

## IMPLEMENTATION OF THE ELIMINATION OF MOTHER-TO-CHILD TRANSMISSION OF HIV, SYPHILIS, HEPATITIS B AND CHAGAS DISEASE IN THE AMERICAN CONTINENT<sup>1</sup>

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1. This article arises from a PhD thesis in Biomedical Research Methodology and Public Health at the Autonomous University of Barcelona.

**Abstract:** Mother-to-Child Transmission (MTCT) of HIV occurs when an HIV-positive woman transmits HIV to her child during pregnancy, labor and delivery, or after childbirth through breastfeeding. On the other hand, MTCT of syphilis occurs when a mother who is a carrier of *treponema pallidum* transmits it to her child only during pregnancy. The objective of this study is to analyze the implementation of the World Health Organization / PAHO guidelines for the elimination of mother-to-child transmission of HIV and syphilis in the countries of the American continent. A quantitative design, descriptive design, was carried out to analyze the statements of the PAHO (Pan American Health Organization) / WHO (World Health Organization) guidelines in the regulations of each country on HIV, syphilis, Hepatitis B and Chagas disease. Among the main results, it is highlighted that the majority of the guidelines declared in their regulations are focused on the elimination of MTCT of HIV and syphilis, but not of hepatitis B and Chagas disease, mainly for the maternal and maternal prenatal and postnatal periods.

**Keywords:** Mother to Child Transmission, HIV, Syphilis, Hepatitis B, Chagas Disease

## INTRODUCTION

Mother-child transmission of HIV, syphilis, Hepatitis B and Chagas disease are a public health problem given their high impact on morbidity and mortality for the health of the neonatal and child population.

Mother-to-Child Transmission (MTCT) of HIV occurs when an HIV-positive woman transmits HIV to her child during pregnancy, labor and delivery, or after childbirth, through breastfeeding. Without prophylactic treatment, approximately 15% to 30% of infants born to HIV-positive women will become infected with HIV during pregnancy and childbirth, and another 5% to 15% will become infected

while being breastfed (PAN AMERICAN HEALTH ORGANIZATION, 2015)

Unlike MTCT of HIV, MTCT of syphilis occurs when a mother who is a carrier of *treponema pallidum* transmits it to her child only during pregnancy. The definition of congenital syphilis, therefore, is made when there is a stillbirth, live birth or fetal death after 20 weeks of gestation or more than 500 grams from a mother seropositive for syphilis who has not received adequate treatment. It may also be a stillborn, live newborn, or child under 2 years of age with microbiological evidence of syphilitic infection (PANAMERICAN HEALTH ORGANIZATION, 2015).

Hepatitis B is a viral infection of the liver. It is mainly transmitted between people through contact with infected blood. Mother-to-child transmission of this disease occurs when the fetus acquires it during pregnancy or through contact with fluids during childbirth (EKE et al., 2017).

In the case of mother-to-child transmission of Chagas Disease, it is caused by *Trypanosoma cruzi* in the maternal blood and is most likely to be transmitted to the fetus during the second or third trimester after the opening of the placental intervillous space. The specific routes for congenital transmission of *T. cruzi* are unclear, but several general transmission routes have been examined in the literature (CEVALLOS; HERNÁNDEZ, 2014; GEBREKRISTOS; BUEKENS, 2014).

Since 2010, the Member States of the Pan American Health Organization (PAHO) have assumed the commitment to promote the elimination of mother-to-child transmission (MTCT) of HIV infection and syphilis in the Region. These commitments were renewed and expanded in 2016 through the approval of the Action Plan for the Prevention and Control of Infection.

by HIV and sexually transmitted infections 2016-2021 (PAN AMERICAN HEALTH ORGANIZATION, [s.d.]), a measure aimed at ensuring that AIDS and STIs no longer constitute public health problems in the Region of the Americas. In 2017, this action plan was expanded to the ETMI-PLUS initiative, as it took advantage of the maternal and child health platform to include the elimination of other preventable communicable diseases on the continent, such as hepatitis B and Chagas disease. (PAN AMERICAN HEALTH ORGANIZATION, 2017), (PAN AMERICAN HEALTH ORGANIZATION, 2018)

Elimination is defined as the reduction to zero of the incidences of the disease or infection in a given geographic area. However, since both HIV infection and syphilis remain a public health problem and measures to prevent mother-to-child transmission (MTCT) are not fully effective, it is currently not feasible to reduce MTCT to zero for any of these infections. Therefore, the objective of ETMI initiatives is to reduce the IMR of these pathologies to a very low level, so that it ceases to be a public health problem (PANAMERICAN HEALTH ORGANIZATION, 2015).

To guide countries to advance toward elimination, the Pan American Health Organization has defined actions to develop both the Pregestational period, the prenatal period, the perinatal period, the maternal postnatal period, and the postnatal period of the infant. Each country, through its Ministries of Health or government health institution, incorporates these guidelines and guidelines into its public policies, in order to meet the objectives and goals proposed around this topic, adapting or innovating its local regulations.

To validate the elimination, impact goals have been defined, in the case of HIV a reduction in MTCT is expected to 2% or less, reduction in the incidence of MTCT

of HIV to 0.3 cases per 1,000 live births or less, and in the case of syphilis, less than 50 cases of congenital syphilis per 100,000 live births must be reported (PANAMERICAN HEALTH ORGANIZATION, 2017)

The term “validation” is used to certify that a country has satisfactorily met the criteria for EMCT of HIV, Syphilis, Hepatitis B or Chagas at a given time. The “validation of the ETMI implies that countries must also maintain continuous, systematic and effective programmatic interventions, as well as the epidemiological surveillance system (PAN AMERICAN HEALTH ORGANIZATION, 2015)

On the American continent, in the year it was Cuba that certified the elimination of MTCT of HIV and Syphilis (WORLD HEALTH ORGANIZATION, 2015). Then, in 2027, Anguilla, Antigua and Barbuda, Bermuda, Cayman Islands, Montserrat, and Saint Kitts and Nevis did so. (PAN AMERICAN HEALTH ORGANIZATION, 2016). In May 2024, the countries of Belize, Jamaica and Saint Vincent and the Grenadines were certified for the elimination of both pathologies.

Through this study, the aim is to describe the implementation of the WHO (World Health Organization) / PAHO (Pan American Health Organization) guidelines for the elimination of mother-to-child transmission of HIV, syphilis, hepatitis B and Chagas disease in the countries of the American continent, through the declaration in its regulations and public policies.

## MATERIAL AND METHOD

A quantitative study, with a descriptive design, was carried out through a documentary review of the regulations and protocols published by the countries of the continent for the elimination of mother-to-child transmission of the 4 diseases. An analysis of the qualitative variables was carried out, regarding the presence of the interventions proposed by the WHO (World Health Organization) / PAHO (Pan American Health Organization) included in the pre-conception, perinatal, post-maternal and post-partum periods of the infant in each of the regulations.

## STUDY POPULATION

Universe: regulations and protocols of all countries on the American continent for the elimination of mother-to-child transmission of HIV and syphilis. The sample corresponded to the countries that had the protocols available at the time of collecting the information, which were 27: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, United States, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Saint Vincent and the Grenadines, Trinidad and Tobago, Uruguay, and Venezuela.

Regarding the sources of information, the study unit and informant corresponded to the regulations and protocols of countries in the region, published on their official websites or retrieved through email with their references in the ministries of health or similar.

## INCLUSION CRITERIA

- Regulations and protocols of the countries of the region, whose States are independent, published on official websites or through their national ministerial references.
- No exclusion criteria were defined

## INFORMATION COLLECTION INSTRUMENT

- An instrument was used that allowed information to be collected through a checklist of the interventions carried out by the countries proposed by the WHO (World Health Organization) / PAHO (Pan American Health Organization) for the elimination of mother-to-child transmission.

For the statistical analysis, the R program was used, performing a descriptive analysis, through the calculation of relative frequencies and absolute frequencies.

## RESULTS

The interventions declared by the countries for the adolescence and pre-pregnancy stages, prenatal period, perinatal period, maternal postnatal period and infant postnatal period are described below.

Of the total interventions proposed for **Adolescence and prior to pregnancy**, 100% of the countries declare to have “Information Campaigns” and “Family Planning, facilitating access to adolescents”, 96.3% declare in their regulations “Access to cases of gender violence and prevention and protection measures” and “Measures for the prevention and treatment of sexually transmitted infections.” Only 55.6% of countries declare in their regulations to carry out “Diagnosis and treatment of girls and women of reproductive age with *Trypanosoma cruzi* infection” and 66.7% declare “Vaccination for Hepatitis B in adolescents.” who were not previously vaccinated as part of the official vaccination schedule” (Table 1).

In relation to the interventions proposed for the **prenatal period**, of the total number of countries studied, 100% of them declare in their regulations all the guidelines defined for this period, with the exception of “Management of unplanned pregnancy” (81.5%)., “Adequate provision of a basic prenatal care package that

includes the promotion of male participation” (92.6%), “Follow-up of pregnant women with serological results indicating syphilis infection (92.6%) and “Access to cases of gender violence and prevention and protection measures” (96.3%). Only 51.9% of countries declare in their regulations the “Monitoring of pregnant women with Chagas infection”, 55.6% declare the “Monitoring of pregnant women with serological results that indicate hepatitis B virus infection” and 59.3% declare “Treatment of pregnant women with serological results that indicate hepatitis B virus infection.” (Table 2)

Of the intervention for the **perinatal period**, 88.9% declare “Prophylaxis for Newborns of HIV-infected mothers.” Only 51.9% of the countries declare “Parasitological and serological screening for the detection of *T. cruzi* in newborns of infected mothers”, 74.1% “Specific immunoglobulin against hepatitis B” and 77.8% states “Vaccination with the birth dose of monovalent hepatitis B vaccine in the first 24 hours of life” (Table 3).

In relation to interventions in the **maternal postnatal period**, 100% of the countries declare “Easy access to family planning services after childbirth”, and 96.3% declare “In HIV-positive women: ensure that they receive care and that they do not abandon their treatment.” Only 37% declare “In women undergoing tests for the detection of HBsAg: if the result is negative, the hepatitis B vaccine is applied”, 51.9% “In women undergoing tests for the detection of HBsAg: If the result is positive, the patient is referred for evaluation and to determine her suitability for treatment” and 63% “Treatment of mothers with *T. cruzi* seropositivity after pregnancy.” (Table 4).

Regarding interventions for the **postnatal infant period**, 96.3% of the countries studied declare in their regulations “Perform in infants exposed to HIV: the polymerase chain reaction test 4 to 6 weeks after birth and take a second sample if the result is positive.” On

the contrary, only 77.8% declare “In infants exposed to HIV: Serological test (rapid diagnostic) for the detection of HIV at nine months of age” and 81.5% declare “Infants with congenital syphilis or exposed to the risk of contracting syphilis: treat them and carry out clinical and serological follow-up until negative results are obtained. Only 40.7% declare “Serological tests for the detection of *T. cruzi* in newborns of infected mothers (at 8 months)” and 51.9% “Treatment of children with *T. cruzi* seropositivity before they reach one year of age and clinical and serological follow-up until negative results are obtained” (Table 5).

## DISCUSSION

In public policies in the countries studied, in general, various strategies have been implemented to improve pregnant women’s access to HIV and syphilis screening, and the delivery of corresponding treatment, with early detection in pregnant women being an important pillar for prevention. of mother-to-child transmission, together with prenatal care. An alternative studied in terms of cost – benefit during pregnancy has been the use of the rapid HIV and syphilis test (BRISTOW et al., 2016), which could contribute to improving access to diagnosis.

This improvement in public policies could have contributed to the decrease in MTCT rates of HIV in the countries of the continent, but they are probably not being available to all pregnant women or children in the countries of the continent. This is also suggested in a study published in 2019 (SILVEIRA et al., 2019), which shows that although most countries on the American continent have regulations for the elimination of congenital syphilis, work must be done on inequalities. for decision making.

INTERVENTIONS IN ADOLESCENCE AND PRIOR TO PREGNANCY	Yes		No	
	N°	%	N°	%
a. Information, education and communication campaigns within the ETMI-plus initiative in relation to infection prevention	27	100	0	0
b. Family planning, facilitating access to adolescents of both sexes without legal impediments and promoting male participation	27	100	0	0
c. Offering tests for the detection of HIV infection and syphilis, screening measures, notification of sexual partners and linking patients to the care system	24	88,9	3	11,1
d. Access to cases of gender violence and prevention and protection measures	26	96,3	1	3,7
e. Measures for the prevention and treatment of sexually transmitted infections	26	96,3	1	3,7
f. Vaccination for Hepatitis B to adolescents who were not previously vaccinated as part of the official vaccination schedule	18	66,7	9	33,7
g. Diagnosis and treatment of girls and women of reproductive age with Trypanosoma cruzi infection	15	55,6	12	44,4%

Table 1: Distribution according to interventions declared by the countries of the American continent for the stage of adolescence and prior to pregnancy

Source: Ministry of Health of the countries, 2019

INTERVENTIONS CARRIED OUT IN THE PRENATAL PERIOD	Yes		No		TOTAL	
	N°	%	N°	%	N°	%
a. Early access to prenatal care	27	100	0	0	27	100
b. Management of not planned pregnancy	22	81,5	5	18,5	27	100
c. Adequate provision of a basic prenatal care package that includes the promotion of male participation	25	92,6	2	7,4	27	100
d. Access to cases of gender violence and prevention and protection measures	26	96,3	1	3,7	27	100
e. Systematic serological screening for the detection of HIV infection	27	100	0	0	27	100
f. Systematic serological screening for the detection of syphilis infection	27	100	0	0	27	100
g. Systematic serological screening for the detection of Chagas disease infection	16	59,3	11	40,7	27	100
h. Systematic serological screening for the detection of hepatitis B infection (AgHBs)	16	59,3	11	40,7	27	100
i. Guidance on the importance of timely administration of a birth dose of hepatitis B vaccine	21	77,8	6	22,2	27	100
j. Hepatitis B vaccination	27	100	0	0	27	100
k. Treatment of pregnant women with serological results indicating HIV infection (treatment with antiretrovirals)	27	100	0	0	27	100
l. Follow-up of pregnant women with serological results indicating HIV infection (treatment with antiretrovirals)	27	100	0	0	27	100
m. Treatment of pregnant women with serological results indicating syphilis infection (treatment with benzathine benzylpenicillin)	27	100	0	0	27	100
n. Follow-up of pregnant women with serological results indicating syphilis infection (treatment with benzathine benzylpenicillin)	25	92,6	2	7,4	27	100
o. Treatment of pregnant women with serological results indicating hepatitis B virus infection (VHB)	16	59,3	11	40,7	27	100
p. Follow-up of pregnant women with serological results indicating hepatitis B virus infection (VHB)	15	55,6	12	44,4	27	100
q. Follow-up of a pregnant woman with chagas infection	14	51,9	13	48,1	27	100

Table 2: Distribution of interventions declared by the countries of the American continent for the prenatal period

Source: Ministry of Health of the countries, 2019

INTERVENTIONS IN THE PERINATAL PERIOD	Yes		No		TOTAL	
	N°	%	N°	%	N°	%
a. Parasitological and serological screening for the detection of <i>T. cruzi</i> in newborns of infected mothers	14	51,9	13	48,1	27	100
b. Specific immunoglobulin against hepatitis B (100 IU) no more than 12 hours after birth (women with HBsAg seropositivity)	20	74,1	7	25,9	27	100
c. Vaccination with the birth dose of monovalent hepatitis B vaccine in the first 24 hours of life	21	77,8	6	22,2	27	100
d. Newborns of HIV-infected mothers: dual prophylaxis (zidovudine twice daily or nevirapin once daily) during the first six weeks of life	24	88,9	3	11,1	27	100

Table 3: Distribution of interventions declared by the countries of the American continent for the perinatal period

Source: Ministry of Health of the countries, 2019

INTERVENTIONS IN THE MATERNAL POSTNATAL PERIOD	Yes		No		TOTAL	
	N°	%	N°	%	N°	%
a. Easy access to family planning services after childbirth	27	100	0	0	27	100
b. Treatment of mothers with <i>T. cruzi</i> seropositivity after pregnancy (benznidazole and nifurtimoxd)	17	63	10	0	27	100
c. In women undergoing testing for HBsAg: if the result is negative, the hepatitis B vaccine is administered (if required by national policy)	10	37	17	0	27	100
d. In women undergoing testing for HBsAg: if the result is positive, the patient is referred for evaluation and to determine her suitability for treatment	14	51,9	13	0	27	100
e. In HIV-positive women: ensure they receive care and do not abandon their treatment	26	96,3	1	0	27	100

Table 4: Distribution according to interventions declared by the countries of the American continent for the maternal postnatal period

Source: Ministry of Health of the countries, 2019

INTERVENTIONS IN THE POSTNATAL PERIOD OF INFANTS	Yes		No		TOTAL	
	N°	%	N°	%	N°	%
a. In infants exposed to HIV: Perform polymerase chain reaction testing 4 to 6 weeks after birth and collect a second sample if the result is positive	26	96,3	1	3,7	27	100
b. In infants exposed to HIV: Serological test (rapid diagnostic) for the detection of HIV at nine months of age	27	77,8	0	7,4	27	100
c. In infants exposed to HIV: Comprehensive care of HIV-infected children	26	96,3	1	3,7	27	100
d. Infants with congenital syphilis or at risk of contracting syphilis: treat them and follow them clinically and serologically until negative results are obtained	22	81,5	5	18,5	27	100
e. Administration of the entire hepatitis B vaccine series (combination vaccine) within one year: at 2, 4, and 6 months of age	26	96,3	1	3,7	27	100
f. Serological tests for the detection of <i>T. cruzi</i> in newborns of infected mothers (at 8 months)	11	40,7	16	59,3	27	100
g. Treatment of children with <i>T. cruzi</i> seropositivity before they reach one year of age and clinical and serological follow-up until negative results are obtained.	14	51,9	13	48,1	27	100

Table 5. Distribution of interventions declared by the countries of the American continent for the postnatal period in infants

Source: Ministry of Health of the countries, 2019

Another aspect to consider could be the economic distribution of the countries of the continent, such as, for example, the inequality indicators, which could account for the inequality present in the region and, therefore, the regulations are not developed based on to the multiple realities of each subnational territory, so its execution is carried out with underlying difficulties.

On the other hand, it is suggested that social determinants influence these health indicators in the problem, such as those characteristics related to the vulnerability of the population, such as the indigenous population, migrants, among others (HUAMÁN et al., 2017). Labor migration as a phenomenon of demographic mobility since 2020 on the American continent (INTERNATIONAL LABOR ORGANIZATION, 2016), (UNITED NATIONS ORGANIZATION, 2019)

Regarding limitations, although information from 27 countries was accessed, it would have been favorable to access all of them. Among the strengths of this study are the possibility of collecting information on the regulations of a large number of countries on the American continent through their websites or through their ministerial references for the elimination of MTCT. with a multidisciplinary global perspective and applied to subnational realities.

It could be suggested that the implementation of the WHO (World Health Organization) / PAHO (Pan American Health Organization) guidelines in the American continent to achieve the goal of EMTCT for HIV, Syphilis, Hepatitis B and Chagas Disease may respond more than to its economic reality, to social, cultural or of their health systems, without current evidence in this regard. Furthermore, there is a greater approach to interventions for

the prevention of MTCT of HIV and Syphilis, but not for hepatitis B and Chagas disease.

In relation to the implications for practice, at a more strategic level, for public policy and decision makers, it is suggested that they must consider the elements of the local scenario of each country so that the actions of each of the Policies that emerge can be in tune with the needs of the population according to their local reality. At a more operational level, it is suggested that health services be brought closer to the most remote, vulnerable or areas with greater characteristics of inequality, in order to promote access to diagnosis, treatment and timely follow-up, which will allow progress towards the elimination of TMI in the countries of the American continent.

## CONCLUSIONS

Of the total number of interventions proposed for the elimination of MTCT of HIV and syphilis, most countries declare them in their regulations both for the stages of adolescence and prior to pregnancy, prenatal period, perinatal period, postnatal maternal period and postnatal lactating period. The interventions declared to a lesser degree are those related to mother-to-child transmission of hepatitis B and Chagas disease.

It is concluded that one of the main challenges will be to move towards biopsychosocial health models with emphasis on health promotion and prevention for those who make decisions in public health policies regarding this matter; to carry out a comprehensive, multidisciplinary approach, both in construction of regulations and their execution in each territory, with respect to local cultural diversity.



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