PREVALENCE OF HIV SEROPOSITIVITY IN NEONATES OF NON-BOOKED WOMEN DELIVERING AT THE KENYATTA NATIONAL HOSPITAL.

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A DISSERTATION IN PART FULFILLMENT FOR THE DEGREE OF MASTERS OF MEDICINE IN PAEDIATRICS AND CHILD HEALTH OF THE UNIVERSITY OF NAIROBI.

2002

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DECLARATION.

I declare that this dissertation is my original work and has not been published elsewhere or presented for a degree in any other university.

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DEDICATION.

THIS BOOK IS DEDICATED TO THE MILLIONS OF INNOCENT HIV POSITIVE CHILDREN. WE HOPE THAT ONE-DAY HIV/AIDS WILL BE CONQUERED.

ACKNOWLEDGEMENTS.

1) I am grateful to my supervisors Dr. R. Nduati and Prof. Musoke for their support and guidance all through the study.
2) My family members for the encouragement all the time may God bless you all.
3) I am also grateful to my lecturers and the entire staff at the department of paediatrics for their support.
4) Mr. Erustus Muniu from KEMRI for contribution on data analysis, your patience was appreciated.
5) Mr. Bakari, the entire staff of labour ward and newborn unit for their tireless work on data collection.

ABBREVIATIONS.

AIDS	Acquired Immunodeficiency syndrome.
ANC	Ante-natal Clinic
ARC	AIDS Related Complex.
ART	Antiretroviral therapy.
AZT	Zidovudine
BW	Birth weight
C I	Confidence interval
CDC	Center for disease control
CMS	Centimeters.
DOB	Date of birth
ELISA	Enzyme Linked immunosorbent assay
GPA	Global program on AIDS
HC	Head circumference
HIV	Human Immunodeficiency Virus.
HTLV	Human T-Lymphocyte Virus
KNH	Kenyatta National Hospital.
KSH	Kenya shillings
LAV	Lymphadenopathy associated virus
MMed.	Masters in medicine.
MOH	Ministry of health
MTCT	Mother to child transmission
NASCOP	National AIDS control program
NVP	Nevirapine
OR	Odds ratio
PCR	Polymerase chain reaction
S E	Standard error.
SPA	Special programme on AIDS

SPSS	Statistical program for social sciences.
STD	Sexually transmitted disease
SVD	Spontaneous vertex delivery.
T4	T helper lymphocyte
T8	T suppressor lymphocyte.
UNAIDS	United nations program on HIV/AIDS
UON	University of Nairobi
US$	US dollars.
USA	United States of America.
VCT	Voluntary counseling and testing
WHO	World health organization.
Wk.	Weeks.

EXPLANATION OF TERMS.

Non-booked women: women who did not attend antenatal clinic at KNH and were not booked to deliver in this hospital.

Abstract.

Background.

Non booked women constitute about 67% of women delivering at Kenyatta National Hospital (KNH). The magnitude of HIV infection in this group of women is unknown hence it is not possible to put in place intervention methods to prevent MTCT of HIV.

Objective.

To determine the prevalence of HIV seropositivity in neonates of 'non booked' women delivering at KNH.

Study design.

A cross sectional descriptive study was carried out in an attempt to describe the prevalence of HIV antibodies in neonates of women who came to deliver in KNH as 'non booked'.

Setting.

Labour ward and newborn unit KNH.

Study period.

July to September 2001.

Study subjects.

A total of 253 infants delivered to 'non booked' women in KNH labour ward were included in the study.

Methods.

The non-probability sampling method was used where every consecutive non-booked woman who met the inclusion criteria was recruited . Five milliliters of cord blood was taken from each infant and labeled. Consent was sought from the mother to test the blood for HIV antibodies. Where the consent was denied testing was done anonymously, without identification data, to get the true prevalence. Screening for HIV antibodies was done using Capillus HIV1/HIV2 and confirmed with Immunocomb.

Results.

A total of 253 babies were recruited of whom 220 (87%) mothers gave consent to testing for HIV and 33 (13%) declined to give consent. The maternal age ranged from 15 to 39 years with a median age of 23 years (24 for HIV seropositive population and 23 for the HIV seronegative population). The median age at first coitus in the study population was 18 years (17.5 for HIV seropositive women and 18 years for HIV seronegative women). There were a median number of two pregnancies among the study population (two for the HIV positive women and one for the HIV negative women).

Two hundred and fifty three infants were recruited, of which 134 (53%) were males and 119(47%) were females. Gestational age ranged from 26 to 42 weeks by assessment using Dubowitz criteria (median 38weeks) Birth weight ranged from 650 to 5000 grams (median 2500 grams).

Forty infants (15.8%) tested HIV positive by both Capillus and immunocomb rapid methods. Neonatal AZT was provided to 17 (48.6%) of 35 HIV seropositive women who consented to HIV testing while the remaining 18 (51.4 %) declined.

Counseling was done to the HIV positive mothers on infant feeding options according to WHO and Ministry of health's recommendations. Twenty-eight (80%) chose to breast feed, 3 (8.6%) chose to formula feed while 4 (11.4%) opted to give their infants cows milk.

Mothers whose infants tested HIV positive were requested to come back after two weeks for follow up and further counseling. Only 20 (55.56%) came back and of these only 12 (60%) had informed their partners of their infant's HIV status.

Conclusion

The prevalence of HIV antibodies in neonates of non-booked women coming to deliver in KNH is 15.8%. The acceptance of HIV rapid testing amongst the study population was 87%. Acceptance rate of neonatal AZT as a post exposure intervention in prevention of mother to child transmission of HIV in the study population who tested HIV positive was 48.6%. Majority (80%) of mothers whose babies tested positive for HIV antibodies opted to breast-feed their babies.

BACKGROUND AND LITERATURE REVIEW.

INTRODUCTION.

Acquired immunodeficiency syndrome (AIDS) was first described among homosexual men in USA in 1981[1,2,3]. Since then, HIV/AIDS epidemic has become one of the greatest challenges facing humanity in the twentieth century [4].

The causative agent was identified in 1983 in Paris and called lymphadenopathy-associated virus (LAV). One year later Gallo isolated a virtually identical virus, but called it the human T cell lymphotrophic virus type III (HTLVIII). The name currently used is human immonodeficiency virus (HIV) [5]. HIV is a human retrovirus, which predominantly infects human T lymphocytes of the helper subset (T4 cells) and leads to a gradual decline in these cells as HIV infection progresses [6]. Reduced T4 cell numbers results in global defects in a number of components of the body immune system, leading to immunosuppression and susceptibility to opportunistic infections, as well as lymphoid malignancies [6].

TRANSMISSION.

The three modes of transmission of HIV are sexual intercourse, contact of blood and blood products and mother to child transmission [4]. It is estimated that sexual transmission accounts for 75 percent of all new HIV infections in sub Saharan Africa. In Kenya 75 percent of HIV transmission is through sexual intercourse, 5 percent by contaminated blood and 20 percent through perinatal transmission

[7]. Transmission through blood transfusion has been greatly reduced by screening of donor blood and selecting volunteer low risk donors. A study done on multiply transfused children with sickle cell anemia at Kenyatta National Hospital (KNH) found no HIV positive child among the study group [8].

In pediatric HIV disease, 90 percent of the children acquire the infection from their mothers. Overall, approximately one third of the infants born to HIV positive women acquire HIV infection, the risk being highest for mothers with high viral loads and women who are already symptomatic [4].

INCIDENCE AND PREVALENCE.

More than 36 million people worldwide are now suffering from HIV infection [4]. Sub-Saharan Africa has by far the largest number of people living with HIV- about 22 million, which is two-thirds, the world's total [7].

Since the start of HIV epidemic it is estimated that 3.8 million children have died of AIDS before their 15th birthday, nearly 0.5 million of them in 1999 alone. Another 1.3 million children are currently living with HIV and most will die before their teens. According to the latest estimates 1.07 percent of all adults globally are infected with HIV [4].

HIV infection rates in Kenya are high, about 14 percent among all adults and over 20 percent in pregnant women in some areas of Kenya [7]. The proportion of women attending antenatal clinics who have HIV infection has continued to increase since HIV was first

described and only in the last 2-3 years has there been some tendency to leveling off of the prevalence in the large cities and towns. The prevalence in rural areas continues to rise as shown by the data from the peri- urban/ rural sentinel sites as shown in table 1 and 2. This means that there is a large number of babies exposed to HIV each year in Kenya.

Table 1: Percentage of pregnant women testing HIV positive by sentinel site (urban)

Sentinel site	1990	1993	1996	1998	2000
Busia	17	22	28	30	22
Garissa	5	4	5	6	
Kakamega	5	9	10	16	12
Kisii	2	3	16	15	16
Kisumu	19	20	27	29	35
Kitale	3	8	12	10	17
Kitui	1	8	4	10	14
Meru	3	2	16	23	
Mombasa	10	17	12	16	12
Nairobi	6	17	16	16	
Nakuru	10	23	11	25	
Nyeri	3	3	9	17	14
Thika	3	28	13	34	21

Source NASCOP 2000.

Table 2: Percentage of pregnant women testing HIV positive by sentinel site

(Peri-urban and rural)

Rural site	District	1994	1995	1996	1997	1998	1999	2000
Chulaimbo	Kisumu		21	27		37	26	31
Kaplong	Bomet			4	6	3	6	4
Karurumo	Embu	2	10		26	12		
Maragua	Muranga	7	13					10
Mbale	Vihiga	12	11		16	12	13	25
Mosoriot	Uasin Gishu	2	12		9	3		7
Njambini	Nyeri				4	4		9
Tiwi	Kwale	17	24			33	23	14

Source NASCOP 2000.

Several studies have been done on HIV infection in children at KNH since 1988. Phiri in 1989 reported a rate of 11.24 percent HIV sero-prevalence amongst the screened neonates in newborn unit [9]. Warurua in 1992 found HIV sero-prevalence of 12.7 percent amongst the general pediatric emergency admissions [10]. Otieno in a subsequent study in 1993 found HIV sero-prevalence of 23.1% of which 14% were diagnosed as having AIDS. Seventy percent of these were below 24 months of age [11].

PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV.

Approximately six hundred thousand babies worldwide are infected with HIV through mother to child transmission each year [12]. Understanding the timing of perinatal transmission of HIV is very important in order to target interventions appropriately. Mother to child transmission of HIV can occur during pregnancy, during labor and after delivery. The majority of transmissions occur at the end of pregnancy, during labor, delivery, and through early breast-feeding period [13]. Mother-to-child transmission of HIV1 through breast milk has been well documented. Based on meta-analysis, the frequency of breast milk transmission during acute maternal infection has been estimated to be 29% (95%confidence interval [CI] 16%-42%) [14]. For women with established infection, the additional risk of HIV-1 in breastfed infants was estimated at 14%(95% CI, 7%-22%) [14]. A randomized clinical trial of formula versus breast milk, conducted in antenatal clinics in Nairobi determined the frequency of breast milk transmission of HIV-1 to be 16.2%. The majority of infections occurred early during breastfeeding [15]. In view of this, formula feeding, early weaning, surrogate breastfeeding by HIV negative women and pasteurization of breast milk have been proposed as a way of reducing the risk of postnatal infection [16,17,18].

In the past few years, important progress has been made in the prevention of mother to child transmission of HIV, by use of antiretroviral therapy (Table 3). The Center for Disease Control (CDC) sponsored short course Zidovudine trial reported a 50%

efficacy in a non-breastfeeding population in Thailand [19]. In a breast-feeding population, 37% efficacy was reported in Cote d'Ivoire at 6 months postpartum [20]. The regime consists of 300mg Zidovudine twice daily starting at 36 weeks gestation and every 3 hours during labor until delivery. While a similar study in Cote d'voire and Burkina Faso using a regime of Zidovidine 300mg twice daily from 36 weeks until labour, 600mg at the beginning of labour and 300 mg twice daily for seven days post partum had an efficacy of 38% [21]. Preliminary ACTG findings from MTCT of HIV study (the PETRA clinical trial study) [22] in Sub Saharan Africa reported a preliminary efficacy rate of 51% at six weeks in a breast feeding population. This regime consisted of 300 mg Zidovudine and 150 mg Lamivudine twice daily from 36 weeks gestation until delivery (PETRA-A regime). An additional 200-mg Zidovudine was provided every 3-h during labor. The twice-daily Zidovudine and Lamivudine regime was continued for 1 week postpartum for the mother and given to the baby as 5 mg/kg Zidovudine and 2 mg/kg Lamivudine in syrup form every 12 hrs for one week. Efficacy was 37% in a regime of Zidovudine and Lamivudine equivalent to the intrapartum and postpartum parts of PETRA-A (PETRA-B regime). Because the Thai and the PETRA regimes begin late, at 36-38 weeks gestation or at labor, they are more feasible and less expensive than the ACTG 076 regime.

Results of a third short course regime, the HIVNET 012 trial in Kampala, Uganda, also in a breast feeding population were announced in July 1999. The nevirapine regime consists of a single 200-mg oral dose given to women at onset of labor and at 2-mg/kg dose to neonates within 72 hrs of birth. Nevirapine, a non-nucleoside reverse transcriptase inhibitor, has a long half-life and readily passes from

the mother to the fetus in utero. The mothers in the control group received 600 mg Zidovudine orally at the onset of labor and 300 mg every 3 hrs until delivery, and neonates received 4mg/kg Zidovudine orally twice daily for 7 days after birth. Compared with Zidovudine, Nevirapine decreased transmission of HIV-1 by 47% at age 14-16 weeks [23, 24]. The regime was well tolerated. Because the HIVNET 012 regime consists of only one dose to mothers and one dose to neonates, it is less expensive than the other regimes and potentially more cost effective. The total cost of the two dose treatment is only about US$ 4, a price that makes it much more likely the regimen that could be widely adopted in the developing world. If this were to happen the treatment would save 300,000 to 400,000 newborns from HIV infection each year [25]. In Kenya where the adult HIV prevalence is 14% and there are approximately 1.5 million births per year 40,000 of the annual 80,000 new HIV infections in babies could be prevented.

Table : 3. PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV USING ART.

TRIALS

STUDY	POPULATION	TRIAL END POINT	EFFICACY
Short course Zidovudine (Thailand)	Non breast feeding.	Six months	50%
Short course Zidovudine (Cote d'voire)	Breast feeding	Six months	37%
Short course Zidovudine(Cote d'voire and Burkina faso)	Breast feeding	Six months	38%
PETRA regimen	Breast feeding	Six weeks	51%
HIV NET 012 regime	Breast feeding	Sixteen weeks	47%

SIGNIFICANCE AND STUDY UTILITY.

The HIV/AIDS pandemic threatens to undo the considerable progress made over the past three decades in the field of mother and child health [4].

HIV VCT is offered at the antenatal clinic KNH. HIV seropositive women are subsequently offered short course AZT or NVP if they have been late in booking into the clinic. The women are counseled about infant feeding options that include replacement feeding, exclusive breastfeeding and early weaning. However, 67% of mothers who come to deliver in KNH are non-booked, that is they either attended antenatal clinic elsewhere (47%) or did not attend any clinic at all (20%) [26]. HIV VCT is not routinely offered in other health facilities. Many non-booked women present for delivery with many unattended antenatal problems, including anemia, vitamin deficiencies, untreated sexually transmitted illnesses, which increase the risk of MTCT of HIV. A study done by Wanyoro A.K in 1999 on the outcome of labor between booked and non-booked parturient in KNH found that perinatal mortality of non-booked parturients (249 /1000) was significantly higher compared to that for the booked parturients (22/1000); p value was 0.0001 [27]. Many women give birth before arrival to the hospital or only spend a short time before delivery leading to difficulties in intrapartum regimens of ARVT and VCT. In view of the fact that there are effective interventions to prevent MTCT, establishing the magnitude of HIV disease in this population is imperative. The sero-prevalence of HIV infection in these women can be assessed efficiently by a survey of blood specimens from their newborn babies. The mothers' antibodies pass

through the placenta and if the mother is HIV positive the baby will test positive because of the presence of the mother's antibodies, even if the baby is not infected with HIV. The maternal antibodies start to disappear after the baby is 6 months old. Any time after that, the child may test negative, and this means that the child is not infected. However the mother's antibodies may remain up to 18 months. If a child tests positive before 18 months, you cannot be sure what it means, as it may reflect only the presence of the mother's antibodies and the child may not be infected. However, if the test is positive after 18 months of age, then it means that the child is infected [28]. It is possible to test for HIV virus itself in young babies by more complicated and expensive tests such as PCR, P24 antigen testing or Viral cultures. However these tests are not available in Kenya except in research settings

One method of prevention of MTCT of HIV in this group of non-booked mothers would be to offer targeted counseling on appropriate infant feeding and use of abbreviated regimen of oral AZT within 48 hours [15, 16, 17]. Recent studies have shown that exclusive breast-feeding is associated with a lower risk of mother to child transmission of HIV [29]. Non booked women will benefit from targeted counseling on exclusive breast-feeding and demonstration of appropriate breast feeding techniques. Wade et. al showed that there are reductions in the rates of perinatal transmission of HIV even when abbreviated regimens are begun intrapartum or in the first 48 hours of life[30].

Methods available in KNH for HIV testing require that the patient waits for at least two days for results by which time most mothers who deliver without complications would have been discharged from the hospital. In a study done by Kiarie in 1996 on acceptability of

prenatal screening for HIV in KNH, an overall acceptance of 99.4% was found when HIV testing was offered. Of these, only 69.5% returned to collect results [31]. Rapid methods of testing for HIV would reduce this problem and would allow appropriate intervention before the women leave hospital.

Data on the prevalence of HIV infection amongst the 'non booked' mothers coming to deliver at KNH will help the hospital to plan preventive strategies and the health services which will be needed to care for those who will be infected.

This information can also be used to strengthen campaign for HIV VCT in all antenatal clinics.

HYPOTHESIS.

1. There is high HIV sero-prevalence among 'non booked' women delivering at KNH.
2. There will be high acceptance of rapid HIV testing and neonatal AZT as a post exposure intervention in prevention of MTCT of HIV among mothers testing HIV positive soon after delivery.

OBJECTIVES.

1. To determine the prevalence of HIV seropositivity in neonates of 'non booked' women coming to deliver in KNH.
2. To determine the acceptance of rapid HIV testing and attitude towards administration of AZT as a post exposure intervention in prevention of mother-to-child transmission of HIV in women testing HIV positive in the post delivery period.
3. Compare HIV seropositive and seronegative women to determine factors associated with seropositivity.

MATERIALS AND METHOD.

STUDY AREA.

The study was conducted in the labor ward KNH, which is a referral hospital for the whole country. It is also a teaching hospital for the University of Nairobi. There are 6-8 thousand deliveries per year and 2-3 thousand admissions to the newborn unit annually [26].

SUBJECTS.

All infants in labor ward delivered to 'non booked' women were included in the study.

STUDY DESIGN.

This was a cross sectional descriptive study.

STUDY PERIOD.

This study took place during the months of July, August and September 2001.

INCLUSION CRITERIA.

All infants delivered to non-booked women who delivered at the KNH during the study period were recruited.

EXCLUSION CRITERIA.

1. Infants of women already participating in another HIV related interventional study.

SAMPLE SIZE.

Sample size was be calculated using the formula :

$$n = \frac{z^2_{1-\alpha/2}[p(1-p)]}{d^2}$$ With 95% confidence[32].

Where: z= No of standard errors away from the mean
p= True but unknown proportion in the population.
d= Precision (percentage points of the true proportion)
n= Sample size

Assuming a prevalence level of 20% in the neonates of non booked women. The sample size required was 245 neonates.

PROCEDURES.

SAMPLING METHOD

The non-probability sampling method was used where every consecutive non-booked woman who met the inclusion criteria was recruited.

RECRUITMENT PROCEDURES.

Infants were examined by the investigator on Monday to Fridays between 8.00am to 4.00 p.m where mothers gave consent for participation in the study. Birth weight and head circumference was measured and recorded. Assessment of gestational age was done on all infants based on physical and neurological signs according to Dubowitz [33] and by dates of the last menstrual period. A standard questionnaire was used to obtain information on maternal demographic, clinical status and obstetric data.

CLINICAL INVESTIGATIONS.

Consent was sought from the mother to test cord blood for HIV antibodies after pre-test counseling. Five milliliter of cord blood was taken from each infant and labeled. If consent was denied, cord blood was tested for HIV antibodies anonymously after removing all identification data. Blood specimens were sent to the immunology laboratory KNH. On arrival to the laboratory the specimen was centrifuged and separated sera was placed in labeled vials for analysis.

Screening for HIV antibodies was done using Capillus® HIV-1/HIV-2, manufactured by Cambridge Diagnostics of Ireland and confirmed with Immunocomb®II HIV 1 & 2 manufactured by Orgenics company in Israel. Both are rapid tests intended for the qualitative and differential detection IgG antibodies to human immunodeficiency

viruses types 1 and 2 in human serum or plasma. Immunocomb has a sensitivity of 100% and a specificity of 99.4%, while Capillus HIV1/HIV2 has a sensitivity of 100 % and a specificity of 99.7%. The results were then entered in the data sheet. The sera considered positive was the one, which was reactive in both tests. This method was chosen as the results could be obtained quickly in view of administration of AZT to the children who turn out positive. Babies who were HIV positive were offered AZT 5mg/kg every 12 hours for six weeks as post exposure prophylaxis. All HIV sero-negative mothers were counseled to carry out exclusive breast-feeding. HIV positive women were counseled on different infant feeding options according to the guidelines laid out by WHO and the ministry of health, Kenya and were referred to the general paediatrics outpatient clinic for follow up.

ETHICAL CONSIDERATION.

1. Written consent to conduct the study was obtained from KNH ethical committee.
2. A pre-test and post-test counseling was done.

- Pre-test counseling provided the mother with accurate information concerning HIV infection, preventive measures, modes of transmission, the meaning of HIV antibody test and an accurate history of the patients risk behavior that may contribute to HIV infection was assessed.
- Post-test counseling entailed breaking the news of the HIV test results, reinforcing the preventive education with an emphasis on use of antiretroviral drugs, infant feeding options and safe sexual practices.

3. Laboratory results of those women who gave consent to testing for HIV were provided to the clinician looking after the patient to assist in the management of the patients.
5. Infants who tested positive for HIV antibodies were offered AZT as a post exposure intervention in reducing mother -to-child transmission of HIV and were referred to pediatrics outpatient clinic for follow up.
6. Mothers whose infants tested positive for HIV antibodies, were counseled on different infant feeding options and availability of ART in the country.

DATA ANALYSIS.

All the clinical and laboratory data was analyzed using SPSS program.

Results.

Description of study population.

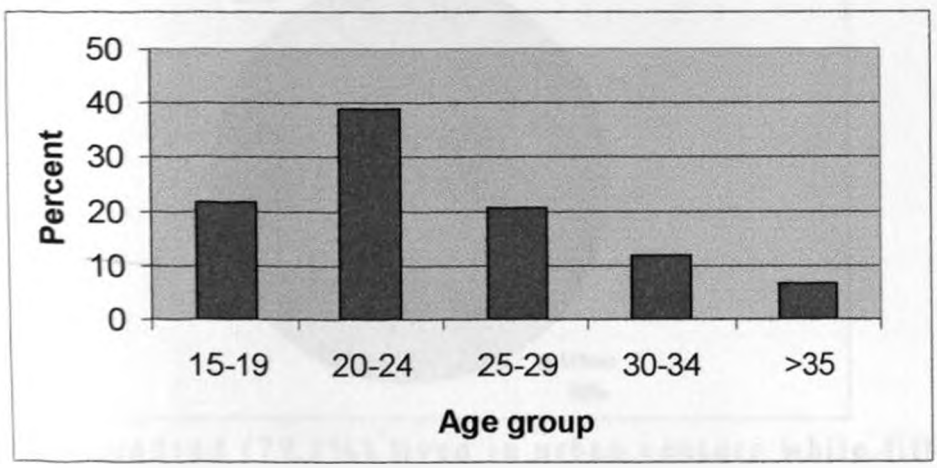
A total of 253 neonates of 'non booked' women delivering at the Kenyatta national hospital were recruited into the study. One hundred and thirty four (53%) were males, while one hundred and nineteen (47%) were females, constituting a male: female ratio of 1.13:1. Gestation age ranged from 26 to 42 weeks (median gestation 38 weeks).

Table 4 : Birth weight distribution of the neonates.

Weight in grams	Frequency	Percent
<1000	5	2.0
1001-1500	39	15.4
1501-2000	44	17.4
2001-2500	46	18.2
>2500	119	47.0
Total	253	100

Median weight was 2500 grams.

Graph 1: Age distribution of the mothers in years.



Mother's ages ranged from 15 to 39 years with a median age of 23 years.

Marital status of the mother.

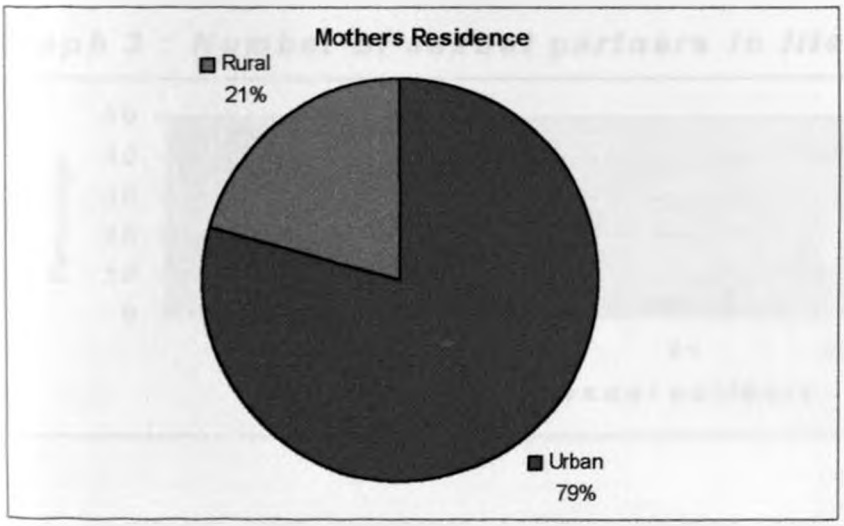
Table 5: Marital status of the mother.

	Frequency	Percent
Single	76	30
Married monogamous	147	58.1
Married Polygamous	25	9.9
Married inherited	1	0.4
Widowed	1	0.4
Divorced	3	1.2
Total	253	100

Seventy-six (30%) were single mothers, whereas 177 (70%) had ever been married.

Mothers residence.

Chart 1: Mothers residence.

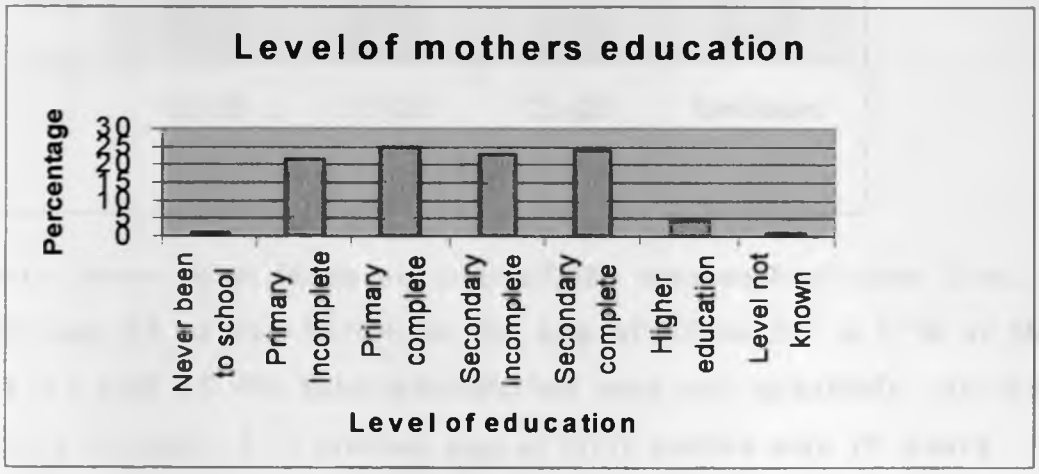


Two hundred (79.1%) lived in urban centers while fifty-three (20.9%) lived in rural areas for the past five years.

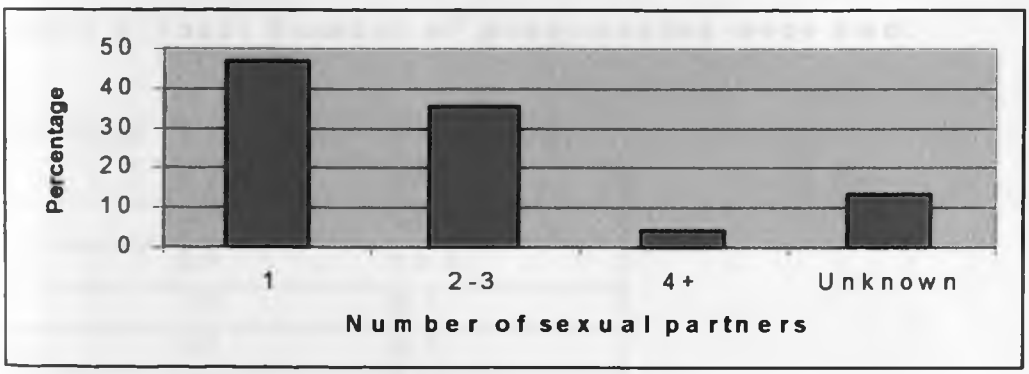
Level of education of the mother.

Fifty-five (21.7%) had primary incomplete, 63 (24.9%) primary complete, 58 (22.9%) secondary incomplete. 61 (24.1%) secondary complete 12 (4.7%) had higher education and 2(0.8%) had never been to school.

Graph 2 Level of mothers education.

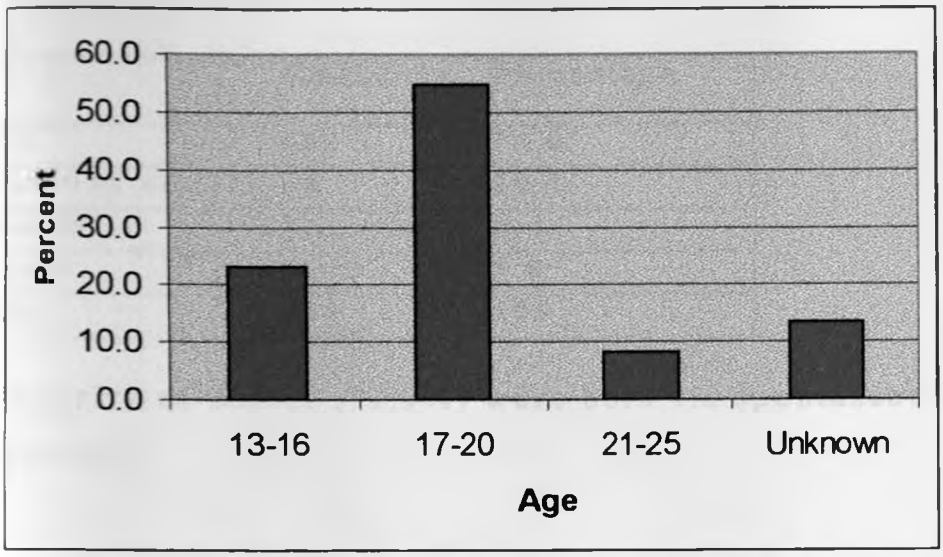


Graph 3 : Number of sexual partners in life.



One hundred and nineteen (47%) women had one lifetime sexual partner, while one hundred (39.5%) had multiple partners. For thirty-four women (13.4%) this information was not available.

Graph 4 : Age at first sexual contact.



Twenty three point three percent of the women had their first coitus at the age 13 to 16, 54.9% at the age of 17 to 20. 8.3 % at the age of 21-25 and 13.4% this information was not available, as they did not give consent. The median age at first coitus was 18 years.

Table 6:Total Number of pregnancies ever had.

Gravidum	Frequency	Percentage
1	122	48.2
2	63	24.9
3	39	15.4
4	17	6.7
≥5	12	4.8
Total	253	100

The women in this study had a median number of two pregnancies.

Table 7: Mode of delivery

	Frequency	Percentage
SVD	182	71.9
Caesarian section	66	26.1
Vacuum	1	0.4
Breech	4	1.6
Total	253	100

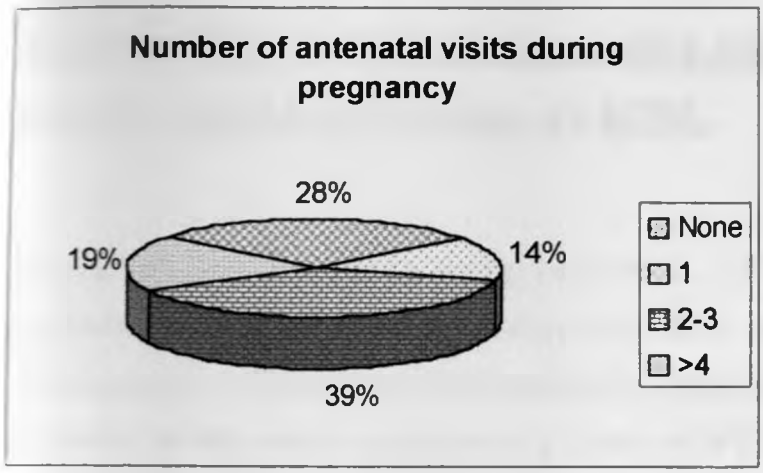
Majority of babies (71.9%) were born via spontaneous vertex delivery.

Table 8: Duration of membrane rupture in hours.

	Frequency	Percentage
<4hrs	144	56.9
4-8 hrs	51	20.2
9-24hrs	24	9.5
>24hrs	11	4.3
Unknown	23	9.1
Total	253	100

The median duration of membrane rupture before birth was 3 hours. Forty three percent of the women had more than 4 hours of ruptured membranes.

Chart 2: Number of antenatal visits during pregnancy



Seventy-two mothers (28%) did not attend ANC, 36 (14) attended only once, 97 (39%) attended 2-3 times, while 48 (19%) attended 4 or more times.

Table 9: Gestation at the time of first antenatal visit.

	Frequency	Percentage
<6 months	59	23.3
6-7 months	102	40.4
≥8months	20	7.9
Did not attend ANC.	72	28.4
Total	253	100

One hundred and sixty one mothers (63.7%) started attending antenatal clinic in good time, while 20(7.9%) were late for appropriate counseling and testing for HIV. Seventy- two (28.4%) did not attend antenatal clinic.

Acceptability of HIV testing using rapid methods by 'non booked' women delivering at KNH.

A total of 253 neonates were recruited, of whom 220 (87%) of their mothers gave consent to testing for HIV and 33 (13%) declined to give consent. This gave acceptability rate to HIV testing using rapid methods in the early postnatal period of 87%.

Prevalence of HIV in the study population.

Among the 253 neonates tested for HIV antibodies 40 tested positive giving a sero-prevalence rate of 15.8%. We compared women who accepted testing to those who refused and found no difference in terms of their HIV seropositivity. 184 (86.4%) of 213 seronegative women and 36 (90%) of 40 seropositive women accepted HIV testing (P=0.5)

Table 10: HIV Status in relation to maternal and infant factors.

	HIV –ve client n=213	HIV +ve Client n=40	P Value
Accepted HIV test	184 (86.4%)	36 (90%)	0.5
Age <20 years	78 (36.6%)	7 (17.5%)	0.02
Ever Married	148 (69.5%)	29 (72.5%)	0.7
Residence urban	170 (79.8%)	30 (75%)	0.49
Level of education			
Non or primary incomplete	40 (19%)	17 (42.5%)	
Primary complete	55 (26.1%)	8 (20%)	
Secondary incomplete	53 (25.1%)	5 (12.5%)	0.02
Secondary complete	52 (24.6%)	9 (22.5%)	
Higher education	11 (5.2%)	1 (2.5%)	
Mode of delivery			
SVD	155 (72.8%)	27 (67.5%)	0.5
C/S, Vacuum, breech.	58 (27.2%)	13 (32.5%)	
ANC Attendance			
None	67 (31.5%)	5 (12.5%)	
1	25 (11.7%)	11 (27.5%)	0.015
2 – 3	80 (37.6%)	17 (42.5%)	
≥ 4	41 (19.2%)	7 (17.5%)	
Parity			
1	126 (59.2%)	9 (22.5%)	
2	39 (18.3%)	15 (37.5%)	0.001
3	31 (14.5%)	9 (22.5%)	
≥ 4	17 (8.0%)	7 (17.5%)	
No. of sexual partners in life	n=183	n=36	
1	108 (59%)	11 (30.6%)	
2-3	70 (38.3%)	19 (52.8%)	0.00015
≥ 4	5 (2.7%)	6 (16.7%)	
Desire for other children			
Want another	98 (53.6%)	8 (22.2%)	
Undecided	60 (32.8%)	24 (66.7%)	0.00049
Want no more	25 (13.7%)	4 (11.1%)	
Sex of baby	n=213	n=40	

Male	110 (51.6%)	24 (60%)	0.33
Female	103 (48.4%)	16 (40%)	
Gestation in weeks by Dubowitz criteria	n=183	n=36	
<37weeks	83 (45.4%)	21 (58.3%)	0.29
≥37	100 (54.6%)	15 (41.7%)	

There was a significant relation between HIV sero-positivity and the following maternal factors, Maternal age, level of education, number of sexual partners, ANC attendance and desire for other children. No significant association was found between HIV status and acceptance to testing, marital status, residence, and mode of delivery as well as sex of the baby and gestation in weeks.

Table 11: Independent predictors of HIV seropositivity

Variable	N (%)	Odds ratio	95% confidence interval		P Value
			Lower	Upper	
Age at first coitus (Median =18 Years)	-	0.90	0.730	1.106	0.3146
Parity					
1	115 (52.5%)				0.0036
2	49 (22.4%)	5.80	1.961	17.088	0.0015
3	34 (15.5 %)	6.81	1.870	24.861	0.0036
4 and above	21 (9.6%)	5.93	1.426	24.665	0.0144
Level of education.					
None & Primary incomplete	54 (24.7%)	2.60	0.708	9.432	0.1508
Primary complete	58 (26.5%)	0.90	0.239	3.398	0.8781
Secondary incomplete	51	0.72	0.187	2.780	0.6347

	(23.3%)				
Secondary complete and higher	56 (25.6%)				0.1757
ANC Visits.					
None	61 (27.9%)	0.26	0.056	1.191	0.0825
1	32 (14.6%)	2.78	0.664	11.652	0.1618
2-3	84 (38.4%)	1.16	0.349	3.879	0.8059
4 and above	42 (19.1%)				0.0187
No. of sex partners					
1	119 (54.3%)				0.0081
2-3	89 (40.7%)	3.62	1.402	9.339	0.0078
4 and above	11 (5.0%)	7.09	1.374	36.585	0.0193
Constant					0.4008

NB : Infants with missing data on one or more variables were excluded from the analysis.

The multivariate analysis of various risk factors is shown in table 25. The significant findings were : Women with multiple sexual partners (Significance of 0.019, odds ratio 7.1, 95% C.I, 1.37 to 36.59) and women who were multiparous (Significance 0.0015 odds ratio 5.8, 95% C.I, 1.96 to 17.09) were at increased risk of being HIV positive. No significant risk of HIV seropositivity was noted for the following factors: age at first coitus, level of education and number of ANC visits during pregnancy.

Table: 12. Acceptance of intervention to prevent MTCT of HIV.

	N = 35
Proportion receiving AZT	17 (48.6%)
Proportion opting to breast-feed.	28 (80%)

Thirty-five mothers of neonates, who tested positive for HIV antibodies out of the forty, were offered neonatal AZT. Four mothers did not consent to testing therefore their demographic identifiers had been removed as per the research protocol and one baby died soon after delivery hence five infants could not benefit from the intervention. Seventeen mothers out of the thirty-five offered neonatal AZT accepted while eighteen declined.

Acceptability rate of neonatal AZT was 48.6% amongst the women offered neonatal AZT. Majority (80%) of mothers whose babies tested positive for HIV antibodies opted to breast-feed their children.

Follow up of HIV positive mothers.

Mothers whose infants tested HIV positive were requested to come back after two weeks for follow up and further counseling. Only 20 (55.56%) came back and of these only 12 (60%) had informed their partners of their baby's HIV status. Ten fathers who had been informed of their infant's HIV status accompanied the mother-infant pair to the follow-up visit and only six of these (60%) accepted counseling and testing.

Table 13. Acceptance of neonatal AZT by willingness to inform partner of HIV status.

	Informed partner n=12	Did not inform partner N=8	OR
Accepted AZT	10 (83.3%)	2 (25%)	
Declined AZT	2 (16.7%)	6 (75%)	5.8

Women who informed their partners of their infant's HIV seropositivity were more likely to accept AZT compared to those who did not inform their partners (OR 5.8).

Discussion.

Since the first reports of AIDS in 1981 [5] the seriousness of the epidemic has been recognized all over the world. WHO special programme on AIDS (SPA) preventive strategy has been intensified since 1986 due to the threat posed by human immunodeficiency virus. According to the national surveys the HIV prevalence rates at ANC in the country range from as low as 4% (Bomet) to as high as 35% (Kisumu) [7]. Countered with such a reality, those in the paediatric fraternity are bound to be concerned. Many of the children might be infected by HIV virus and will require prolonged care and support. Since HIV infection is associated with considerable morbidity in infants and children, the affliction brought upon them presents the pediatrician with one of the greatest challenges of our time.

Results of this study show that HIV infection is common in non-booked women coming to deliver in KNH as indicated by the prevalence rate of 15.8%. This is quite significant as it implies that approximately one in every six neonates delivered to this group of women is exposed to HIV infection. Without intervention, a third of these babies will be infected. Preliminary results of a similar study going on amongst the booked women shows a HIV prevalence rate of 4% [34]. This means the HIV prevalence in this study group reflects the situation in Nairobi as it is similar to that demonstrated by the sentinel studies done by NASCOP in antenatal clinics in Nairobi (table1 and 2).

Eighty seven percent of the population gave consent to testing of HIV antibodies using rapid methods. Capillus®HIV1/HIV2 and Immunocomb® are both rapid tests for Ig G antibodies to human immunodeficiency viruses type 1 and 2 in human serum or plasma. They are easy to carry out, have a high sensitivity (100%) and a high

specificity (99.7% and 99.4% respectively). Quick results are useful in emergency situations where decision about interventions to reduce MTCT is needed. This means that the majority of these women are willing to be tested only that VCT services were not available in the ANC they attended. However 28.5% of this population did not attend any ANC (chart 2). Non clinic attendance could be targeted and offered VCT using rapid methods when they come to hospital to deliver. This would allow intervention to reduce MTCT during labor and post delivery for the HIV positive women and for the HIV negative ones to counsel on importance of breastfeeding and safe sexual practices to prevent HIV infection.

In the study group maternal age ranged from 15 to 39 years with a median age of 23 years (graph1). Age 20 and above was significantly associated with HIV seropositivity (82.5 %), as compared to the teenagers (17.5%) (table10). This could probably be explained by a longer period of sexual activity.

Low level of education was found to be associated with higher rates of HIV seropositivity as compared to higher education level (42.5%) in those with one or incomplete primary, 20% in those with complete primary education, 25 % with secondary education and 2.5 % in those with higher education) (graph2). This contradicts a study done earlier by Dr. Phiri [9] where it was found that HIV seropositivity was lower in infants of mothers without education. Dr. Phiris' work was early in the epidemic where access to information about HIV/AIDS to the general population was limited. However the level of education was not found to be an independent predictor of HIV seropositivity.

Amongst other risk factors for HIV infection assessed in the study population was the number of lifetime sexual partners. One hundred and nineteen women (47%) had one lifetime sexual partner. while 100 (39.5%) had multiple lifetime sexual partners (graph3).
Those who had multiple lifetime sexual partners had a higher prevalence of HIV seropositivity (69.4%) as compared to those who had one lifetime sexual partner (30.6%) This was found to be statistically significant (P value 0.00015) (table10).

A report by Minkoff et. al. [35] found that the risk of HIV transmission was increased if membranes were ruptured for over 4 hour before birth. In our study duration of ruptured membranes before birth ranged from 10minutes to 168 hours with a median duration of ruptured membranes of 3 hours. Forty three percent of the women had more than 4 hours of ruptured membranes (table8).
The women were interviewed on the desire to have other children. Higher rate of HIV seropositivity was found amongst women who were undecided (66.7%) and those who wanted another child (22.2%) as compared to those who did not wish to have another child (11.1%) (table10). This was found to be statistically significant. This has bigger implications in that these women if not tested would expose more babies in future to HIV, increasing the already big health and economic burden to the society.

Marital status, mother's residence, mode of delivery, sex of the baby and gestation of the baby were not associated with HIV seropositivity.
Perinatal HIV transmission can be reduced even if neonatal Zidovudine prophylaxis is begun within 48 hours postpartum in infected women who did not receive Zidovudine during pregnancy or

before onset of labour [30]. Neonatal AZT was offered to 35 HIV seropositive women who consented to testing. Seventeen (48.6%) accepted while 18 (51.4) declined (table12). Two of the mothers who accepted neonatal AZT left the drug in the postnatal ward on discharge. The low acceptance rate could be associated with the long duration of the regime six weeks and the fear of stigmatization if other people knew why the baby was taking the medication. It was noted that time taken with the women in counseling was an important factor in acceptance of neonatal AZT. Most women who accepted neonatalAZT had their babies admitted in newborn unit (10/17) so contact with them was longer. This means that if most women had been counseled during their ANC attendance on different interventions to reduce MTCT of HIV, acceptance of neonatal AZT would have been higher. The low rate of acceptance could also be due to lack of information on available methods and their effectiveness in prevention of MTCT. This information should be made available to the public during campaigns for HIV control.

Breastfeeding has been consistently shown to reduce infant morbidity and mortality associated with infectious disease. In studies both in developing and developed countries, [36,37] data from two trials suggests that the first 6-8 weeks of life may be a period of particularly high risk of MTCT of HIV through breast milk [15,38]. In a South African study, Coutsoudis et al. [29] reported that mixed feeding in the first 3 months of life was associated with increased risk of infant HIV infection when compared to exclusive breastfeeding. When counseling on feeding options was done to 35 mothers whose infants tested positive for HIV antibodies, 28 (80%) chose to breast feed, 3 (8.0%) chose to formula feed while 4 (4.4%) opted to feed their infants on cows milk. Breastfeeding remains the most popular mode of infant feeding by HIV seropositive women in

developing countries. This could be associated with the high cost of breast milk substitutes, poor economic status of most women hence safety of giving these substitutes cannot be ensured. Unless suitable conditions are met for the promotion of formula feeding to infants of all infected women in developing countries (clean water, funds to buy formulas, sterilization, facilities for cups etc) the recommendation of WHO and UNICEF should be observed [13,39,40].

The multivariate analysis of various risk factors is shown in table 11. Several studies have identified multiple sexual partners as a major risk factor for HIV infection (41,42,43,44). In our study number of lifetime sexual partners was strongly positively associated with HIV risk even at low numbers of partners. Compared with women who had only a single lifetime partner, women with two partners were at approximately four fold increased risk, and the risk increased seven fold for women with four or more lifetime partners. It is possible that this association is due to residual confounding by aspects of sexual behaviour of the male partners not controlled for in the multivariate model. A reduction in number of sexual partner would contribute to HIV control.

The significant findings were Women with multiple sexual partners No significant risk of HIV seropositivity was noted for the following factors: age at first coitus, level of education and number of ANC visits during pregnancy. A positive association was also noted between number of pregnancies and HIV risk compared to women with only one pregnancy even with women with only two pregnancies were at a five fold increased risk and the risk increased six fold for women with four or more pregnancies. Possible explanation may be the tradition of peri-and post partum sexual abstinence described for many cultures in Kenya (45) which may lead to greater numbers of

sexual partners among the male partners of highly multiparous women.

Mothers whose infants tested HIV positive were requested to come back after two weeks for follow up and further counseling. Only 20 (55.56%) came back and only 12 (60%) of those who came back had informed their partners of HIV status. One of those who did not come back had left the country, 5 had lost their babies and for19, reason for not returning was not known. We analyzed acceptance of AZT by willingness to inform partner of their infant's HIV status. Women who informed their partners of their infant's HIV status were more likely to accept AZT than women who did not inform their partners (OR 5.8). Ten partners were informed of the infant's HIV seropositive status, but only 6of them (60%) came for counseling and testing. This has great big implications especially for the polygamous families where the other sexual contacts are left unaware of the risk their families are exposed to. None of the women could afford to go for a confirmatory test to know the infection status of their infant so they were referred to the pediatric outpatient clinic for follow up and testing of the child after 18 months.

Conclusions.

1) The prevalence of HIV antibodies in neonates of non-booked women coming to deliver in KNH is 15.8%.
2) The acceptance of HIV rapid testing amongst the study population was 87%.
3) Acceptance rate of neonatal AZT as a post exposure intervention in prevention of mother to child transmission of HIV in the study population who tested HIV positive was 48.6%.
4) Majority (80%) of mothers whose babies tested positive for HIV antibodies opted to breast-feed their babies.

Recommendations

1) HIV testing using rapid methods should be offered to non-booked women coming to deliver in KNH.
2) VCT Should be offered in all antenatal clinic

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APPENDICES

DATA SHEET. ANNEX 1 .

MOTHER:_____ **Hospital IP NO.**_____

Age (yrs) _____

Marital Status:
(1) Single **(2)** Married (monogamous) **(3)** Married (polygamous)
(4) Married (Inherited) **(5)** Widowed **(6)** Divorced

Residence:
Mother's: **(1)** Urban **(2)** Rural
Father's: **(1)** Urban **(2)** Rural

Level of Education:
(1) Primary incomplete **(2)**.Primary complete
(3) econdary incomplete **(4)**.Secondary complete **(5)**.Higher

Number of sexual partners in life
(1). 1 **(2)**. 2-3 **(3)**. 4+ **(4)**. Don't know

Number of sexual partners during this pregnancy
(1). 1 **(2)**. 2-3 **(3)**. 4+ **(4)**. Don't know

Age at first sexual contact _____

Self reporting of sexually transmitted diseases:
(1). Syphilis **(2)**. Gonorrhea **(3)**. Genital warts**(4)**. Other

Parity : _____

Mode of delivery:
(1).SVD **(2)**.Caesarian section **(3)**.Vacuum **(4)**. Breech

Duration of ruptured membranes before delivery: _____

ANC visited (Name)) : _____

ANC visits during pregnancy:
(1).None **(2)**.1 **(3)**. 2-3 **(4)**.4+ **(5)**.Don't know.

Number of months pregnant at time of first ANC visit:
(1).<6 mo. (2).6-7mo.(3).8+ mo. (4). Don't know.

Desire for other children:
(1).Have another soon (2).Have another later (3).Undecided
(4).Want no more.

BABY

Study No……

DOB: ……

Gestation by Dubowitz criteria (wks): ……

Gestation by dates (wks):

Sex : …… HC (cms) : ……

Birth Weight (Grams): ……Length (cms): ……

LABORATORY DATA.

Code : Positive = 1, Negative = 0.

Serology.

CAPPILUS HIV-1/HIV2 test [ ]

IIMMUNOCOMB test [ ]

Infant AZT given
(1). Yes (2). No

Feeding option:
(1) Breastfeeding
(2) Formula feeding
(3) Cow milk
(4) Others.

CONSENT FORM

Study number: [ ] [ ] [ ]

I Dr. Inwani .I. W. of the department of pediatrics, university of Nairobi is conducting a study to find out the magnitude of HIV disease in non booked women delivering at KNH and to find out acceptance rate of rapid HIV testing and neonatal AZT as a method of intervention in prevention of mother-to-child transmission of HIV1 among those who turn out HIV positive. HIV status of a woman can be efficiently assessed by a survey of blood specimen of their new born babies. The mother's antibodies pass through the placenta and if the mother is HIV positive the baby will test positive because of the presence of the mothers antibodies, even if the baby is not infected with HIV.
Cord blood has been taken from your child. I am requesting for permission to carry out a HIV test on this blood. If you would not want to know the results of this test I will remove the identifying label on the sample in your presence and the blood will be tested as anonymous.
. If you wish to know the results of the test, they will be discussed with you and the primary doctor to help in planning of further management and future follow up. If your baby is found to be HIV positive he/she will be offered Zidovudine at 5 mg every 12 hours for six weeks to try and prevent them from contracting HIV virus from you. If your baby is HIV positive you will be counseled on feeding options to try further and reduce chances of MTCT of HIV and will be referred to the general paediatrics outpatient clinic for further follow up.

The results of this follow up will be treated with strict confidence. You may opt not to participate in the study and the management of your child will not be interfered with in the least.
Do you wish to be part of the study?