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Original research

Evaluating elimination of mother-to-child transmission of HIV in Suriname: a mixed method study

Deborah Stijnberg,[1] Suze Holband,[2] Regillio Charles,[3] Dorien Ulenaers,[4] Ward Schrooten,[4] and Malti R. Adhin[1]

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ABSTRACT

Objectives. To evaluate the cascade of care for the elimination of mother-to-child-transmission of human immunodeficiency virus (HIV) in Suriname and identify sociodemographic and clinical factors preventing transmission to exposed infants.

Methods. A mixed-methods study design was used. Antenatal care data from the 2018 cross-sectional multi-indicator cluster survey on 1 026 women aged 15–49 years who had had a live birth in the previous 2 years were used. Furthermore, national data on a cohort of 279 mothers with HIV and their 317 infants born from 2016 to 2018 were evaluated. Additionally, 13 cases of mother-to-child-transmission of HIV were reviewed.

Results. In 89.3% of cases, no mother-to-child HIV transmission occurred. Early cascade steps show that 28.4% of women had unmet family planning needs, 15% had no antenatal visits, 8% delivered outside a health facility, and 71.5% received an HIV test during antenatal care. Of the pregnant women with HIV, 84.2% received antiretroviral therapy, while 95.5% of their infants received HIV prophylactic treatment. Receiving antiretroviral therapy for the mother (odds ratio (OR) 45.4, 95% confidence interval (CI) 9.6–215.3) and the child (OR 145.7, 95% CI 14.4–1477.4) significantly increased the odds of a negative HIV test result in infants. Conversely, living in the interior decreased the odds (OR 0.2, 95% CI 0.4–0.7) compared with urban living.

Conclusions. HIV medication for mothers with HIV and their infants remains key in the prevention of mother-to-child-transmission of HIV. Early prenatal care with follow-up should be strengthened in Suriname.

Keywords HIV; infectious disease transmission, vertical; Suriname.

Globally there were an estimated 150 000 children newly infected with human immunodeficiency virus (HIV) in 2020, most of whom were infected via mother-to-child transmission (1). The prevention of mother-to-child transmission of HIV is an important strategy in the HIV response. The rate of mother-to-child transmission of HIV is between 15% and 45%. When interventions are taken during pregnancy, labor, delivery, and breastfeeding, the transmission rate can be reduced to less than 2% (2). Antiretroviral therapy (ART) coverage for mother and child is key in preventing HIV transmission from mother to child and the reported global coverage of 82% masks the great variation across regions – between 62% and 95% (2).

Since 2010, countries in the Americas have committed to the elimination of mother-to-child-transmission (EMTCT) for HIV and syphilis. In 2016, the commitment was expanded to include hepatitis B and Chagas disease (3). Interventions to prevent HIV mother-to-child-transmission include primary prevention of HIV infections, improved reproductive health services, access to HIV testing, increased ART coverage, safe delivery practices, and provision of postnatal services such as early infant diagnosis, optimal infant feeding and ART for infants (4). Suriname

[1] Faculty of Medical Sciences, Anton de Kom Universiteit van Suriname, Paramaribo, Suriname. Deborah Stijnberg, ✉ deborah.stijnberg@uvs.edu; deborah.stijnberg@uhasselt.be

[2] National AIDS Program, Paramaribo, Suriname.
[3] Academic Hospital Paramaribo, Paramaribo, Suriname.
[4] Faculty of Medicine and Life Sciences, Hasselt University, Hasselt, Belgium.

committed to the four-pronged approach of the World Health Organization (WHO) to end mother-to-child-transmission. The elimination target for HIV includes a 2% or lower transmission rate and 95% or higher coverage of antenatal care, testing for HIV among pregnant women, and ART use for pregnant women living with HIV (4).

Evaluation of the EMTCT cascade of care includes a systematic assessment of the different steps in the health care system to achieve a low HIV transmission rate from mother to child (5). A 2018 progress report for the Americas showed that 89% of pregnant women had antenatal coverage, 95% had a hospital delivery, 73% had at least one antenatal HIV test, and 73% testing positive for HIV received ART (3). Based on 2010 and 2015 data, Suriname reported that 20% of pregnant women had unmet family planning needs, 67% had at least four antennal care visits, 80% delivered in hospital, and 84% of had received an HIV test. While the precise prevalence of HIV is unknown among pregnant women in Suriname, ART coverage was 92% and the mother-to-child-transmission rate of HIV was 1.8% in 2014 (6). As Suriname is close to elimination for HIV (3) and still only has a rudimentary surveillance system for syphilis and hepatitis B mother-to-child-transmission, single validation for HIV mother-to-child-transmission is followed at this time. This study presents the first evaluation of the HIV EMTCT cascade of care in Suriname, ranging from prevention to infection to postnatal care. Additionally, various factors were investigated that potentially influence the HIV transmission from mothers to infants.

METHODS

Study design

A mixed-methods study design was used to evaluate the longitudinal EMTCT cascade of care for HIV. Using survey data on women and children, the initial steps in the cascade of care were evaluated using a cross-sectional design. A retrospective cohort study design using routine surveillance data and case review information was used for the analysis of pregnant women with HIV. In-depth analyses of the cases where HIV transmission occurred were done. The study covered the period 2016 to 2018.

Setting

Suriname is a multiethnic country in South America. Although classified as an upper middle-income country, it is battling a recession. Suriname is divided into 10 districts – three urban, four rural, and three interior. The urban districts include the capital Paramaribo, Wanica and the district of Nickerie, which borders Guyana. These three districts have about 70% of the total population. The interior is a hard-to-reach Amazonian area that is scarcely populated (7).The rural districts are closer to the city but still consist of smaller communities. During the study period, the population of Suriname was about 583 000 inhabitants, of which 50% were females (8). About 77% of women between 15 and 49 years had health insurance (9). The first level of care, including care for pregnant women, is offered by the regional health services and private clinics and covers the coastal areas and primary health clinics in the Medical Mission in the interior. Second-line care is provided, after referral, by four hospitals in the capital and one in Nickerie district (7). When a person is diagnosed with HIV his/her family physician can do the medical work-up and initiate treatment, which is available free of charge. Complicated cases are referred to infectious disease specialists in the hospitals (10).

From 2017 to 2019, 10 166 live births on average were registered (8). The Multiple Indicator Cluster Survey (MICS 2018) reported 93% of deliveries took place in health facilities (9). The antenatal care protocol of Suriname recommends that pregnant women be seen early in the first trimester to evaluate their medical and obstetric history and to schedule a blood work-up (11). HIV is among the required tests and should be repeated at 30 weeks gestation. The national protocol requires that pregnant women living with HIV be on ART before 14 weeks gestation (12) and that HIV treatment be started or continued for each pregnant woman with HIV. This in line with option B+ of WHO. HIV treatment, CD4 count and viral load testing are available free of charge, as well as prophylactic zidovudine and lamivudine for 4 weeks for the exposed infant. If the viral load of the mother exceeds 1000 copies/mL, a caesarean section is indicated. All other costs, such as other laboratory tests and pregnancy ultrasounds, need to be financed either through insurance or out of pocket. However, the Surinamese government provides infant feeding free of charge for all infants exposed to HIV until the age of 2 years.

Study population

This study focused on women of reproductive age (15–49 years). All 279 pregnant women living with HIV during 2016–2018 were considered and the 13 cases of mother-to-child HIV transmission were analyzed.

Data sources

The primary data sources used were MICS and the national EMTCT database. MICS is a periodically executed multipurpose household survey, which collects information on women and children (9). It is a repeated nationally representative survey. In 2018, the household response rate was 90.2% of 9 508 households sampled. For this study, information on 6 999 women interviewed within these households was used.

The EMTCT database contains information gathered through the EMTCT focal point system, implemented since 2010. Information on pregnant women living with HIV and their infants is reported. The demographic and clinical data of every mother and child, such as age, gravidity, and ART use, is entered in the database.

Additionally, cases where HIV was transmitted to the child were examined to identify other contributing factors not regularly collected in the database.

Variables and definitions

To evaluate the cascade of care in the EMTCT in Suriname, nine steps were reviewed. The key steps and definitions for the process indicators for EMTCT provided by the Pan American Health Organization (PAHO) and WHO (3, 4, 13, 14) were used as a basis (Table 1).

Step 1 covers how well reproductive needs of women are met, while steps 2, 3, and 4 cover antenatal care of all pregnant women. Information on these steps comes from MICS 2018.

TABLE 1. Definitions and targets of process and impact indicators for elimination of mother-to-child transmission of HIV

Indicator	Definition	Target, %
1. Percentage of women currently married or in a union with their needs met for family planning with modern methods	Number of women in the survey married or in a union with the need for spacing or limiting of births that had their need satisfied with modern methods for family planning	90
2. Percentage of pregnant women attending antenatal care	Number of women aged 15–49 years with a live birth in the past 2 years who during the pregnancy of their most recent live birth were attended at least once by skilled health personnel	95
3. Percentage of pregnant women delivering in a health facility	Number of women who were pregnant in the 2 years preceding the survey whose most recent live birth was delivered in a health facility	95
4. Percentage of pregnant women tested for HIV	Number of women who were pregnant in the 2 years preceding the survey who reported having an HIV test as part of antenatal care	95
5. Percentage of pregnant women testing HIV positive as a percentage of the registered live births in the civil registry office	Number of live births from an HIV positive pregnant women reported to the national elimination of mother-to-child transmission registration system	No target
6. Percentage of pregnant women testing HIV positive starting ART	Number of registered pregnant women testing HIV positive with a live birth and at least one reported ART initiation in the period of pregnancy	95
7. Percentage of live-born infants with a mother testing HIV positive started on ART	Number of live-born infants from a mother testing HIV positive reported to have received prophylactic ART; this excludes infants dying shortly after birth	100
8. Percentage of live-born infants with a mother testing HIV positive evaluated for HIV	Number of live-born infants with a mother testing HIV positive with a PCR test result on record; this excludes live-born infants with a mother testing HIV positive dying shortly after birth	100
9. Percentage of live-born infants with a mother testing HIV positive who test negative for HIV	Number of live-born infants from pregnant women with HIV with a negative PCR test as a percentage of the total number of live births. This excludes live births dying shortly after birth. For a negative test result, either the one negative result on record or two consecutive negative PCR test results will be used. In case of no recorded result, the infant will be considered HIV positive.	98

ART, antiretroviral therapy; HIV, human immunodeficiency virus; PCR, polymerase chain reaction.
Source: World Health Organization; 2021 (4).

Subsequent steps in the cascade of care provide an overview of the care of pregnant women living with HIV for which the EMTCT database was used. The population case rate of new pediatric HIV infections due to mother-to-child transmission was also calculated. The target is 50 or fewer cases of mother-to-child transmission per 100 000 live births (4). Several factors associated with mother-to-child HIV transmission were evaluated, namely: age of the mother (≤ 19, 20–24, ≥ 25 years), residence (urban, rural, interior), and ART initiation (yes, no, irrespective of the gestational age it was started). Obstetric factors, gravidity and whether HIV status was known during an earlier pregnancy (repeat pregnancy) were also evaluated for the pregnant women living with HIV.

Statistical analysis

The clinical and demographic characteristics of the pregnant women and their infants for each step are described. For steps of the cascade of care for mothers with HIV and their infants, the 95% confidence interval (CI) for proportions was calculated. The odds ratio (OR) with 95% CI were calculated for the association between demographic and clinical factors and mother-to-child transmission of HIV using SPSS version 27 (SPSS Inc., Chicago, USA).

RESULTS

The unmet family planning need for women married or in union was 28.4% (n = 3238). The highest percentages of unmet needs were reported by women from the interior (37.1%), women aged 15–19 years (59.7%), those with a primary education (31.0%), and those of Maroon ethnicity (37.0%) (9). For unmarried women 53.2% had unmet family planning needs (n = 260).

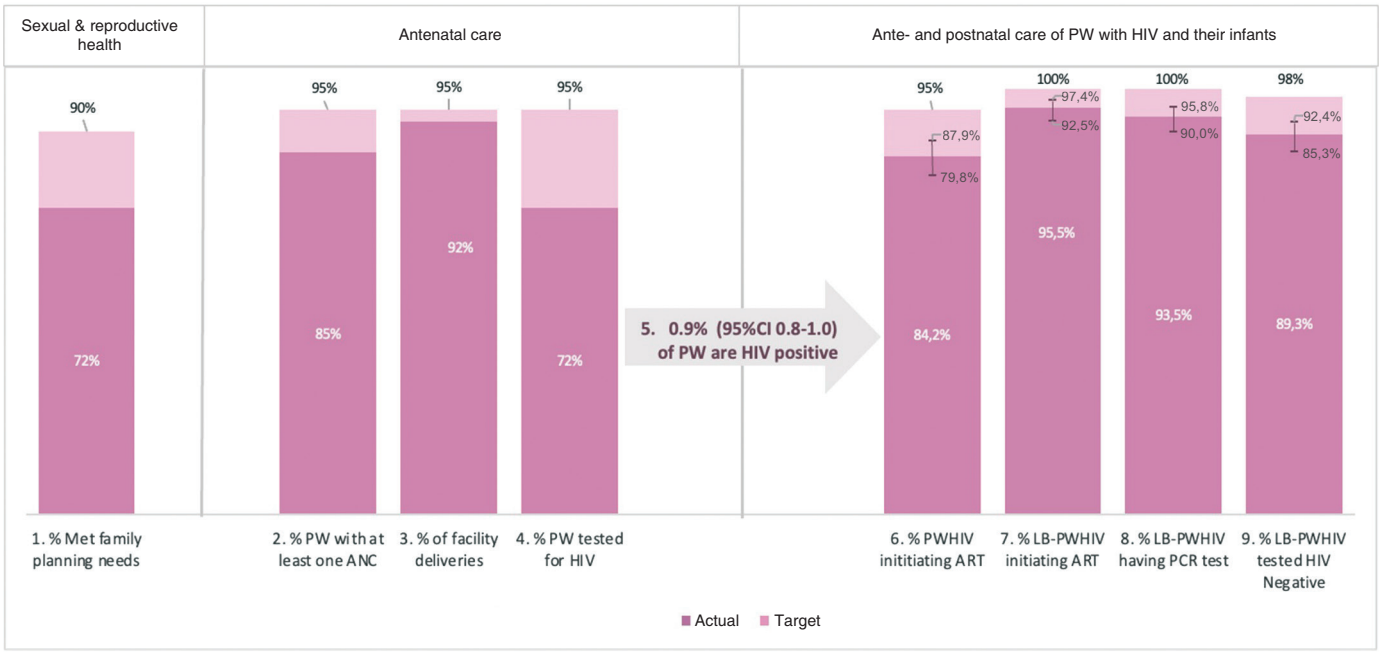
Of 1026 women giving birth in the past 2 year, 84.8% were seen at least once by skilled medical personnel (Figure 1), with most (70.5%) being seen by a medical doctor. However, 13.3% were not seen by any provider offering antenatal care – this was 16.5% for women in urban areas, compared with 4.1% for women in the interior. The remaining 1.9% were attended by non-skilled persons, for example, traditional birth attendant. Schooling and age did not affect antenatal care visits. About 19.0% of women in the top wealth quintile never went for antenatal care, compared with 10.1% for women in the poorest wealth quintile.

Of the 1026 women, 85.5% reported blood samples taken during antenatal care and 71.5% were tested for HIV (Figure 1). The estimated HIV prevalence in pregnant women, calculated using live births as a proxy, was 0.9% (95% CI 0.8–1.0%) (Figure 1).

Infants exposed to HIV during pregnancy

From 2016 to 2018, 317 infants were exposed to HIV during pregnancy (279 pregnant mothers with HIV) (Table 2). The average age of these mothers was 29 years (range 15–44 years) with most (79.8%) living in urban areas. For 100 (31.5%) of these infants, it was their mother's first pregnancy. For 157 (49.5%) infants, the mother was known to be HIV positive from an earlier pregnancy. Excluding abortions, 84.2% of mothers received ART.

FIGURE 1. Elimination of mother-to-child-transmission indicator results and targets for mothers delivering in Suriname, 2016–2018



ANC, antenatal care; ART, antiretroviral therapy; CI, confidence interval; HIV, human immunodeficiency virus; PW, pregnant women; PWHIV, pregnant women living with HIV; LB-PWHIV, live birth from PWHIV.
Source: prepared by authors based on the results.

Infants alive at birth

Of the 317 exposed infants, 296 (93.4%) were alive at birth. Most infants (83.9%; 266) were delivered through vaginal delivery. Four (1.4%) were delivered at home or on the way to the hospital. The viral load of the mother in the year of delivery was unknown for 84 (28.4%) of the infants alive at birth, and was lower than 1000 copies/mL for 173 (58.4%). Three infants born alive died minutes after birth. Of the remaining 293 infants, the use of ART was unknown for eight infants. With 280 infants receiving treatment and assuming the two extremes where either all eight infants received treatment or none of them did, the prophylactic treatment coverage was between 95.6% and 98.3%. For 92.8% (272/293) of infants, a polymerase chain reaction (PCR) test result was recorded. The median time between birth and test was 7 weeks (interquartile range 6–10 weeks). For 67.6% (184/272) of the infants, more than one PCR test was done, with a median of 42 days between the first and second test. All infants who tested positive in the first test also tested positive in the second test, while 1.7% (3/177) of infants initially testing negative were positive in the follow-up test.

For 19 of the live births, an HIV test was not recorded and their HIV status was unknown. Therefore, the actual negative HIV ratio ranged between 89.0% (259/291) and 95.5% (278/291) when assuming all 19 infants were positive for HIV versus none of them. The population case rate for the period 2016 to 2018 based on known results and the average number of live births in Suriname was 131 per 100 000 live births. ART use by mothers and infants (Table 3) was significantly associated with no HIV transmission to the infant: OR 45.4 (95% CI 9.6–215.3) and OR 145.7 (95% CI 14.4–1477.4) respectively. Women in the interior were less likely to have an HIV negative baby than women living in urban areas (OR 0.2, 95% CI 0.4–0.7).

Case reports review

For most of the 13 infants (69.2%) where HIV was transmitted, this was not a repeat pregnancy (Table 4). For 10 of these 13 infants, a case report was available. Of these 10, two had no antenatal care visits, one started at 17 weeks' gestation and the remaining started after 23 weeks' gestation. Reasons for the time of starting antenatal care were not reported. For nine of the infants, the mother's viral load was recorded. Four mothers had a viral load higher than 1000 copies/mL, three of whom still had a normal vaginal delivery. One mother went into early labor at 28 weeks. She was prescribed ART at 23 weeks, but had not attended further clinical visits, nor taken the ART. Another mother came for delivery having had no antenatal care, so the HIV result came after delivery. In the four mothers with no maternal viral load on record, the infants also did not receive ART. In all four instances, the HIV status of the mother became known after birth. In three cases, the positive HIV diagnosis of the mother came weeks to 2 years after birth. All three mothers had had one HIV test result, dated 7 to 12 weeks before delivery, that was negative. For two mothers, HIV status was discovered while being tested during a job application process and in the next pregnancy 2 years later. For the third mother, the infant was tested almost 2 years after birth, following repeated hospital admissions for lung infections.

DISCUSSION

This study reiterates the importance of providing treatment to both mother and exposed child to prevent the transmission of HIV. In Suriname, unplanned pregnancies, late or no antenatal visits and low HIV test coverage are identified issues that can lead to treatment delay for mothers with HIV. Based on findings in the latest EMTCT report of the Americas (3), antenatal coverage and testing for HIV are at least 10% lower than the target

TABLE 2. Mother and infant characteristics of infants exposed to HIV during pregnancy and birth, Suriname, 2016–2018

Characteristic	All exposed infants	Infants with vertical transmission
	n (%)	n (%)
	317 (100)	13 (100)
Birth year		
2016	119 (37.5)	5 (38.5)
2017	101 (31.9)	4 (30.8)
2018	97 (30.6)	4 (30.8)
Maternal age group, in years		
≤ 19	19 (6.0)	1 (7.7)
20–24	58 (18.3)	3 (23.1)
≥ 25	240 (75.7)	9 (69.2)
Repeat pregnancy[a]		
Yes	157 (49.5)	4 (30.8)
No	160 (50.5)	9 (69.2)
Gravidity		
1	100 (31.5)	6 (46.2)
≥ 2	217 (68.5)	7 (53.8)
Mother's ART use		
Yes	267 (84.2)	2 (15.4)
No	50 (15.8)	11 (84.6)
Infant's ART use		
Yes	280 (88.3)	7 (53.8)
No	5 (1.6)	5 (38.5)
Unknown	9 (2.8)	1 (7.7)
NA[b]	23 (7.3)	NA
Residence		
Urban	253 (79.8)	7 (53.8)
Rural	32 (10.1)	2 (15.4)
Interior	22 (6.9)	3 (23.1)
Unknown	10 (3.2)	1 (7.7)
Mode of delivery		
Vaginal	266 (83.9)	8 (61.5)
Caesarean section	30 (9.5)	3 (23.1)
Unknown	21 (6.6)	2 (15.4)
Outcome		
HIV negative	259 (81.7)	NA
HIV positive	13 (4.1)	NA
Died before HIV status known	5 (1.6)	NA
Abortion	6 (1.9)	NA
Intrauterine fetal death[c]	6 (1.9)	NA
Stillbirth	7 (2.2)	NA
Lost to follow-up	21 (6.6)	NA

ART, antiretroviral therapy; HIV, human immunodeficiency virus; NA, not applicable.
[a] Repeat pregnancy in a woman already known to have HIV during an earlier pregnancy.
[b] Because of intrauterine fetal death, stillbirth, abortion, or infant death shortly after birth.
[c] Intrauterine fetal death is the death of the fetus before 24 weeks gestation.
Source: prepared by authors based on the results.

TABLE 3. Clinical and sociodemographic factors associated with preventing mother-to-child transmission of HIV in live births, Suriname, 2016–2018

Variable	Infant HIV status		Total	OR (95% CI)
	Negative	Positive		
	n (%)	n (%)		
Total	**259 (95.2)**	**13 (4.8)**	**272**	
Birth year				
2016	95 (95.0)	5 (5.0)	100	1
2017	81 (95.3)	4 (4.7)	85	1.1 (0.3–4.1)
2018	83 (95.4)	4 (4.6)	87	1.1 (0.3–4.2)
Mother's age group, in years				
≥ 1 9	16 (94.1)	1 (5.9)	17	1
20–24	46 (93.9)	3 (6.1)	49	1.0 (0.1–9.9)
≥ 25	198 (96.1)	8 (3.9)	206	1.4 (0.2–11.5)
Repeat pregnancy				
Yes	126 (96.9)	4 (3.1)	130	1
No	133 (93.7)	9 (6.3)	142	2.1 (0.6–7.1)
Gravidity				
1	83 (93.3)	6 (6.7)	89	1
≥ 2	176 (96.2)	7 (3.8)	183	1.8 (0.6–5.6)
Mother's ART use				
No	28 (71.8)	11 (28.2)	39	1
Yes	231 (99.1)	2 (0.9)	233	45.4 (9.6–215.3)*
Infant's ART use				
Yes	255 (97.3)	7 (2.7)	262	1
No	1 (20.0)	4 (80.0)	5	145.7 (14.4–1477.4)*
Unknown	3 (60.0)	2 (40.0)	5	
Residence				
Urban	210 (96.8)	7 (3.2)	217	1
Rural	26 (92.9)	2 (7.1)	28	0.4 (0.1–2.2)
Interior	15 (83.3)	3 (16.7)	18	0.2 (0.4–0.7)*
Unknown	8 (88.9)	1 (11.1)	9	

ART, antiretroviral therapy; CI, confidence interval; HIV, human immunodeficiency virus; OR, odds ratio.
*Significant at p=0.05.
Repeat pregnancy in a woman already known with HIV during an earlier pregnancy.
Source: prepared by authors based on the results.

to be reached. In South Africa, 34.9% of mothers had dropped out of one or more steps of the EMTCT service cascade which accounted for a third of the exposed infants being infected (15). Similar findings have been reported in Brazil and India (16–18). Low antenatal service uptake and hence missed clinical measurements leads to more children being born with HIV. The case report review supports these findings as the mothers in whom HIV was transmitted to their infants had either delayed antenatal visits or had had no antenatal care. A prenatal HIV test coverage of 72% was reported in the MICS survey, although 86% of women report general laboratory work-up during antenatal care (9). It seems strange that physicians would exclude HIV from pregnancy laboratory work-up. A more plausible explanation is that mothers are not explicitly told that they are also being tested for HIV.

In different countries low education level, little knowledge of HIV, low socioeconomic status and stigma are related to gaps in the EMTCT cascade (15–17). A study among countries in Latin America and the Caribbean identified low testing coverage during pregnancy, lack of trained staff and lack of follow-up with cases as factors hindering the reduction of mother-to-child transmission of syphilis and HIV (19). Reasons for low uptake of health care services and continued mother-to-child transmission in Suriname need to be further investigated. Anecdotally, health care workers mention the lack of health insurance as an issue.

A program directed at women from the interior of Suriname is needed. Their odds of transmitting HIV to their children are

TABLE 4. Cases of mother-to-child transmission of HIV, Suriname, 2016–2018

Mother							Infant				Case review
Age, years	Repeat	Residence	ART use	Date of HIV diagnosis, day/month/year	Started ANC, gestational week	Viral load near delivery, copies/mL	Birth year	Sex	ART	Mode of delivery	
20	Yes	Interior	No	23/12/2013	No	11 000	2016	M	Yes	CS	No ANC. No further information.
21	No	Interior	Yes	Unknown	Unknown	10	2016	F	Yes	VD	No additional information available.
31	Yes	Urban	Unknown	Known to be HIV positive	Unknown	38 000	2016	F	Yes	VD	No additional information available. Previous viral loads were undetectable.
31	No	Rural	No	1/4/2017	17	Unknown	2017	F	No	CS	HIV discovered after delivery when mother was tested while applying for a job.
30	No	Urban	No	22/3/2017	25	Unknown	2017	M	No	CS	First ANC visit at 25 weeks gestation. Mother was sent for laboratory tests, including HIV. Came after 3 months for next prenatal visit. All test results were good. HIV was read as negative and never repeated. Delivered in May and in June the HIV diagnosis was confirmed.
26	No	Rural	No	23/11/2017	23	4 400	2017	M	Yes	VD	Under HIV care of internal specialist at 23 weeks gestation. ART was prescribed, but never used. Premature delivery at 28 weeks.
22	No	Urban	No	1/04/2017	No	12 000	2017	F	Yes	VD	No ANC. Unknown reason. Came to deliver her child. HIV test result known after delivery.
36	No	Urban	No	9/2/2018	27	Unknown	2016	M	No	VD	After birth, the infant was recurrently admitted for different lung infections. In February 2018, an HIV test was done for the child.
17	No	Urban	No	6/3/2018	30–32	Unknown	2016	F	No	VD	Infant reported as HIV positive 2 years after birth. The infant tested because mother had an HIV diagnosis during pregnancy.
26	Yes	Interior	No	13/1/2012	33	220	2018	F	Yes	CS	Third pregnancy with known HIV. Discontinuation of ART in 2015. Non-adherent to ART and clinical visits. Late ANC.
35	No	Urban	Yes	30/11/2017	32	10	2018	M	Yes	CS	Mother started on ART after delivery.
27	Yes		No	Known to be HIV positive	Unknown	750	2018	M	No	VD	Known HIV. Went to traditional midwife for ANC and delivery. Did not visit the doctor because insurance card expired 2 months before pregnancy.
27	No	Urban	No	31/12/2018	Unknown	310	2018	M	Unknown	VD	No additional information available

ANC, antenatal care; ART, antiretroviral therapy; CS, caesarean section; F, female; HIV, human immunodeficiency virus; M, male; VD, vaginal delivery.
A repeat pregnancy was one where the mother was already known to be HIV positive during an earlier pregnancy.
Source: prepared by authors based on the results.

five times higher than women from urban districts. Interior women attend antenatal care later in the pregnancy (9), due to cultural beliefs (20). Only 44% of women have knowledge on how to prevent mother-to-child transmission, which is even lower (33%) for women from the interior (9). Interventions to inform the public about the importance of early antenatal care are needed, as are programs guaranteeing access to care, for example, universal insurance for pregnant women. MICS 2018 showed declining early first antenatal care visit when moving from the richest to the poorest wealth quintile (9). Additionally, a good case management system should be set up. As seen in Mozambique (21), this could be an effective way to identify improvement strategies for mother and child care. Furthermore, if implemented as a case-based system, this could serve as a reminder to health care providers to follow up with individual pregnant women to prevent loss-to-follow-up and delays.

Interestingly, in almost a quarter of cases with transmission of HIV, a negative maternal HIV test was on record during pregnancy. Reports on false negative test results during pregnancy are scarce; more often false positive tests are reported (22, 23). Given that breastfeeding was not reported, the most plausible explanation for the false negatives in our study is that the three women were in their window period when tested. Most HIV testing occurs through rapid testing and with antibody/antigen tests HIV can be detected 18 to 45 days after exposure (23). WHO recommends repeat HIV testing of pregnant women in the third trimester (24). In Kenya, they found a seroconversion incidence of 0.4% with no specific pattern in time during or after pregnancy when this happens. They recommended repeat testing based on the risk profile of the mother (25). A modelling study found that a 50% reduction in transmission could be achieved by doing an HIV test at 34 weeks' gestation and 8 weeks' postpartum during the first immunization of the child (26). In Suriname, the EMTCT protocol already recommends repeat HIV testing at 30 weeks' gestation. To what extent this recommendation is followed needs to be evaluated. However, with these three cases among the 279 pregnant women living with HIV with live births in the period 2016 to 2018, at a minimum, the seroconversion rate is 1.1%. Furthermore, only in one case was prenatal care started at 17 weeks' gestation. All others were 23 weeks or later, limiting the time for repeat HIV tests. This finding supports repeat HIV testing during delivery and postpartum.

The retrospective study design is a limitation of this study. For the evaluation of the EMTCT cascade, the use of perinatal data is recommended. Because of the lack of a perinatal registry, different sources of data have been used to calculate the indicators. The small number of cases and missing information on other possible variables relevant to mother-to-child transmission (for example, the quality of different health care services) prevented extensive investigation of factors influencing mother-to-child transmission. Breastfeeding practices have not been thoroughly evaluated in this study. Several studies mention that, given the stigma associated with HIV, women in the Caribbean, especially black women, are fearful of not breastfeeding in case it is taken to indicate their HIV status (27, 28) and it harms their bond with the infant. This factor should be further explored because generally mothers in the interior are more likely to breastfeed (9).

This study presents the first evaluation of the progress in Suriname in the implementation of interventions leading to the elimination of mother-to-child transmission of HIV in the country. More information, especially about factors influencing antenatal care, is needed. In light of the findings, we make the following recommendations. First, a perinatal registry should be established, data from which should be regularly evaluated by a multidisciplinary group, including on mother-to-child transmission of HIV. Second, education of the public is needed to improve family planning and encourage early antenatal care. Third, the HIV mother-to-child-transmission guideline should consider recommending additional HIV testing of every pregnant woman during labor or postpartum. Fourth, training of health care workers should continue to ensure adherence to the HIV guidelines and improve the treatment of mothers and children. Lastly, it is important to guarantee the continuity of care for pregnant of women in general but specifically for those living with HIV. Health insurance for every pregnant woman and introduction of a perinatal system promoting case management at the clinical level are key in this regard. These interventions should cover both antenatal and postnatal care with extra attention for vulnerable groups such as mothers from the interior or poorer mothers.

Conclusion

Suriname is well on track to eliminating the transmission of HIV from mother to child, as recommended by WHO. This study reaffirmed the importance of using HIV medication for mothers living with HIV and their children. A prerequisite for this to happen is continuity of care for pregnant women before, during, and after delivery. Both the indicator results and the case reviews indicate that guaranteeing early and good-quality antenatal care for all pregnant women will help Suriname reach EMTCT.

Author contributions. DS and WS conceived the original study and undertook the analysis with feedback from all authors. SH collected the data with critical appraisal by RC and DS and review by DU. MA and WS had the overall supervision for the study. DS drafted the manuscript and all authors critically revised and approved the final version.

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Estudio con métodos mixtos para evaluar la eliminación de la transmisión maternoinfantil del VIH en Suriname

RESUMEN

Objetivos. Evaluar la secuencia de la atención para la eliminación de la transmisión maternoinfantil del virus de la inmunodeficiencia humana (VIH) en Suriname y determinar los factores sociodemográficos y clínicos que previenen la transmisión a lactantes expuestos al virus.

Métodos. En este estudio se empleó un diseño de métodos mixtos. Se utilizaron los datos de atención prenatal procedentes de la encuesta transversal de indicadores múltiples por conglomerados del 2018, realizada en 1 026 mujeres de entre 15 y 49 años que habían dado a luz a un nacido vivo en los dos años anteriores. También se evaluaron los datos nacionales correspondientes a una cohorte de 279 madres con infección por el VIH y sus 317 bebés nacidos entre el 2016 y el 2018. Además, se analizaron en detalle 13 casos de transmisión maternoinfantil del VIH.

Resultados. En el 89,3% de los casos no hubo transmisión maternoinfantil del VIH. En las etapas iniciales de la secuencia de la atención se observó que el 28,4% de las mujeres no tenían cubiertas sus necesidades de planificación familiar; además, el 15% no dispusieron de consultas de atención prenatal, el 8% dieron a luz fuera de un centro de salud y en el 71,5% se llevó a cabo una prueba de detección del VIH en el marco de la atención prenatal. De las mujeres embarazadas con infección por el VIH, el 84,2% recibió un tratamiento antirretroviral, mientras que el 95,5% de los bebés recibieron un tratamiento profiláctico contra el VIH. La administración de tratamiento antirretroviral a la madre (cociente de posibilidades [OR] = 45,4; intervalo de confianza [IC] del 95%: 9,6-215,3) y al bebé (OR = 145,7; IC del 95%: 14,4-1477,4) hizo que aumentaran significativamente las posibilidades de obtener un resultado negativo en la prueba de detección del VIH en los lactantes. Por el contrario, residir en el interior del país hizo que disminuyeran dichas posibilidades (OR = 0,2; IC del 95%: 0,4-0,7), en comparación con residir en un entorno urbano.

Conclusiones. Para las madres con infección por el VIH y para sus bebés, los medicamentos contra el VIH siguen siendo esenciales para prevenir la transmisión maternoinfantil del VIH. En Suriname debe reforzarse la atención prenatal temprana, incluido el seguimiento.

Palabras clave HIV; transmisión vertical de enfermedad infecciosa; Suriname.

Avaliação da eliminação da transmissão materno-infantil do HIV no Suriname: estudo de métodos mistos

RESUMO

Objetivos. Avaliar a cascata de atendimento para a eliminação da transmissão materno-infantil do vírus da imunodeficiência humana (HIV) no Suriname e identificar fatores sociodemográficos e clínicos que impedem a transmissão a bebês expostos.

Métodos. Foi utilizado um delineamento de estudo com métodos mistos. Foram usados dados de atendimento pré-natal de uma pesquisa de indicadores múltiplos por conglomerados de corte transversal realizada em 2018, que incluiu 1 026 mulheres com idades entre 15 e 49 anos que haviam tido um nascido vivo nos dois anos anteriores. Além disso, foram avaliados os dados nacionais de uma coorte de 279 mães com HIV e seus 317 bebês nascidos vivos de 2016 a 2018, além de 13 casos de transmissão materno-infantil de HIV.

Resultados. Em 89,3% dos casos, não houve transmissão materno-infantil do HIV. As etapas iniciais da cascata demonstram que 28,4% das mulheres tiveram necessidades não atendidas de planejamento familiar, 15% não fizeram consultas pré-natais, 8% tiveram o parto fora de uma unidade de saúde e 71,5% receberam um teste de HIV durante o atendimento pré-natal. Das gestantes com HIV, 84,2% receberam terapia antirretroviral, e 95,5% de seus bebês receberam tratamento profilático para o HIV. O tratamento antirretroviral da mãe (razão de chances [RC]: 45,4; intervalo de confiança [IC] de 95%: 9,6–215,3) e da criança (RC: 145,7; IC 95%: 14,4–1477,4) aumentou significativamente a probabilidade de um resultado negativo no teste de HIV dos bebês. Por outro lado, morar no interior diminuiu a probabilidade (RC: 0,2; IC 95%: 0,4–0,7) em comparação com o ambiente urbano.

Conclusões. A medicação de mães e bebês contra o HIV continua sendo fundamental para a prevenção da transmissão materno-infantil do HIV. Deve-se reforçar o atendimento pré-natal precoce com acompanhamento no Suriname.

Palavras-chave HIV; transmissão vertical de doenças infecciosas; Suriname.