furniture and protective clothing provided to the sites.

The third step in support for service provision was to ensure security of the essential consumables. The DP applied to the Axios program for the free NVP and Determine® (Abbot laboratories, Abbot Park, IL) (Abbot laboratories, Abbot Park, IL) test kits donations to support the scale-up of PMTCT. The supplies were used to help sites start up PMTCT activities and to ensure that there was no stock out but not to replace the normal government supplies from the Kenya Medical Supplies Agency (KEMSA). Sites were expected to provide service statistics of the clients who have been tested and provided with NVP in-order to access supplies from KEMSA. New sites did not have this type of data and therefore the DP provided a start-up kit containing NVP and the rapid test kits accessed through the free donation program and a second rapid HIV test kit Bioline HIV ½ TM rapid test kit (Standard Diagnostics, Kyonggi-Do, Korea) accessed from Kenya Medical Supplies Agency (KEMSA) or from direct procurement. The DP also supported the same sites with supplies to ensure universal precautions including personal protective gear for labour ward staff, ensured constant monitoring of supplies of gloves and antiseptics and provision to prevent stock-outs, as well as training on universal precautions as part of the PMCT package.

(iii) Service delivery: The first step in service delivery was to ensure support for the provision of a standard package of antenatal and delivery services as recommended by Kenya MOH guidelines. This package of services included **quality antenatal care** (health education, delivery planning, screening for anaemia, micronutrient supplementation, screening and treatment of STD's, intermittent treatment for malaria, routine monitoring of the pregnancy for progressive growth of the fetus, and occurrence of pregnancy related complications that were packaged as 'focused antenatal care'; **provision of routine HIV counselling and voluntary HIV testing services** that was provided confidentially after verbal informed consent**; safe delivery** (avoidance of invasive procedures and premature rupture of membranes, appropriate use of elective caesarean section); **ARV prophylaxis** for HIV-1 infected women; **infant feeding counselling** to guide informed choice and to support those who choose exclusive breastfeeding and l**ong-term** care of the baby and mother[2, 9]. During training the standard care package was reviewed to ensure all the staff were knowledgeable on the evidence base for this package of services and a pocket job-aid was provided to support provision of these services.

The second step in service provision was establishment of a standardized model of delivery of integrated PMTCT services in the antenatal clinic, maternity and postnatal clinic. The model was developed collectively with the DHMTs, HMTs and DP. In the antenatal clinic the model included (i) small group health education with emphasis on PMTCT alongside key messages for pregnant women as defined in the PMCT and focused antenatal care guidelines, targeted at first antenatal visit mothers or women on a revisit with unknown status[2, 9]. A job-aid was provided to the nurse midwives to aid this discussion and the same was posted on the walls of the antenatal clinic and maternity. Group health education was followed by individualized confidential HIV test decision taking. Women who consented to testing had a rapid HIV test administered by the nurse midwife as part of the clinical

consultation. The same nurse/midwife provided post-test counselling to all women, and provided pre-packed mother and infant NVP, co-trimoxazole for opportunistic infection prophylaxis, and relevant infant feeding counselling for HIV antibody positive women. HIV infected women were encouragement to continue to attend ANC and to delivery in a health facility with specific appointments to come back for additional support counselling and referred to the HIV clinic for further assessment. There was documentation of testing and issuance of NVP on mother ANC card as per the Kenya ministry of health guidelines and facility based registers[2].

In the maternity the model of care included establishing whether the mother knew her HIV status and a verification of whether HIV positive women had taken their sdNVP. Women who had forgotten to take their drugs were immediately issued with a tablet of NVP. Women with unknown status were offered HCT with informed right of refusal using rapid HIV tests before delivery for women who were not in advanced labour followed by provision of sdNVP. Post-delivery HCT was provided for women who presented in advanced stages of labour. All HIV exposed babies were to be provided with sdNVP and mothers were supported to initiate the pre-selected method of infant feeding counselling. The program did not provide infant formula.

The third step was a strategy of '*community engagement*' to create awareness of PMTCT, support increased uptake of interventions, provide HIV infected women and their families with additional psychosocial support at the community and to reduce the HIV related stigma. Three strategies were implemented to build community engagement. The first was support to sites to initiate a peer support group. Peers were HIV sero-positive who had gone through PMCT services and were willing to be members of a support group that met regularly at the health facility, initially under the guidance of a health worker and gradually members of the peer group taking over leadership. Members of the peer support group received training on rudiments of counselling, PMTCT and HIV care. Members of the peer support group were requested to volunteer on a rotation basis to provide peer counselling to new antenatal clients and newly diagnosed HIV infected women. The development partner provided a lunch/transport allowance to the peer counsellor on the day they provided services. The second strategy was to strengthen community based counselling on PMTCT by providing the knowledge and skills to community health workers and TBA's; and the third strategy was to stimulate community wide dialogue around PMTCT by sponsoring community-based groups, use folk media to dramatize issues relating to PMTCT at public meetings and small group interactions with established groups in the community.

(iv) Monitoring, evaluation and support supervision: The fourth major component of the program was support supervision and monitoring and evaluation. To support Monitoring and Evaluation, each site was provided with a standard Kenya ministry of health (MOH) antenatal and maternity and later postnatal register to document routine PMCT service delivery data. The women and their babies were provided with a handheld record to enable them access care at different facilities if the need arose. The DP provided a standard form to abstract key information from each of the facility registers in quadruplicate, one copy forwarded to the District AIDS Co-ordinator (DASCO) a member of the DHMT, for national reporting, one copy to the facility in-charge, one retained by the site co-ordinator, and one copy to the development partner for onward forwarding to the funding agency after conversion to an

electronic record at DP data management centre. Reports from high volume facilities like the District hospital were collected on a weekly basis and monthly for the low volume facilities. Each health facility had a service delivery staff (SDS) who was the designated facility based PMCT co-ordinator and who was responsible for abstracting this data for onward transmission.

Three levels of support supervision were provided for the PMCT services on a regular basis. Support supervision to individual service providers was carried out within 2 weeks of training to ensure that PMTCT services were initiated before forgetting the newly acquired skills. At these visits the supervisor observed and demonstrated how to provide services especially the HIV testing, re-organize client flow to minimize missed opportunities and documentation of the services that had been provided in the standard registers. The supervisor (District PMCT co-ordinator or development partner officers) would carry a start-up kit in case they found that the site has not started because they lacked supplies. The support supervision visits were carried out biweekly at inception of the services and then reduced monthly once services are well established. More frequent on as need be basis visits were made to sites that were experiencing low PMTCT uptake or were failing to report service statistics in a timely manner. The second level was support supervision to the health facility during which the DHMT, HMT and DP jointly reviewed the service delivery, including observation of client flow at the service delivery points, service statistics to determine coverage, and assessment of the supplies. These assessments were followed by discussions with the health workers to identify successes and weakness and plans on improvement made. The third was the program review meeting with the DHMTs, HMTs and DP that took place 1-2 times a year and provided a forum for determining the ongoing needs in terms of support supervision, on job training and provision of supplies. During these meetings feedback on District service statistics were provided and ways of improving uptake discussed.

Challenges during scale up: Specific challenges experienced during the scale-up were staff shortages especially at level 2 and 3 facilities, staff turnover, and temporary suspension of the PMCT services when the only trained staff was on leave or night duty. The staff also had problems in completing the facility registers used to document the service delivery. The other major challenge was the staff perception that PMCT was not their work and was burdensome. Fortunately, the latter problem has eased over time as mothers come back to thank health workers for assisting them have an HIV-free infant.

Data analysis: This report is based on the routinely collected service delivery data from the period 1st April 2006 to 31st March 2007. The data is analysed per District and then grouped by level of health facility DH/SDH, Health centres and dispensaries. Currently, health facilities maintain a daily activity register and do not have facility-based records per client, and therefore longitudinal follow-up data per client is not available. Numbers and proportions of women accessing HCT in the antenatal, maternity and postnatal period are presented. Effectiveness of antenatal counselling was assessed by a variable called counselling uptake, calculated as total number of women finding out their status divided by total number of counselling sessions (first antenatal clients plus total clients tested at revisit). Uptake of HCT in maternity is expressed a proportion of women tested in maternity as proportion of women with unknown status who were admitted into the maternity. Uptake of HCT in postnatal period is expressed as proportion of women with unknown status who accepted testing at first postnatal visit.

There was inadequate documentation of women testing on repeat postnatal visit. HIV prevalence is expressed as number of women testing positive as a proportion of all the women tested with antenatal and maternity data presented separately. Uptake of prophylactic ARV's is number of women receiving ARV prophylaxis in antenatal clinics and maternity as proportion of the HIV positive women seen in each of these areas, for example in maternity this would be women admitted with known status and those newly identified in the maternity. The different levels of the health facilities were compared for uptake of CT, delivery of ARVs and association with HIV prevalence.

Data quality: A random sample of 10% of all health facilities in 12 Districts was selected to verify the accuracy of the abstracted data from the institutional daily activity registers. There was no significant variation between the abstracted data and that in the records. This data is not presented in this paper. The health institutions did not maintain individual longitudinal case records for the patients and therefore we were not able to assess whether there was over or under-reporting of the services.

Ethical considerations: HIV counselling and testing was offered as part of the integrated pregnancy and delivery care services. Women were clearly informed that they had the right to refuse the test. Women were informed on the need for shared confidentiality to ensure appropriate health services and were provided with a basic HIV care package that included supportive counselling, OI and ARV prophylaxis and referral for long-term HIV care. In keeping with the Kenya MOH guidelines, women's HIV status was recorded on their hand-held antenatal card in a coded manner to protect against loss of confidentiality. In the maternity, HIV CT was deferred until delivery for women presenting with advanced labour. Ethical approval was obtained from the KNH ERC before commencement of the service.

RESULTS

Capacity Building: In-service training was provided to 384 health workers on the basic PMTCT package, and 151 on a PMCT update, to enable roll-out of more efficacious anti-retroviral (ARV) prophylactic regimens. To support counselling 38 peer counsellors were trained on rudiments of counselling and PMCT. During the year, the 12 District hospitals were supported to do 83 continuing medical education sessions.

Facility level coverage: In the 12 Districts, 415 (85%) of the 489 government health facilities were providing MCH services that included antenatal care, 29 level 4 units (DH/SDHs), 91 level 2 (HC) and 295 level 2 (dispensaries). At the beginning of this reporting period PMCT services were being offered in 147 (35%) of the 415) facilities, 26 DH/SDH, 76 HC and 42 dispensaries. At the end of the reporting period 194 new facilities had integrated PMCT making a total of 341 facilities and an overall facility level coverage of 82% as shown in table 1. This was a 130% increase in the number of facilities providing PMCT with the greatest expansion at lower level facilities.

Table 1

Number of sites providing PMCT services at the beginning and end of the reporting period

District	Number of Government facilities	Number of sites providing MCH (District /sub-District hospital, Health centres and dispensaries				No. Reporting PMTCT by 1st April 2006				PMTCT sites by 31st March 2007			
		H/SDH	HC	Disp	T	H/SDH	HC	Disp	T	H/SDH	HC	Disp	T
Bondo	27	2	4	20	**26**	2	4	5	**11**	3	5	21	**29**
Homabay	14	2	6	6	**14**	2	6	5	**13**	2	6	6	**14**
Kajiado	60	2	13	0	**15**	2	11	0	**13**	2	13	11	**26**
Kiambu	29	2	11	14	**27**	2	11	3	**16**	2	12	11	**25**
Kilifi	30	3	3	3	**9**	1	0	0	**1**	1	0	0	**1**
Kirinyaga	40	2	6	30	**38**	2	9	7	**18**	2	9	26	**37**
Kitui	61	1	8	31	**40**	1	5	3	**9**	1	8	25	**36**
Maragua	26	1	6	15	**22**	1	6	14	**21**	1	6	16	**23**
Murang'a	59	2	3	28	**33**	2	3	3	**8**	2	4	30	**36**
Mwingi	43	3	10	28	**41**	2	10	2	**14**	3	10	18	**31**
Nyeri	75	7	8	41	**56**	7	7	2	**16**	7	9	40	**56**
Rachuonyo	25	2	8	15	**25**	2	4	1	**7**	2	10	14	**26**
Total	**489**	**29**	**86**	**229**	**346**	**26**	**76**	**42**	**147**	**28**	**91**	**220**	**341**

Distribution of pregnant women within the health services: During this period, 94,047 women booked antenatal care, 31691 (34%) at the DH/SDH, 36,588 (39%) at a HC and 25766 (27%) at a dispensary. In the same period of time 13,027 women with unknown HIV status came to deliver in the health facilities, 9196 (70.6%) at a DH/SDH, 3299 (25%) at a HC and 532 (4%) at a dispensary. In the postnatal clinic 64,234 women with unknown status were seen, 15,451 (24%) at the DH, 13280 (21%) at HC and 35,503 (55%) at dispensary level. Thus level 2 and 3 facilities (HC and dispensaries) provided two thirds of the antenatal care, one third of the deliveries and three quarters of the post-natal follow up for well child services to women with unknown HIV status.

Uptake of HIV counselling and testing (HCT) in the antenatal clinics and maternity: Overall 83,752 (89%) of 94,049 women booked antenatally accessed HCT and found out their HIV status. Overall, uptake of HCT at first antenatal visit was 67%. Uptake of HCT at first antenatal visit was 75% at a DH/SDH, 62% at HC and 65% dispensary level. Up to 24% of all women who accepted HCT did so at a revisit, 19% at DH/SDH, 28% at HC and 25% at dispensary level. Nine of the eleven districts had > 20% of the women accepting HCT at a revisit. In the reporting period during a total of 114,349 antenatal counselling sessions 83,752 women tested giving an overall counselling uptake rate of 73%. In the maternity, 5641 (43%) of 13027 women with unknown status found out their HIV status. Uptake of HCT at the maternity was generally low with 4667 (50.7%) of 9196 women with unknown status at DH/SDH level, 868 (26%) of 3299 women at HC level and 106 (19.9%) of 532 women at dispensary level finding out their status. Data on uptake of HCT in ANC, and maternity is presented on table 2. As part of the expanded PMCT program, HIV testing was extended to women of unknown status in the postnatal/well child clinic. During this period only 4221 (6.5%) women accessed HCT on the first postnatal contact with the health facility.

Table 2

Uptake of HIV Counselling and Testing (CT) in the Antenatal clinic and Maternity

District	1st ANC (a)	CT first ANC (b)	uptake of CT on first visit (c)	CT ANC revisit (d)	Proportion of women tested accepting CT at revisit (e=d/b+d)	Overall Uptake of CT in ANC (f=b+d/a+d)	unknown maternity (g)	CT maternity (h)	Uptake of CT in maternity (i= h/g)
Bondo	8030	4322	54%	1494	26%	61%	674	226	34%
Homabay	8689	4513	52%	1347	23%	58%	744	279	38%
Rachuonyo	7229	4548	63%	1358	23%	69%	821	132	16%
Kajiado	5719	3035	53%	1130	27%	61%	1364	339	25%
Kitui	7216	5463	76%	2201	29%	81%	536	248	46%
Mwingi	7140	5365	75%	2652	33%	82%	671	267	40%
Maragua	7757	6824	88%	786	10%	89%	100	74	74%
Muranga	4160	3025	73%	1404	32%	80%	678	230	34%
Kirinyaga	9031	5447	60%	2123	28%	68%	2050	1190	58%
Nyeri	11863	7923	67%	3135	28%	74%	2728	1422	52%
Kiambu	11906	7757	65%	2270	23%	71%	1947	599	31%
Kilifi	5307	5228	99%	402	7%	99%	714	635	89%
Total	94047	63450	67%	20302	24%	73%	13027	5641	43%
Type of facility									
DH/SDH*	31691	23878	75%	5781	19%	79%	9196	4667	51%
HC+	36588	22767	62%	8759	28%	70%	3299	868	26%
Dispensary	25768	16805	65%	5762	26%	72%	532	106	20%

** District/sub-District hospital, + Health centre*

HIV prevalence in the antenatal clinics and maternity: A total of 7993 women were identified as HIV infected through antenatal HCT, 2970 (37%) at DH/SDH, 2807 (35%) at HC level and 2216 (28%) at the level of the dispensary. The overall prevalence of HIV was 9.5% as shown in table 3 Antenatal HIV prevalence was 10% at the DH/SDH, 8.9% at HC and 9.8% at the level of the dispensaries. HIV prevalence at the health centres and dispensary was significantly lower compared to that at the District hospital, OR 0.88 [(95%CI 0.83,0.93) p < 0.000] and OR 0.98 [(95%CI 0.92,1.04) p < 0.04] respectively. There were inter-District variations in the HIV prevalence, with the following 3 Districts in western Kenya having the highest HIV prevalence, Bondo 24%, Rachuonyo 21.3%, and Homa bay 24.7%. Kajiado district at 12.8% and Murang'a at 8.2% had a medium prevalence while the lowest was Kilifi at 4%. The other districts had an ANC HIV prevalence ranging between 5.1-5.5%. Overall, 4162 (52%) of the newly identified HIV positive women were from the 3 high HIV prevalence Districts, 781 (8.5%) from the two middle prevalence Districts and 2931 (36.7%) from the 7 low HIV prevalence Districts.

In the maternity, 701 women were newly diagnosed as HIV sero-positive 78% at DH/SDH facilities, 20% at HC level and 2% at the level of the dispensary. Overall HIV prevalence was 12.4% among clients tested in the maternity with some variation across facility level, 11.7% (548/4667) at DH/SDH, 16.2% (141/868) at HC and 11.3% (12/106) at the level of the dispensary. Compared to the District hospital women accepting

maternity HCT at lower level facilities had a two-fold increased likelihood of being HIV positive OR 2.03 [(95% CI 1.52,2.76) p < 0.000]. As shown in table 3, the overall maternity HIV prevalence was 30% higher than that in the antenatal clinics, 14% higher at DH/SDH, 82% and 13% higher at HC level and dispensary level respectively. Only 3 of the 12 Districts had a maternity HIV prevalence that was lower than that at antenatal clinic. The difference between antenatal and maternity HIV prevalence was significantly different on statistical testing for only one district. The overall HIV prevalence of women testing in the postnatal period was 7.7%.

Table 3

HIV Prevalence in the ANC and Maternity

District	Total CT (a)	Total ANC positive (b)	ANC HIV prevalence (c=b/c)	CT maternity (d)	Newly diagnosed as HIV infected in maternity (e)	Maternity HIV prevalence (f=e/d)	Difference between ANC and maternity HIV prevalence (g=c-f)	P (difference between ANC and maternity HIV prevalence (h)
Bondo	5816	1458	25.1%	226	50	22.1%	2.9%	0.6
Homabay	5860	1448	24.7%	279	66	23.7%	1.1%	0.8
Rachuonyo	5906	1258	21.3%	132	38	28.8%	-7.5%	0.2
Kajiado	4165	536	12.9%	339	71	20.9%	-8.1%	0.1
Kitui	7664	419	5.5%	248	16	6.5%	-1.0%	1
Mwingi	8017	414	5.2%	267	17	6.4%	-1.2%	0.7
Maragua	7610	389	5.1%	74	6	8.1%	-3.0%	0.3
Muranga	4429	362	8.2%	230	17	7.4%	0.8%	0.8
Kirinyaga	7570	411	5.4%	1190	104	8.7%	-3.3%	0.3
Nyeri	11058	527	4.8%	1422	89	6.3%	-1.5%	0.7
Kiambu	10027	548	5.5%	599	183	30.6%	-25.1%	0.000
Kilifi	5630	223	4.0%	635	44	6.9%	-3.0%	0.3
Total	**83752**	**7993**	**9.5%**	**5641**	**701**	**12.4%**	**-2.9%**	**0.8**
Type of facility								
DHSDH	29659	2970	10.0%	4667	548	11.7%	-1.7%	0.1
HC	31526	2807	8.9%	868	141	16.2%	-7.3%	0.8
Dispensary	22567	2216	9.8%	106	12	11.3%	-1.5%	0.6

Delivery of antenatal and maternity ARV prophylaxis: Eighty-one percent, 6478 of the 7993 women identified as HIV sero-positive through antenatal testing received their ARV prophylaxis as shown in table 4. The backbone of the ARV prophylaxis was sdNVP which was issued to 87.3% of the women who received any ARV prophylaxis. During the course of the year more efficacious regimens were introduced. Thus 90% of the women using ARV prophylaxis in the first quarter receiving sdNVP compared to 78% of those reported in the last quarter of the year. In the first quarter of the year 136 women used the AZT/NVP protocol compared to 346 women in the last quarter reflecting a 2.5-fold increased use of a more efficacious PMCT regimen.

In 5 districts, the total number of women receiving ARV's at the time of delivery exceeded 100%. It was not possible to determine whether there was a problem of

documentation like double counting or women were being issued with additional doses of prophylactic ARV's. Nevertheless, 74% of the HIV positive women who delivered at the DH/SDH received ARV prophylaxis, as did 65% at HC and 71% at a dispensary.

Table 4

Delivery of ARV prophylaxis to HIV positive women in the antenatal clinic

District	Total ANC positive	Mother ANC sdNVP	Mother ANC AZT+sdNVP	Mother ANC HAART	Any ANC mother prophylaxis	Uptake of ARV prophylaxis among HIV positive women in ANC
Bondo	1458	1391	43	4	1438	99%
Homabay	1448	1243	229	10	1482	102%
Rachuonyo	1258	1017	120	13	1150	91%
Kajiado	536	82	99	0	181	34%
Kitui	419	275	26	3	304	73%
Mwingi	414	318	19	0	337	81%
Maragua	389	169	49	8	226	58%
Muranga	362	131	23	5	159	44%
Kirinyaga	411	257	21	1	279	68%
Nyeri	527	242	56	13	311	59%
Kiambu	548	355	62	0	417	76%
Kilifi	223	181	13	0	194	87%
Total	7993	5661	760	57	6478	81%
Type of facility						
DHSDH	2970	2239	345	39	2623	88%
HC	2807	1701	304	12	2017	72%
Dispensary	2216	1721	111	6	1838	83%

Utilization of maternity services by HIV positive women: During this reporting period only a fraction of the women identified as HIV infected during the ANC delivered at a health facility. The number of HIV positive women delivered at the health facility as a ratio of HIV positive women identified in the antenatal period was 2545/7993 (32%) and varied across the different health care levels with highest rates in District hospitals (60%) followed by health centres (21%) and dispensaries (8%). There was also variation across districts as shown in figure 2

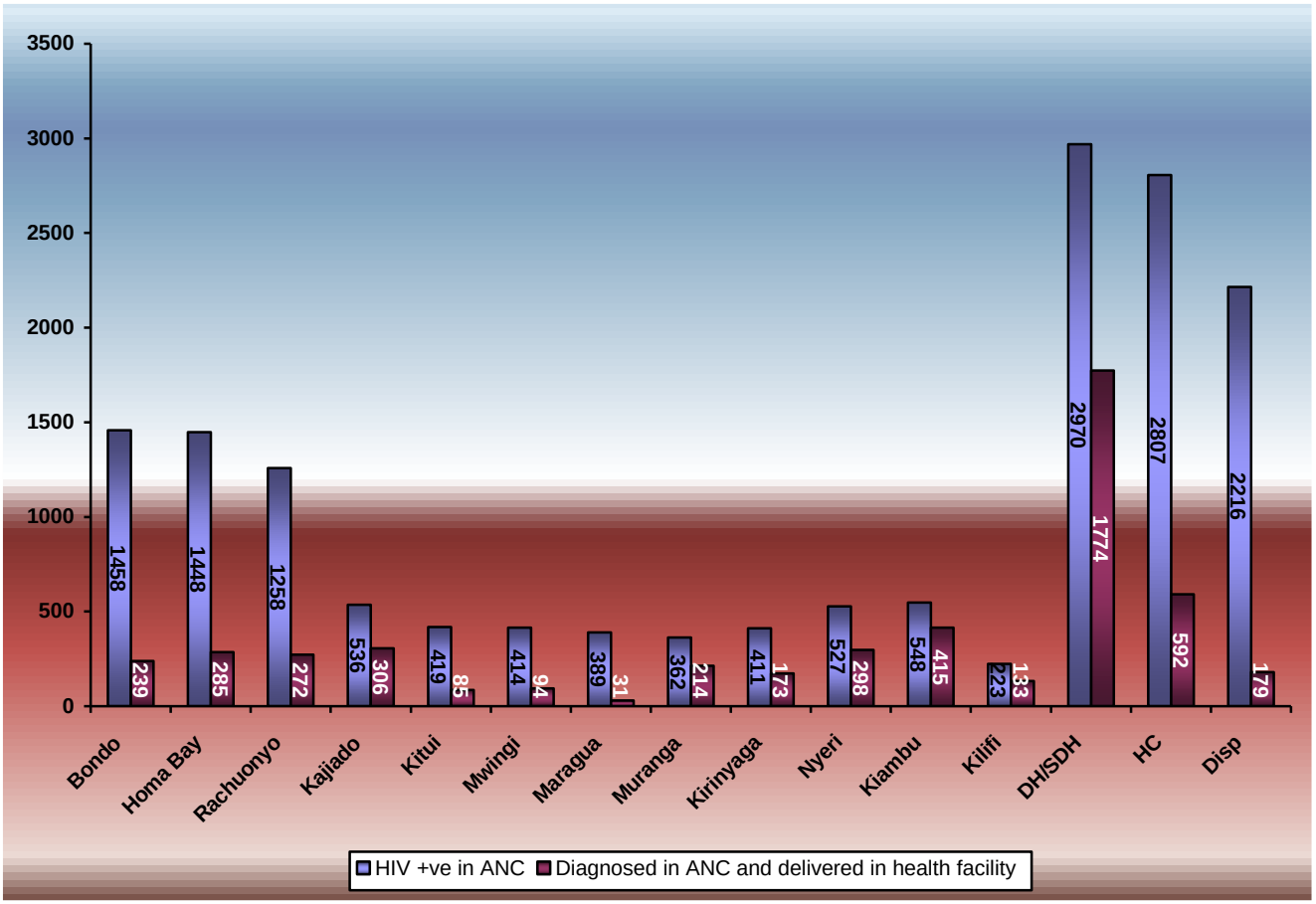


Figure 2: Maternity Utilization by Women Identified as HIV Infected in the Antenatal Clinic

Factors affecting uptake of HCT: Uptake of HCT was affected by health facility level at which services were provided. Compared to the DH/SDHs, uptake of HCT on first antenatal visit at HC level and dispensary was significantly lower OR = 0.54 [(95% CI 0.5,0.56) p < 0.000] and OR = 0.61 [(95% CI 0.59,0.64) p < 0.000] respectively and for combined first and revisits OR = 0.6 [(95% CI 0.58,0.62) p < 0.000] and OR = 0.66 [(95% CI 0.64,0.69) p < 0.000] respectively. Women attending antenatal clinics at level 2 and 3 facilities (HC and dispensary) were more than 40% less likely to find out their HIV status on first visit OR=0.57[(0.5,0.56) p< 0.000] or at combined first and revisit, OR=0.63[(0.61,0.6) p<0.000] compared to those attending at level 4 (DH/SDHs) as shown in table 5). Similarly uptake of CT in the maternity was significantly lower at health centre and dispensary level OR=0.35 [(0.32,0.38)] and OR=0.24 (0.19,0.30) respectively compared to the DH/SDH level. Overall women delivering at lower level 2 and 3 facilities had a 70% less likelihood of finding their HIV status OR 0.33 [(0.30.0.36) p<0.000].

Table 5

Anti-Retroviral Drugs for Prophylaxis and Treatment in The Maternity

District	**Total HIV infected women in maternity (a)**	**HIV Positive mothers in maternity reporting receiving ANC NVP (b)**	**HIV positive mothers in maternity reporting receiving ANC AZT/NVP (c)**	**Mothers issued with NVP in the maternity (d)**	**Mothers receiving intrapartum AZT/NVP (e)**	**Total number of mothers reporting and ARV in the maternity [f=∑(b,c,d,e)]**	**Proportion of infected women in maternity receiving any ARV prophylaxis g= f/a**
Bondo	289	219	26	51	15	311	107%
Homabay	351	200	138	33	12	383	109%
Rachuonyo	310	265	19	46	12	342	110%
Kajiado	377	58	6	29	2	95	25%
Kitui	101	80	6	17	2	105	104%
Mwingi	111	56	0	27	0	83	75%
Maragua	37	13	20	10	7	50	135%
Muranga	231	73	8	29	2	112	48%
Kirinyaga	277	63	4	51	3	121	44%
Nyeri	387	122	23	101	10	256	66%
Kiambu	598	145	13	145	6	309	52%
Kilifi	177	82	1	73	0	156	88%
Total	3246	1376	264	612	71	2323	72%
Type of facility							
DHSDH	2322	1004	212	463	29	1708	74%
HC	733	265	52	123	40	480	65%
Dispensary	191	107	0	26	2	135	71%

Effect of HIV prevalence on uptake of HCT: The HIV prevalence was associated with uptake of antenatal HCT. Compared to districts with low HIV prevalence, the odds of HCT at first antenatal visit in the high and medium HIV prevalence districts was 0.47 [(95% CI 0.45,0.48) p < 0.000] and 0.58 [(95% CI 0.56,0.61) p < 0.000]. The odds of HCT was even lower when one considers testing at first antenatal and revisits 0.31 [(95% CI 0.30,0.32) p < 0.000] and 0.33 [(95% CI 0.32,0.34) p < 0.000] for high and medium HIV prevalence districts respectively compared to low prevalence districts. Likewise, the odds of maternity HCT was lower in high and medium prevalence districts compared to low prevalence districts OR 0.39 [(95% CI 0.35,0.45) p < 0.000] and OR 0.38 [(95% CI 0.34,0.42) p < 0.000] respectively. The likelihood of taking up HCT in the ANC and maternity was 50% and 70% lower in medium and high prevalence districts compared to low HIV prevalence Districts.

Effect of level of facility and HIV prevalence on delivery of prophylactic ARV's in the antenatal clinic and maternity: Delivery of prophylactic ARV varied across facility level with 88% of the women seen at DH/SDH receiving ARV prophylaxis compared to 72% at HC and 83% at the level of the dispensary. Compared to the district hospital, HIV positive women identified in the antenatal clinics were significantly less likely to receive their ARV prophylaxis if they attended a health centre OR 0.34 (95%CI 0.29,0.39) or a dispensary OR 0.64 (95% CI 0.55,0.49). Overall, there was a nearly 60% less likelihood for receiving antenatal ARV prophylaxis at the lower level facilities OR 0.44 [(0.40,0.49) p < 0.000]. In the maternity women delivered at a health centre were significantly less likely to receive ARV prophylaxis OR 0.68 (0.57, 0.82), while delivery of prophylactic ARV at the level of the dispensary was similar to that at the district hospital OR 0.87 (95% CI 0.62,1.22).

In this period, 19.4% of the women who were identified as HIV infected did not receive their ARV prophylaxis, 863 (56%) were from 7 Districts with HIV prevalence of < 6%, 558 (36%) from Districts with HIV prevalence of 6-20% and only 8% from Districts with an HIV prevalence of > 20%. HIV infected women accessing antenatal care in high prevalence districts were 18 times more likely to be provided with their ARV prophylaxis OR = 18.1 (95% CI 14.4,22.6) p < 0.000] compared to low prevalence districts. In the two medium prevalence districts, HIV positive women were significantly less likely to receive ARV prophyalxis in the antenatal period compared to the low HIV prevalence districts OR 0.25 (95% CI 0.22,0.3).

Table 6

Correlates of Uptake of CT, and ARV delivery

	Number accepting	**OR [95% Confidence interval (CI)]**	**P**
Effect of level of facility			
Uptake of CT at first antenatal visit			
DH/SDH	23878/31691 (80%)	1.0	
HC	22767/36588 (72%)	0.54 (0.5,0.56)	< 0.000
Dispensary	16805/25768 (74%)	0.61(0.59,0.64)	<0.000
		0.57(0.5,0.56) *	< 0.000
Uptake of CT at first antenatal visit and revisits			
DH/SDH	29659/37472 (79%)	1.0	
HC	31526/45347 (69%)	0.6 (0.58,0.62)	< 0.000
Dispensary	22567/31530 (71%)	0.66(0.64,0.69)	<0.000
		0.63(0.61,0.6) *	< 0.000
Uptake of maternity testing			
DH	4667/9196 (51%)	1.0	
HC	868/3299 (26%)	0.35 (0.32,0.38)	< 0.000
Dispensary	106/532 (20%)	0.24 (0.19,0.30)	<0.000
		0.33 (0.30.0.36) *	< 0.000
HIV prevalence at ANC			
DH	2970/29659 (10%)	1.0	
HC	2807/31526 (8.9%)	0.88 (0.83,0.93)	< 0.000
Dispensary	2216/22567 (9.8%)	0.98 (0.92,1.04)	0.046
		0.92(0.89,0.96) *	< 0.000
HIV prevalence at maternity			
DH	548/4667 (11.4%)	1.0	
HC	41/868 (16.2%)	2.36 (1.68,3.32)	< 0.000
Dispensary	12/106 (11.3%)	1.04 (0.5,2.01)	<0.000
		2.03 (1.52,2.76) *	< 0.000
ANC delivery of ARV			
DH/SDH	2623/2970 (88%)	1.0	
HC	2017/2807 (72%)	0.34 (0.29,0.39)	< 0.000
Dispensary	1838/2216 (83%)	0.64 (0.55,0.7)	<0.000
		0.44 (0.40,0.49) *	< 0.000
Maternity Delivery or ARV			
DH/SDH	1708/2322 (74%)	1.0	
HC	480/733 (65%)	0.68 (0.57,0.82)	< 0.000
Dispensary	135/191 (71%)	0.87 (0.62,1.22)	0.3
		0.72 (0.62,0.85) *	< 0.000
Effect of HIV prevalence			
Uptake of CT at first antenatal visit			
High HIV prevalence	13383/23948 (56%)	0.47 (0.45,0.48)	0.00000
Medium HIV prevalence	6060/9879 (61%)	0.58 (0.56,0.61)	0.00000
Low HIV prevalence	44007/60220 (73%)	1.0	
		0.5 (0.49,0.52) *	0.00000
Uptake of CT at first			

antenatal visit and revisits			
High HIV prevalence	17582/32695 (54%)	0.31 (0.30,0.32)	0.00000
Medium HIV prevalence	8594/15448 (56%)	0.33 (0.32,0.34)	0.00000
Low HIV prevalence	57576/72779 (79%)	1.0	
		0.32 (0.31,0.32) *	0.00000
Uptake of maternity testing			
High HIV prevalence	637/2239 (28%)	0.39 (0.35,0.45)	0.00000
Medium HIV prevalence	569/2042 (28%)	0.38 (0.34,0.42)	0.00000
Low HIV prevalence	4435/8746 (51%)	1.0	
		0.38 (0.35,0.41) *	0.00000
ANC delivery of ARV			
High HIV prevalence	4070/4164 (98%)	18.1 (14.4,22.6)	0.00000
Medium HIV prevalence	340/898 (38%)	0.25 (0.22,0.3)	
Low HIV prevalence	2068/2931 (71%)	1.0	
		0.74 (1.78,2.21) *	0.000

** MH weighted odds ratio*

DISCUSSION AND RECOMMENDATIONS

This study shows that utilization of a standard approach to PMCT intervention allows for rapid scaling up of services to many facilities at the same time. The standardized components included a nationally approved training package for trainers and service providers, standard tools for baseline assessment and support supervision, standard package of pregnancy and delivery care as well as a fairly standard approach to delivery of the services. The study also shows that data from well-maintained institutional daily activity registers collected by trained personnel can be used to assess progress in roll-out and help strengthen the program.

The second key observation is that PMCT services need to be scaled up to the lowest point in the health care system in order to achieve universal coverage. Scaling up to the HC and dispensary doubled and tripled the number of women accessing PMCT and the potential for further scale-up existed within these districts if the additional 74 facilities that are currently not providing MCH services and any new ones in the future are upgraded to provide a comprehensive care package that includes PMCT. The current approach to PMCT roll-out has been to have comprehensive HIV care at higher level facilities where there is a large compliment of staff with diverse skills. This study shows utilization of maternal child health services is complex with 70% of pregnant women accessing antenatal care at level 2 and 3 facilities, and of note 27% at dispensary, a level which is not equipped to provide antenatal care. Up to 55% post-delivery bookings were at a dispensary by mothers bringing their babies for immunization and growth monitoring. Dispensaries were ill-equipped to provide the mother with postnatal care let alone HIV care services. The PMCT package provides different components of care during pregnancy, delivery and in the postnatal period. Lower level facilities need specific strengthening, to enable provision of MCH services as well as PMCT services that extend into the postnatal period. Booking antenatal care or delivery in a facility offering PMCT services has been associated with increased likelihood of accessing HCT[10].

A significant number of women were opting out of HCT when offered on first antenatal visit. In this study uptake of HCT on first antenatal visit was 67% and a quarter of the women who found out their

HIV infection status through antenatal testing did so on a revisit. Published studies have shown that some women defer HCT to consult with their partners and other family members and therefore offering HCT to women with unknown status on a revisit increases coverage [10,11,12]. Quality of information and counselling may also influence uptake of HCT[10]. Group counselling, a strategy adopted in busy poorly staffed facilities alone is associated with refusal of testing while group counselling followed by individual counselling is associated with a very high likelihood of accepting HCT[10]. Other factors shown to increase HCT include opt-out approach to HCT compared to opt-in, and rapid on-site testing by the nurse midwife[13,14]. The model of delivering HCT in this program roll out already incorporated all these best practices. HCT during revisits considerably increases the staff workload and may reduce opportunities for counselling on other relevant areas like infant feeding and family planning. Since individual women were not interviewed, it is not possible to determine whether women failed to test in the antenatal period either because HCT was not offered, or because they accessed care where PMCT services were not yet integrated into MCH services or because of personal reasons. Partner involvement increases uptake of PMCT services and although women were routinely encouraged to bring their partners for antenatal HCT, very few of them were seen according to verbal reports by the care providers[11,12].

PMCT program was initially focused on antenatal testing and only later rolled out to the maternity and more recently to the postnatal clinic and it is not surprising that the highest uptake of HCT was in the antenatal clinic. In this population 6% of the pregnant women with unknown status presented to health care system for the first time, during labour and delivery, and although only 43% of these women accessed testing, they contributed 8% of the women who were identified as HIV positive. Maternity HCT provided an opportunity for identifying infected women and directly observing their ARV prophylaxis. HCT uptake of > 90% in maternity has been reported in a hospital program that trained nurse midwives to systematically offer testing to women and their partners with unknown status before and after delivery[14]. Staff shortages and lack of partner involvement in the maternity HCT and newness of the program probably explains the low uptake of testing in this roll-out context.

Postnatal testing should be strengthened to reach women who fail to access antenatal and maternity services and are accessing immunization and well child clinic services to enable early identification of babies and mothers in need of HIV care. ARV prophylaxis for those identified early enough in the postnatal period and appropriate infant feeding practices will significantly reduce the risk of HIV infection in young infants, while OI prophylaxis and appropriate anti-retroviral therapy will reduce mortality of HIV infected women and their babies[16].

This study also showed that DH/SDH hospitals had better performance, women were more likely to access testing in the maternity and antenatal clinics and when they were identified were more likely to be issued with ARV's for PMCT. The poorer performance at lower level facilities needs to be urgently looked into because the majority (67 %) of pregnant women needing PMCT services are accessing care at level 2 and 3 facilities. In this study among the 10,295 women who booked ANC and failed to test, 20% were at the level of the DH/SDH, 49% at HC and 30% at dispensaries. The PMCT client load in the lower level facilities was low, but this is countered by the fact that there are often only one health workers

responsible for health care provision services at the facility. In addition, failure to provide the services on a daily basis also contributed to the missed opportunities for HCT. We postulate that higher numbers, more skilled staffs at DH/SDH and closer supervision contributed to higher uptake of HCT. There were frequent reports of PMCT services being disrupted when the only qualified personnel at a facility was re-deployed to night duty or to another service area.

Level 2 and 3 facilities are close to the communities, and it is possible that fear of involuntary disclosure may have made women less willing to test. The SDS were well trained to maintain confidentiality but the danger of involuntary disclosure is always there for instance an HIV post-test takes longer and the distress on the client's face as they leave the health facility is often obvious. The observation that women in high HIV prevalence districts were less likely to accept testing in the antenatal and maternity testing further strengths the postulate that fear of positive result and stigma may have led to self-exclusion from the services.

A very worrying observation was the missed opportunities for ARV prophylaxis among women identified as HIV infected. The lack of individual patient records makes it difficult to determine whether these were true missed opportunities or lack of documentation. We have assumed that it is the former since ARV's are fairly well controlled drugs. Most missed opportunities for ARV prophylaxis were in low HIV prevalence Districts. Health workers in high HIV prevalence districts were 18 times more likely to deliver ARV prophylaxis to their ANC clients and in the maternity, there was > 100% delivery of ARV prophylaxis. It was not clear whether health workers were failing to provide the ARV's for PMCT or whether women identified as HIV infected were self-excluding themselves from the services. Health workers were instructed to issue sdNVP for mother and baby a soon as a pregnant woman was identified as HIV infected because there was enough programmatic evidence that many women would not return for subsequent antenatal visits and especially when they are assured that they are well and the baby has a normal lie. Issuance of ARV prophylaxis at the time of diagnosis has been shown to increase uptake of ARV prophylaxis[17]. Low ARV uptake in low HIV prevalence regions is probably due to stigma among the women and the fear of discrimination by family members and society. There were anecdotal reports that health workers reported that some HIV infected women were deferring collection of ARV's. Another problem was that not all the staff working in the critical areas were trained on PMCT, a problem that was further aggravated by staff rotations. Stock-out of sdNVP for PMCT was not a problem in these facilities because he development partner ensured that there was a constant supply by regular monitoring of the stocks.

By all standards these 12 districts were doing very well and had achieved the goals set out by the national PMCT program. Unfortunately, these efforts are still far short of achieving the goals of a HIV free generation. Based on demographic studies, only 70% of pregnant women in all 12 Districts were accessing ANC and delivery care within government health facilities. Once women accessed services, 19% failed to access HCT while 17% of the identified HIV positive women failed to receive their ARV prophylaxis. A program with 80% HCT uptake, 80% ARV delivery of a 50% efficacious regimen, would avert only 32% of the possible infant infections. If the program improves the ARV delivery and ensures that all mother identified as HIV positive receive their ARV's and are well counselled to adhere to the therapy, 59% of

the infant infections can be averted. If a complete switch is made to an ARV regimen with 80% efficacy and delivery of ARV prophylaxis is still at 80%, only 52% of the possible infections are averted and even if ARV delivery is increased to 100%, approximately 64% infections will be averted. Switching to more efficacious PMCT regimens is the ultimate goal and this was implemented after the life of this program but to reach there significant investments have to be made in training health workers on the new regimes, adherence counselling, and more comprehensive commodity management structures. This study team postulated that in the short term, significant improvements could be made on prevention of infant infections by community mobilization to increase utilization of services at PMCT enabled facilities, minimizing the missed opportunities in CT and even more important delivery of ARV prophylaxis to those that are already identified as HIV infected.

In 2006, only 20% of pregnant women in resource constrained settings accessed PMCT services[18]. As it was then and is now, governments in resource constrained settings can only make progress if they systematically ensure that all health facilities are able to deliver an integrated PMCT-maternal child health service. To do this, facilities that are currently not providing MCH services need to be equipped to do so, lower level facilities need to be strengthened in terms of skills and staffing levels to provide all the components of PMCT as part of integrated PMCT-MCH services. An example from this study is that 55% of women with unknown HIV status at 6 weeks postnatal visit accessed care at a dispensary. Survival of HIV exposed children requires effective prevention of HIV and survival of their mothers[19,18,17]. This paper focuses on delivery of antenatal HCT and ARV prophylaxis. A complete PMCT service also includes skills in staging of HIV, administration of co-trimoxazole to HIV infected women and exposed babies, collection of infant dry blood spots for early infant diagnosis (EID), linkages with ARV treatment centres and some level of chronic disease follow-up. Provision of the full complement of PMCT at higher level facilities as is the current practice has limited impact and will not achieve the goal of a HIV free generation. Strengthening of lower level facilities need policy level decisions and a willingness of governments and development partners to invest in bricks and mortar, staff salaries in addition to the current support in training, supervision, ARV's, laboratory, and other consumables.

This study has several strengths, the first being the findings from 12 Districts distributed through 5 of the 8 administrative regions, serving populations with diverse HIV prevalence, as well as cultural and ethnographic differences that are characteristic of Kenya. The second strength of this study is that this data contributed nearly 10% of all women who accessed PMCT services in Kenya in the reporting period. The third strength is that the different levels of health care facilities are represented and show that PMCT can be delivered at facilities with lower staffing levels and limited skills mix. The two key limitations of this study are that individual client records to enable follow-up of women to determine their adherence to the PMCT interventions and universal offer of early infant diagnosis (EID) using PCR testing was not fully established in this time period and therefore program impact in term of infant HIV infection, and HIV-free survival could not be determined (21).

CONCLUSION

Standardized approaches and partnership with the development partner enhanced PMCT scale-up. To achieve adequate

coverage, PMCT services need to be extended to the most peripheral health facilities. Further operational research is required to enhance quality of PMCT services at lower level facilities.

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