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Determinants of HIV Transmission to Infants among Women on PMTCT Program in Mashonaland East Province

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Abstract:

The study was conducted to establish the factors associated with HIV transmission amongst infants born to HIV positive mothers in Mashonaland East Province. A cross-sectional analytical comparative design was used. Respondents were HIV positive mothers whose infants tested HIV positive/negative after six weeks within the four selected districts UMP, Murehwa, Marondera and Mudzi. ANC registers were used to identify the participants. A total 573 records were entered into Epi Info and 555 records were considered for analysis. Of those included 173 (31.2%) transmitted the virus to the child whilst 382 (68.8%) did not. As for results, booking early for ANC reduced the risk of HIV transmission to the unborn baby. Testing during pregnancy had less risk of infection to unborn babies than testing after pregnancy. Home deliveries were more likely to transmit the virus to the baby compared to institutional deliveries. Testing for HIV in less than 6 weeks had less risk of transmitting the virus to the baby than those who didn't. Taking PMTCT prophylaxis during pregnancy had less risk of transmitting the virus to the baby than not. Mothers on exclusive breastfeeding had less chances of transmitting HIV to their babies compared to those not.

Keywords: Prevention, transmission, Determinants, Women, Children, HIV

1. Introduction

Mother-to-child transmission (MTCT) is when an HIV-infected woman passes the virus to her baby. This can occur during pregnancy, labour and delivery, or breastfeeding. Without treatment, around 15-30 percent of babies born to HIV-infected women will become infected with HIV during pregnancy and delivery. A further 5 -20 percent will become infected through breastfeeding. In 2010, globally around 390,000 children under 15 became infected with HIV, mainly through mother-to-child transmission. About 90% of children living with HIV reside in sub-Saharan Africa where, in the context of a high child mortality rate, AIDS accounts for 8 percent of all under-five deaths in the region.

In high income countries MTCT has been virtually eliminated thanks to effective voluntary testing and counseling, access to antiretroviral therapy, safe delivery practices, and the widespread availability and safe use of breast-milk substitutes. If these interventions were used worldwide, they could save the lives of thousands of children each year.

In 2011, UNAIDS produced 'The Global Plan towards the Elimination of New Infections among Children and Keeping Their Mothers Alive'. The plan recognizes the need to consider different ways of preventing MTCT, and to integrate HIV interventions into other family planning, maternal health and child health services. The following are broader strategies for preventing HIV among children:

- Preventing HIV infection among prospective parents - making HIV testing and other prevention interventions available in services related to sexual health such as antenatal and postpartum care and focusing on preventing HIV in women of a child-bearing age.
- Avoiding unwanted pregnancies among HIV positive women - providing appropriate counselling and support to women living with HIV to enable them to make informed decisions about their reproductive lives. Ensuring that contraception is available to women who want it.
- Preventing the transmission of HIV from HIV positive mothers to their infants during pregnancy, labour, delivery and breastfeeding.
- Integration of HIV care, treatment and support for women found to be positive and their families.

According to the World Health Organization (WHO) 2006 guidelines, the recommended course of drugs for preventing mother to child transmission (PMTCT) in resources-limited settings should be a combination of AZT and single dose NVP. This approach is much more difficult to administer than single dose nevirapine on its own, but it is also significantly more effective, and is less likely to lead to drug resistance. AZT was first shown to reduce MTCT rates in 1994, and is the best-studied drug for this purpose.

Zimbabwe began implementing the PMTCT program in 1999 and in Mashonaland East, it was rolled out to all in 2004. Mashonaland East province has a total population of 1 127 211 people comprising of 545 696 (48%) male and 581 515 (52%) female, according to the 2002 census. Murehwa’s population constitute about 14% of the population in the province whilst the other census districts contributed between 2 and 13.6% each. A large proportion (60%) of the population in the province is in the “never married” category, while 33% were in the “married” group.

2. Problem Statement

There are 193 health facilities in Mashonaland East Province and out of these 94% offer basic PMTCT services and 83% offer comprehensive PMTCT. During the period, January to December 2015, 33539 of pregnant women who reported for ANC knew their HIV status. Of these 3 719-tested positive. 2138 infants were tested and received results and of these 416 infants tested positive which gives a positivity rate of 19.5%.

An analysis on a quarterly basis shows a mean trend of 18.7% of children testing positive instead of the expected gradual decline in trend towards virtual elimination of MTCT (zero new infections) due to the various PMTCT interventions which include the More Efficacious Regimen (MER) and Early Infant Diagnosis (EID).

Transmission of HIV from mothers to infants in Mashonaland East Province is not declining despite various PMTCT interventions. The assumption is that once pregnant women know their status and receive PMTCT interventions, the percentage of positive infants born to HIV positive mothers is supposed to decline. Although the goal of PMTCT is to reduce pediatric HIV to below 5% by 2015, the trends in Mashonaland East show a high positivity rate of 19% in 2015.

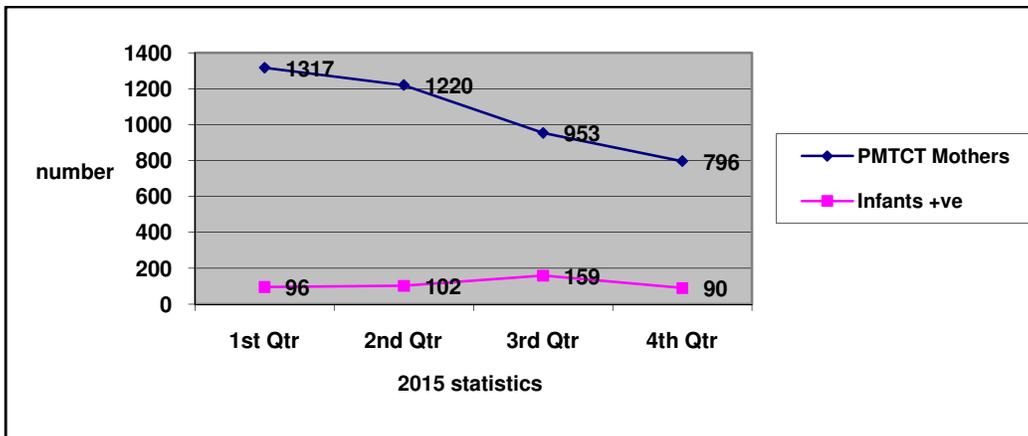


Figure 1: Trends in the number of women being initiated on to the PMTCT program in 2015 versus children testing positive.

The graph above shows that irrespective of the increase in the number of women being tested and initiated on PMTCT still the number of children testing positive is not getting better.

2.1. Positivity Rate

The graph below shows the positivity rate among infants tested during 2011. Based on the graph it is evident that despite PMTCT interventions in Mashonaland East, the province continues to experience infant positivity rates of an average 20%.

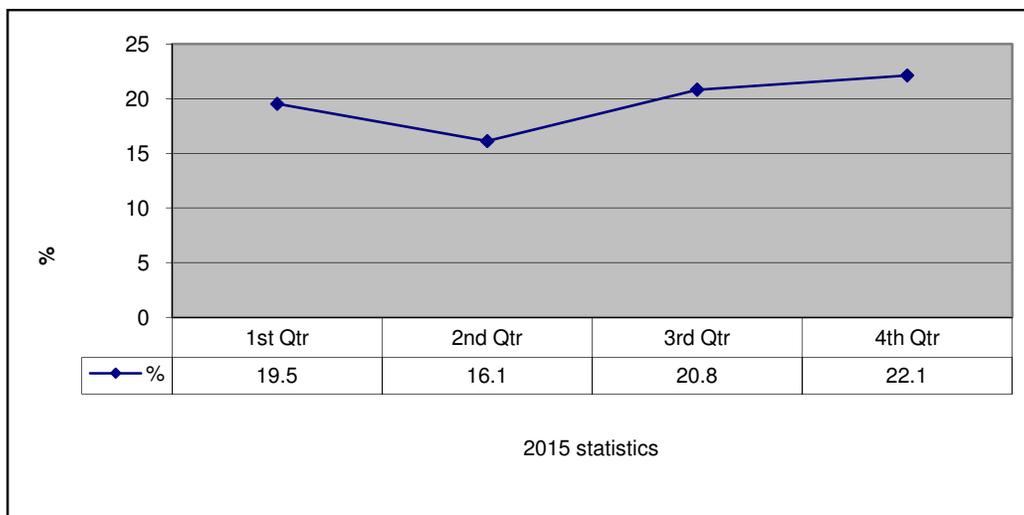


Figure 2: Positivity rate among infants of mothers on PMTCT tested in 2015

3. Literature Review

According to the UNAIDS Report on the Global AIDS Epidemic 2010, ARVs for women for PMTCT increased from 58% in 2008 to 68% in 2009. Infant prophylaxis increased slightly to 45%. Only 50% of pregnant women received HIV Counseling and Testing, up from 43% in 2008. Only 15% of HIV-exposed infants received an HIV test within the first two months of life and only 32% of children in need of ART were receiving it.

Without intervention, MTCT rates range between 20-45%. In Zimbabwe MTCT is around 30%. HIV prevalence rate in pregnancy is 14.1% in Zimbabwe. Male involvement in PMTCT programme is still below 10%. Disclosure rate amongst PMTCT mothers is low. In 2010, around 390,000 children under 15 years became infected with HIV, mainly through mother-to-child transmission. About 90% of children living with HIV reside in sub-Saharan Africa where, in the context of a high child mortality rate, AIDS accounts for 8 percent of all under-five deaths in the region. In high income countries, such as the Australia, Britain and the USA, MTCT has been virtually eliminated thanks to effective voluntary testing and counseling, access to antiretroviral therapy, safe delivery practices, and the widespread availability and safe use of breast-milk substitutes. If these interventions were used worldwide, they could save the lives of thousands of children each year. The literature above shows that it is possible to eliminate MTCT worldwide.

However according to the WHO, biomedical factors such as limitations in identifying women in need of ART and impact of diverse co-morbidity such as TB, Hepatitis B and C, malaria and anaemia continue to fuel HIV transmission from mother to child.

Even where PMTCT services are available, not all women receive the full benefit. Reasons for HIV positive pregnant women not accessing drugs include:

- Not being offered an HIV test
- Refusing to take an HIV test
- Not returning for follow up visits
- Not adhering to self-administered drugs
-

Out of a Population of 12 million, the Zimbabwe HIV prevalence was 24.6% in (2003) and declined to 13.7% in (2009), with ANC at 16.1% in (2009). The pilot PMTCT program was carried out in 1999 and a massive roll out was done in 2001 and currently, PMTCT services are available to 95% of the 1560 facilities in the country. By June 2010, over 818,000 pregnant women at 724 facilities were reached with PMTCT program. There was rapid expansion of PMTCT services by June 2011, with over 1 million pregnant women reached at 1018 health facilities country-wide. The National Goal is to eliminate MTCT of HIV by 2015 using Option A of WHO 2010 guidelines. (*EGPAF presentation at the National PMTCT Conference 2011, unpublished*). Regardless of the above said efforts and targets, Zimbabwe continues to have high transmission of HIV from mother to child as evidenced by the 30% HIV prevalence highlighted below.

3.1. PMTCT in Mashonaland East Province

The PMTCT programme was inceptioned in Zimbabwe in 1999 with the thrust to reduce transmission of HIV to children from mothers during pregnancy; labour / delivery and breastfeeding. The programme was cascaded to provinces in which Mash East Province started the implementation in 2000. Districts started the programme in 2002 and pregnant women were given Nevirapine Single Dose 72 hours before labour and testing of infants for HIV was normally done at 18 months since there were no testing facilities for infants in their early stage of life during that era. However, in 2011 Dry Blood Spot was introduced for infants born to HIV positive mothers which proved to be effective and efficient. This is done at 6 weeks after birth.

In 2015 infants born to HIV positive women in Mash East province were 2138 (as of November 2015,) according to the NAC Mashonaland East November report. Of these 383 (18%) were HIV positive according to DBS results. Despite the provision of comprehensive PMTCT and maternal services there is no change in the positivity trend. It is therefore imperative that a research be carried out to establish factors contributing to continued transmission of HIV from mother to child in the context of Mashonaland East Province in order to determine ways to increase the impact of PMTCT interventions.

3.2. Justification

MTCT contributes to 7% HIV transmission globally. PMTCT is an intervention that has been designed to reduce HIV transmission from positive mothers to their children. The establishment of factors contributing to the continued transmission of HIV from mothers to infants, evidenced by results found in the Mashonaland East, will contribute towards strengthening the PMTCT program. In Mashonaland East, statistics show that the positivity rate amongst exposed children has not been going down a total of **19.5%** tested positive in the 1st quarter, **17%** in the second quarter, **17%** in the third quarter and **24%** in the fourth quarter of 2015.

A constant trend of this nature shows that the reduction of MTCT to below 5% by 2015 is still not achievable. This thus calls for an evaluation of the PMTCT program cycle where re-strategizing is urgently needed after determining the factors leading to constant transmission of HIV to infants despite the various interventions.

3.3. Research Question

What are the factors associated with HIV transmission among infants born to HIV positive mothers on the PMTCT Programme?

3.4. Main Objective

To determine the factors that associated with HIV transmission among infants born to HIV positive mothers in Mashonaland East Province.

3.5. Specific Objectives

1. To assess factors associated with HIV transmission among infants born to HIV positive mothers on PMTCT.
2. To assess Practices of Mothers on PMTCT in Mashonaland East Province.
3. To assess knowledge factors associated with HIV transmission among infants born to HIV positive mothers on PMTCT in Mashonaland East Province.

4. Methodology

4.1. Study Design

An analytical cross-sectional design was used. The respondents were HIV positive mothers whose infants tested HIV positive/negative after 6 weeks. The sampling frame was based on the ANC register and the identified participants were traced to their communities by health institutions directed by the District AIDS Coordinator in the district.

4.2. Setting

Four selected districts of Mashonaland East province (UMP, Murehwa, Marondera and Mudzi)

4.3. Sample Size Determination

We used Epi-Info statistical software to determine sample size. By using a population proportion transmission rate for PMTCT mothers of 18.0% for all women coming for PMTCT services, we got the optimal sample size we needed for the research. We were assuming that 18% of the women who go for PMTCT services are transmitters hence $p = 0.18$, this gave us the optimal sample size we needed for the research. Hence, $Z_{calc} = 1.96, \Delta = 0.05, p = 0.18$,

$$n = (Z_{calc} \div \Delta)^2 * p(1 - p)$$

$$n = (1.96/0.05)^2 * (0.18 * 0.82)$$

$$N = 226.8$$

$$N = 227$$

For the purpose of the research, we anticipated that 40% of the participants would refuse to participate for various reasons, so adjusting for that would bring an adjusted sample size of $(227 \div 0.6) = 380$

4.4. Data Collection Tools

An interviewer administered questionnaire was developed guided by the objectives. The questionnaire was divided into 5 sections. The sections are summarized as below:

- Demographic section
- Knowledge about PMTCT
- Attitude towards PMTCT
- Health seeking behavior for women
- Practices during pregnancy and PMTCT.

4.5. Translation of Questionnaire

After developing the questionnaire was translated into local language and back translated into English for content validity and sequencing of questions for easy understanding.

4.6. Piloting /pre-testing

The finalized tool was pilot tested in Goromonzi district and the questionnaire pre-tested for its flow and easy to understand language use.

4.7. Sampling

A multistage sampling method was used. Firstly, random sample of 4 districts was done. UMP, Murehwa, Marondera and Mutoko. Systematic sampling was used to identify the clinic catchment's areas from where the respondents will be drawn. Convenience sampling was used to pick the respondents using the ANC registers. Based on the names identified these were followed into the communities for interviews.

4.8. Data Quality Management

4.8.1. Quality Control

All data were quality controlled for data transcription errors from the field. Supervisors also checked on the completeness of the data. Consistency checks were also done. Provincial supervisors were in the field to make sure collected data is reliable and valid.

4.8.2. Data Entry

Data were entered using Epi Info version 3.5.8. Data entry errors and any other outliers were checked and corrected.

4.8.3. Data Analysis

All data processing and analysis was done using Epi Info version 3.5.8. Descriptive statistics were used to summarize both continuous and categorical data. Ttest was used to compare continuous data between transmitters versus non-Transmitters. Chi-square test was used to compare categorical data between transmitters versus non-Transmitters.

Ethics and permissions, we obtained ethical clearance from the Parirenyatwa Hospital Institutional Ethical Review Board. Permission to carry out the study was obtained from the Provincial Medical Director, Health Studies Office. Informed written consent was obtained from participants and confidentiality assured and maintained. No names were captured on the questionnaires. The investigators counselled the participants individually after the interview session where it was possible and referred other respondents for further individual counselling by program counsellors.

5. Results

A total 573 records were entered into Epi info version 3.5.8 and 555 records were considered for analysis as they were more than 80% complete. Of those included for analysis 173 (31.2) transmitted the virus to the child whilst 382 (68.8) did not transmit the virus to the child.

Variable	Median (Q1-Q3)
Number of children	3 (2 - 4)
Mother's age (yrs.)	30.5 (26 - 36)
Distance from the health centre (km)	5 (3 - 8)

Variable	Transmitters N (%)	Non-transmitters N (%)	p-value	
Religion	Christian	66 (29.3)	159 (70.7)	0.123
	Muslim	4 (80)	1 (20)	
	Apostolic	90 (31.4)	197 (68.6)	
	Traditional	5 (31.3)	11 (68.8)	
	Other	6 (46.2)	7 (53.8)	
Ethnic group	Shona	158 (31)	352 (69.0)	0.050
	Chewa	8 (53.3)	7 (46.7)	
	Ndau	1 (33.3)	2 (66.7)	
	Shangaan	1 (100)	0	
	Ndebele	2 (67.7)	1 (33.3)	
	Other	3 (13.0)	20 (87.0)	
Marital status	Married	123 (27.5)	324 (72.5)	0.001
	Single	12 (57.1)	9 (42.9)	
	Divorced	13 (36.1)	23 (63.9)	
	Cohabiting	2 (66.7)	1 (33.3)	
	Widowed	23 (47.9)	25 (52.1)	
Number of children	One	33 (37.9)	54 (62.1)	0.101
	Two	46 (31.7)	99 (68.3)	
	Three	43 (29.5)	103 (70.5)	
	Four	24 (22.4)	83 (77.6)	
	Five	21 (46.7)	24 (53.3)	
	>Five	6 (26.4)	17 (73.6)	
Employment status	Formally employed	5 (27.8)	13 (72.2)	0.8486
	Informally employed	55 (31.4)	120 (68.6)	
	Unemployed	28 (34.1)	54 (65.9)	
	Housewife	85 (30.7)	192 (69.3)	
Occupation	Teacher	2 (33.3)	4 (66.7)	0.892
	Extension officer	0	1 (100)	
	Farmer	42 (24.0)	133 (76.0)	
	Other	38 (25.0)	114 (75.0)	
	Residence	Urban	4 (26.7)	
Rural	115 (28.2)	293 (71.8)		

Growth point Farms		36 (44.4)	45 (55.6)	
		17 (34.0)	33 (66.0)	
Practices during pregnancy				
Practices		Transmitters	Non-Transmitters	OR (95% CI)
Booked for ANC	Yes	158	372	0.28 (0.12-0.64)
	No	15	10	1
Tested during pregnancy	Yes	151	350	0.59 (0.32-1.05)
	No	22	30	1
Visit health institution after home delivery	Yes	50	54	0.67 (0.44-0.99)
	No	5	3	1
Place of delivery	Home	51	54	2.5 (1.44-2.34)
	Clinic	122	327	1
Period tested	<6weeks	63	241	0.36(0.22-0.67)
	>6weeks	51	71	1
Knowledge Factors				
Factors		Transmitters	Non-transmitters	OR (95% CI)
Prophylaxis if HIV positive (mother)	Yes	134	338	0.41(0.25-0.66)
	No	38	39	1
Prophylaxis after birth (baby)	Yes	134	365	0.15(0.08-0.29)
	No	38	16	1
Exclusive breastfeeding	Yes	143	359	0.27(0.15-0.48)
	No	30	20	
Health seeking behaviour				
Behaviour		Transmitters	Non-transmitters	OR (95% CI)
Tested as a couple	Yes	79	237	0.5 (0.35-0.72)
	No	92	138	1
Treated for an STI	Yes	55	84	1.6(1.09-2.43)
	No	117	291	1

Table 1

All the demographic variables that were included for analysis were statistically insignificant as they had a p-value >0.05, except residence (p-value-0.034), ethnic group (p-value-0.05) and marital status (p-value-0.001). A greater proportion of those who were married did not transmit the virus to the baby compared to other marital statuses. More Shona people did not transmit the virus compared to other ethnic groups.

The odds of transmitting the virus to those who booked for ANC were 62% less likely compared to those who didn't book for ANC and was statistically significant. Those who were tested during pregnancy were 59% less likely to transmit the virus compared to those tested after pregnancy. Those who delivered at home were 2.5 times more likely to transmit the virus to the baby compared to those delivered at the clinic and it was statistically significant. Those tested in less than 6 weeks had 62% chances less of transmitting the virus to the baby compared to those who didn't.

Mothers who received PMTCT prophylaxis during pregnancy had 41% less chances of transmitting the virus to the baby compared to those who did not and it was statistically significant. Babies who received prophylaxis had 85% less chances of being infected compared to those who did not, and it was statistically significant. Those who did exclusive breastfeeding had 37% less chances of transmitting compared to those who did not and it was statistically significant. Those who were tested as a couple were 50% less likely to transmit the virus compared to those who did not. Those who were treated for an STI were 1.6 times likely to transmit the virus to the baby compared to those who did not.

From results table, all factors with p-value less than 0.05 were statistically significant and also those that had an odd ratio (OR) confidence interval which does not include 1, was statistically significant.

6. Discussion

The research confirmed that booking early for ANC reduces the risk of HIV transmission to the unborn baby as found out by Saharan S, et al (2010). It also confirmed what in the Ministry of Health's training manual that HIV positive mothers who get tested during pregnancy are less likely to infect their unborn babies than those who get tested after pregnancy. The research also confirmed what Saharan et al (2001) that mothers who receive PMTCT prophylaxis during pregnancy have less chances of transmitting the virus to the baby compared to those who do not. It also concurred with what the Avert organisation, (2009) found that babies who receive prophylaxis have less chances of being infected compared to those who do not. Pregnant mothers who deliver at home are more likely

to transmit the virus to the baby compared to those who deliver at the clinic (WHO Update 2007). The research also confirmed that pregnant women who get tested for HIV in less than 6 weeks have less chances of transmitting the virus to the baby compared to those who didn't in concurrence with the WHO Update (2007)

However, the results also revealed what is not widely held that those who were treated for an STI before and during pregnancy are likely to transmit the virus to the baby compared to those who did not.

7. Conclusion

Booking early for ANC reduces the risk of HIV transmission to the unborn baby. HIV positive mothers who get tested during pregnancy are less likely to infect their unborn babies than those who get tested after pregnancy. Pregnant mothers who deliver at home are more likely to transmit the virus to the baby compared to those who deliver at the clinic. Pregnant women who get tested for HIV in less than 6 weeks have less chances of transmitting the virus to the baby compared to those who didn't. Mothers who receive PMTCT prophylaxis during pregnancy have less chances of transmitting the virus to the baby compared to those who do not. Babies who received prophylaxis have less chances of being infected compared to those who do not. Mothers who do exclusive breastfeeding have less chances of transmitting HIV to their babies compared to those who do not. Those who are tested as a couples are less likely to transmit the virus compared to those who do not. Those who were treated for an STI before and during pregnancy are likely to transmit the virus to the baby compared to those who did not.

7.1. Recommendations to all Managers and Implementers of PMTCT Programmes

1. To increase HTC participation rates in PMTCT programmes, husbands and partners to the ANC women should be involved as much as possible, at all levels of the PMTCT programme processes. The men should also be given information about PMTCT just as the women, and then the invitation to test for HIV and hence to join the programme if HIV positive should be extended to both the woman and her partner
2. Mobilise all women of child bearing age on the importance of booking early for ANC.
3. Put more effort in encouraging all pregnant women to get tested early for HIV during their pregnancy.
4. Continue to emphasize the importance of exclusive breastfeeding for HIV positive mothers.

7.2. To Health Educationist

1. Effort should be made in making HIV test for PMTCT a norm especially within families. Information can be disseminated through mass media such as the TV and the radio, at strategic times such as family time on ZTV, so as to provoke discussion of issues pertaining to HIV and PMTCT among family members.
2. There is need to encourage individuals to test even before marriage and pregnancy so that they make it a norm and are more confident to test during pregnancy.
3. Provide continuous health education to individuals and communities on the dangers of contracting STIs as they provide a conduit for HIV infection.
4. Scale up awareness campaigns on correct and consistent condom use to reduce the number of STI cases; and therefore, HIV infection.

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