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SPATIAL DISTRIBUTION AND CHARACTERIZATION OF CASES OF CONGENITAL SYPHILIS

DISTRIBUIÇÃO ESPACIAL E CARACTERIZAÇÃO DE CASOS DE SÍFILIS CONGÊNITA

DISTRIBUCIÓN ESPACIAL Y CARACTERIZACIÓN DE CASOS DE SÍFILIS CONGÉNITA

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ABSTRACT

Objective: to identify the spatial distribution of the incidence of congenital syphilis and maternal and newborn characteristics. ***Method:*** quantitative, documentary study, which analyzed the maternal and newborn characteristics of 1,145 notifications from the Reporting System of Cases of congenital and maternal syphilis. A structured form was used in the collection and descriptive statistics through the Microsoft Excel® 2010 program was used in the analysis. Data were presented in tables and figures. ***Results:*** incidence and lethality were higher in the years 2012 (19/10,000 live births) and 2007 (5.7/100 cases). Regarding maternal characteristics, 38.6% had low levels of schooling, 70% were between 20 and 39 years old, 63.6% had been diagnosed during prenatal care and in 69.4% of cases the partner had not performed treatment. In the newborn, in 95% of cases the diagnosis was made within 6 days of life and 93.9% evolved to cure. ***Conclusion:*** there was a progressive increase in the incidence of congenital syphilis until the year 2012, with a higher lethality rate in 2007. Maternal characteristics indicate low schooling and the characteristics of cases of congenital syphilis confirm that the diagnosis was made in time. ***Descritores*:** Syphilis; Congenital Syphilis; Prenatal Care; Notification of Diseases; Public Health; Health Services.

RESUMO

***Objetivo*:** identificar a distribuição espacial da incidência de sífilis congênita e as características maternas e dos recém-nascidos acometidos. ***Método*:** quantitativo, documental, sendo analisadas as características maternas e do recém-nascido de 1.145 notificações do Sistema de Informação de Agravos de Notificação de casos de sífilis congênita e materna. Utilizou-se na coleta um formulário estruturado, na análise fez-se uso da estatística descritiva por meio do programa Microsoft Excel® 2010 e os dados são apresentados em tabelas e figuras. ***Resultados*:** a incidência e a letalidade foram maiores nos anos de 2012 (19/10.000 nascidos vivos) e 2007 (5,7/100 casos). Quanto às características maternas, 38,6% apresentaram baixa escolaridade, 70% estavam na faixa etária entre 20-39 anos, em 63,6% o diagnóstico foi realizado no pré-natal e em 69,4% o parceiro não realizou tratamento. No recém-nascido, em 95% dos casos o diagnóstico foi realizado em até 6 dias de vida e 93,9% evoluíram para cura. ***Conclusão*:** ocorreu um aumento progressivo de incidência de sífilis congênita até o ano de 2012, com maior taxa de letalidade no ano de 2007, as características maternas apontam para a baixa escolaridade e as características dos casos de sífilis congênita conferem que o diagnóstico foi feito em tempo oportuno. ***Descritores*:** Sífilis; Sífilis Congênita; Cuidado Pré-Natal; Notificação de Doenças; Saúde Pública; Serviços de Saúde.

RESUMEN

Objetivo*:** identificar la distribución espacial de la incidencia de sífilis congénita y las características maternas y de los recién nacidos acometidos. ***Método*: cu**antitativo, documental, siendo analizadas las características maternas y del recién nacido de 1.145 notificaciones del Sistema de Información de Agravíos de Notificación de casos de sífilis congénita y materna. Se utilizó en la recolección un formulario estructurado, en el análisis se usa la estadística descriptiva por medio del programa Microsoft Excel® 2010 y los datos son presentados en planillas y figuras. ***Resultados*: l**a incidencia y la letalidad fueron mayores en los años de 2012 (19/10.000 nacidos vivos) y 2007 (5,7/100 casos). En las características maternas, 38,6% presentaron baja escolaridad, 70% tenían edad entre 20-39 años, en 63,6% el diagnóstico fue realizado en el prenatal y en 69,4% el compañero no realizó tratamiento. En el recién nacido, en 95% de los casos el diagnóstico fue realizado en hasta 6 días de vida y 93,9% se curaron. ***Conclusión: hubo un aumento progresivo de incidencia de sífilis congénita hasta el año de 2012, con mayor tasa de letalidad en el año de 2007, las características maternas apuntan para la baja escolaridad y las características de los casos de sífilis congénita muestran que el diagnóstico fue hecho en tiempo oportuno. ***Descriptores*:** Sífilis; Sífilis Congénita; Cuidado Prenatal; Notificación de Enfermedades; Salud Pública; Servicios de Salud.

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INTRODUCTION

Syphilis is a systemic infecto-contagious disease that has afflicted the human species for many years. Transmission occurs through sexual and vertical transmission, causing, respectively, acquired syphilis and congenital syphilis. Approximately 12 million people worldwide are estimated to have syphilis each year, with half a million children and half a million abortions and stillbirths resulting from maternal syphilis.[1]

The congenital form is currently considered a major public health challenge. The control strategy focuses on the prevention of the disease, which begins during prenatal care, with the early identification of maternal syphilis, through rapid syphilis tests and laboratory tests, which allows diagnosing pregnant women and their partners, and initiating treatment in a timely manner..[1-7] Despite this, the incidence of the disease has increased progressively.[1-3]

The incidence rate in Brazil for the years 2011, 2012 and 2013 were 3.3/1,000 live births; 4.0/1000 live births and 4.8/1000 live births, respectively.[3] It should be noted that, since 1986, congenital syphilis is considered to be a notifiable disease for the purpose of epidemiological surveillance; however, underreporting in Brazil accounts for up to 67% of cases per year.[3] Thus, it is estimated that syphilis indicators may be even higher than reported.

There is scientific evidence of the occurrence of congenital syphilis related to health service frailties regarding prenatal coverage and assistance in primary care.[4-7] In addition, maternal characteristics have also been associated with the occurrence of congenital syphilis. A national-based study identified the association of congenital syphilis cases in women aged 20 to 34 years, with lower levels of schooling, black skin color, no paid activity, late beginning of prenatal care, fewer visits and serological tests and inadequate treatment. In addition, congenital syphilis is a risk factor for prematurity, fetal mortality and frequent hospital admissions.[5]

In this way, it is established the relationship between congenital syphilis and social vulnerability, and the need to characterize the scenario of occurrence in order to provide valuable elements for the planning of control actions by managers and health professionals.

OBJECTIVE

- To identify the spatial distribution of the incidence of congenital syphilis and the maternal and newborn characteristics.

METHOD

This is a quantitative, descriptive and documentary study carried out between October and November of 2016. Data were collected in the Information System of Notifiable Diseases (SINAN) and the Information System on Live Births (SINASC), regarding the cases of congenital syphilis occurred in the state of Paraná, Brazil, from 2007 to 2013.

The state of Paraná is divided into 399 municipalities and has a total population of 10,279,545 inhabitants. The division of the state comprises 22 regional health áreas, namely I Paranaguá, II Curitiba, III Ponta Grossa, IV Irati, V Guarapuava, VI União da Vitória, VII Pato Branco, VIII Francisco Beltrão, IX Foz do Iguaçu, X Cascavel, XI Campo Mourão, XII Umuarama, XIII Cianorte, XIV Paranavaí, XV Maringá, XVI Apucarana, XVII Londrina, XVIII Cornélio Procópio, XIX Jacarezinho, XX Toledo, XXI Telemaco Borba and XXII Ivaiporã.[8]

The population of this study consisted of the records of congenital syphilis included in the SINAN and SINASC, by the 22 regional health areas of the state of Paraná, from 2007 to 2013, which were the last records available in the system. The data were collected on the website of the Department of Informatics of the Unified Health System (DATASUS), updated on September 24, 2014 and are available from the electronic address http://www.datasus.gov.br.[9-10] Data were collected using a form based on SINAN records of congenital syphilis (schooling, race/color, diagnosis of maternal syphilis, treatment of partner, age range of the child at diagnosis, final classification of cases and outcome), syphilis in the pregnant woman (age group of the pregnant woman and classification of syphilis in the pregnant woman). In SINASC the records of live births in Paraná were collected for the same period.

The variables that composed the present study were grouped by maternal characteristics, characteristics of the newborn, temporal-spatial distribution of the incidence rate and lethality rate. **Temporal-spatial distribution:** incidence of congenital syphilis and its lethality over the years and incidence of cases recorded by the 22 regional health areas per 10,000 live births. **Maternal characteristics:** schooling (illiterate,

incomplete primary school, high school and higher education) and race/color (white, black, brown, yellow and indigenous), maternal age group (10-14 years old, 15-19 years old, 20-39 years old, 40-59 years old), diagnosis of maternal syphilis (during prenatal, childbirth/curettage, postpartum and not performed), syphilis classification in the pregnant woman (primary, secondary, tertiary or latent), partner treatment (yes or no) and **characteristics of the newborn:** age at diagnosis (up to 6 days, 7-27 days, 28 days to <1 year, 2 to 4 years), final classification of congenital syphilis (recent congenital syphilis, late congenital syphilis, stillbirth/abortion due to syphilis and discarded) and outcome (alive, death from congenital syphilis and death from other causes).

The variables were stratified by year of occurrence and by regional health area, with absolute and relative frequency distribution using Microsoft Excel® 2010 software and ArcGIS 10.4.1 software resources for the construction of figures and tables.

The incidence of cases of congenital syphilis was calculated based on the number of live births as reported in SINASC and on the absolute number of cases of congenital syphilis collected from SINAN, both for the same period (2007-2013). For this purpose, the equation Incidence = (number of new cases of disease/number of live births in the period)* 10,000 was used. Congenital syphilis lethality was calculated using the equation of Congenital Syphilis Lethality = (congenital syphilis deaths/number of individuals with congenital syphilis)*100.[11]

According to the National Health Council, Resolution No. 510 of April 7, 2016, submission to the Research Ethics Committee was not necessary because it is a study based on secondary databases and public domain, whose information is aggregated and does not allow individual identification.[12]

RESULTS

Between 2007 and 2013, according to data from SINASC, in the state of Paraná, there was a total of 1,062,519 live births, of which 1,145 were reported with congenital syphilis. The incidence of congenital syphilis was 10.8 cases per 10,000 live births, and the lethality for the same period was three deaths/100 cases of congenital syphilis. Figure 1 shows that the incidence of cases increased steadily, reaching its peak in 2012, with 19 cases/10,000 live births, and the highest lethality rate was in 2007, with 5.7 deaths/100 cases of congenital syphilis.

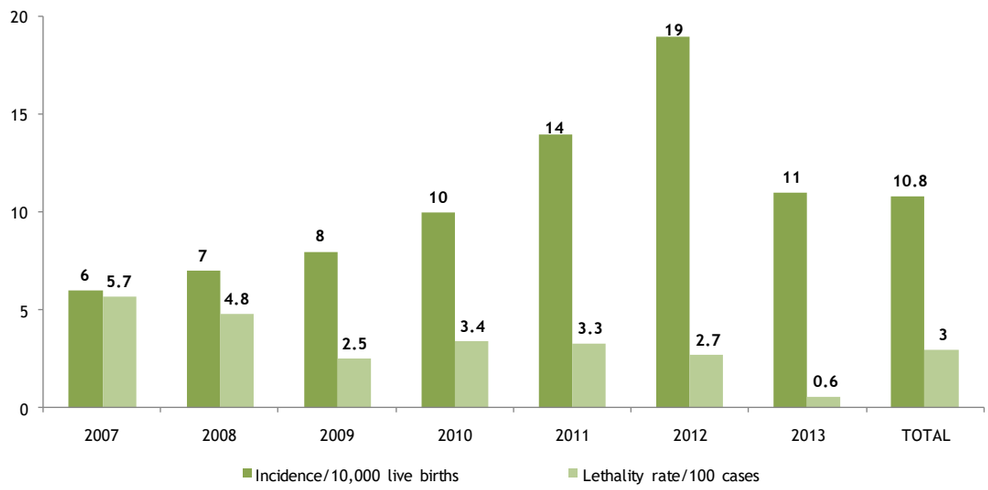

Figure 1. Incidence of congenital syphilis and lethality rate in the state of Paraná, Brazil, 2007 to 2013.

Source: Ministry of Health (BR) - Information System of Notifiable Diseases, 2016; Ministry of Health (BR) - Information System on Live Births. Accessed on August 6, 2017.

Figure 2 shows the spatial distribution of the incidence of congenital syphilis by regional health area. There was a higher incidence in the Regional Health Area VII (Pato Branco), with 20.3 cases/10,000 live births, followed by the Regional Health Area II (Curitiba), with 20.2 cases/10,000 live births.

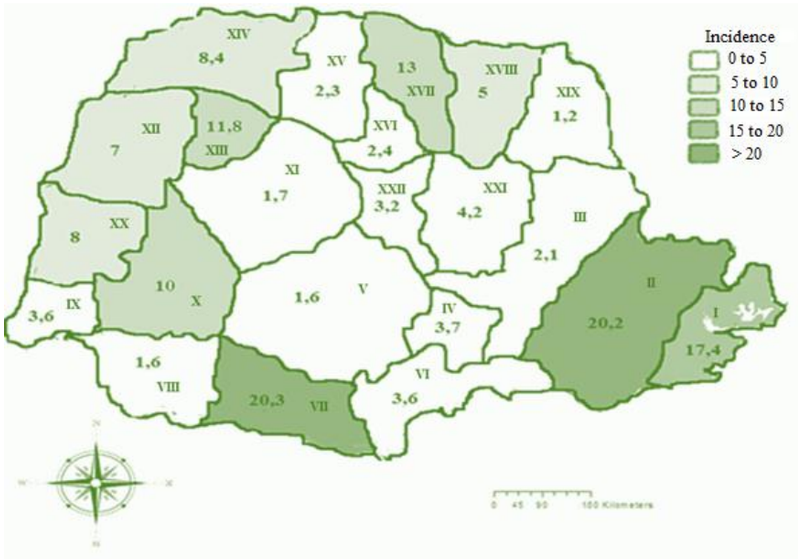

Figure 2. Spatial distribution of the incidence of congenital syphilis per 10,000 live births per health region of the state of Paraná, Brazil, 2007 to 2013.

Source: Ministry of Health (BR) - Information System of Notifiable Diseases, 2016; Ministry of Health (BR) - Information System on Live Births, 2016 [cited in August 10, 2017].

Tables 1 and 2 show the variables related to maternal characteristics, with prevalence of incomplete primary school (38.6%), age between 20 and 39 years old (70%), white race/color (72.9%), performance of prenatal care (86%), gestational syphilis during prenatal care (63.6%), primary syphilis (44.2%) and non-treatment of the partner (69.4%).

Table 1. Distribution of cases of congenital syphilis according to maternal sociodemographic data in the state of Paraná, Brazil, between 2007 and 2013.

Maternal characteristics	n	%
Schooling		
Illiterate	20	1.7
Incomplete primary school	442	38.6
Complete primary school	130	11.4
High school	215	18.8
Higher education	15	1.3
Ignored	313	28.2
Age group (2,576*)		
10-14	34	1.3
15-19	654	25.4
20-39	1804	70.0
40-59	83	3.2
Ignored	1	0.1
Race/color		
White	835	72.9
Black	34	3.0
Brown	161	14.0
Yellow	3	0.3
Indigenous	2	0.2
Ignored	110	9.6

*Data collected from syphilis records in pregnant women.

Source: Ministry of Health (BR) - Information System on Notifiable Diseases; 2016 [cited in Oct 10, 2016].

Table 2. Distribution of cases of congenital syphilis according to maternal clinical data in the state of Paraná, Brazil, between 2007 and 2013.

Maternal characteristics	n	%
Having undergone prenatal care		
Yes	984	86.0
No	148	12.9
Ignored	13	1.1
Diagnosis of maternal syphilis		
During prenatal care	728	63.6
Childbirth/curettage	264	23.1
After childbirth	118	10.3
Unrealized	14	1.2
Ignored	21	1.8
Classification of maternal syphilis	2576*	
Primary	1140	44.2
Secundary	161	6.3
Terciária	119	4.6
Latent	642	24.9
Ignored	514	20
Partner Treatment		
Yes	181	15.8
No	795	69.4
Ignored	169	14.8

*Data collected from syphilis records in pregnant women

Source: Ministry of Health (BR) - Information System on Notifiable Diseases; 2016 [cited in Oct 10, 2016].

Table 3 shows the distribution of the variables related to the newborn, with prevalence of diagnosis of cases of congenital syphilis prior to six days of life (94.8%), with a recent final classification (87.9% %) and outcome alive (93.9%).

Table 3. Characteristics of the newborn with congenital syphilis. Paraná, Brazil, 2007 to 2013.

Clinical-epidemiological variables	n	%
Age group at diagnosis		
Up to 6 days	1085	94.8
7 – 27 days	21	1.8
28 days to < 1 year	38	3.3
1 years to < 2 years	0	0
2 to 4 years	1	0.1
5 to 12 years	0	0
Final classification of cases		
Recent congenital syphilis	1007	87.9
Late Congenital Syphilis	8	0.7
Stillbirth/abortion due to syphilis	23	2.0
Discarded	72	6.3
Ignored/blank	35	3.1
Outcome of the case		
Alive	1013	93.9
Death from congenital syphilis	34	3.1
Death from other causes	13	1.2
Ignored/blank	19	1.8

Source: Ministry of Health (BR) - Information System on Notifiable Diseases; 2016 [cited in Oct 10, 2016].

DISCUSSION

The results showed a progressive increase in the incidence of congenital syphilis until 2012, with a higher lethality rate in 2007. A similar result was identified in a study carried out in Rondônia in 2015, which identified the notification of 325 cases of congenital syphilis between 2009 and 2014, with an increasing number of cases over the observed period.[13] Both cases corroborate with the progressive increase in the incidence rates of congenital syphilis in Brazil. In the year 2015, there was a higher incidence in the Northeast, Southeast and South regions, with 6.9 cases/1,000 live births.[4]

It is worth noting that in Brazil, in the last decade, through the implementation of

compulsory notification of gestational syphilis, instituted by Ordinance No. 33 of July 14, 2005, and rapid tests in pregnant women, based on the health policy entitled Stork Network, the access to the diagnosis was extended in pregnant women as of 2011.[4] Thus, improvements in the epidemiological surveillance system as well as greater subsides to syphilis care may have allowed the notification of a greater number of cases of congenital syphilis in the year 2012.

As for the spatial distribution of cases, there was concentration of the disease in the areas of Pato Branco and Curitiba, which have different social and population characteristics. The Pato Branco health area has 15 municipalities, with an estimated population in 2010 of 249,793 thousand inhabitants, with a mean per capita income of R$ 724.44, and 29% of the population with incomes of less than half a minimum wage (minimum wage of R$ 510.00 in the year 2010) and illiteracy rate of 7%. The coverage of primary care services in 2009 for this region was 76%.[8,12-4] On the other hand, the health area of Curitiba has 29 municipalities with an estimated population in 2010 of 3,213,754 inhabitants with a median income per capita of R$ 1,149.72, 15% of the population with incomes of less than half a minimum wage and illiteracy rate of 3%. The coverage of primary care services in 2009 was 74%.[8,14-5]

Even with better coverage by the primary care services in the health areas of Pato Branco and Curitiba, it is assumed that there may be insufficiencies in the procedures adopted during prenatal care, corroborating the high incidence of congenital syphilis. Regarding the population characteristics, we can see that the Curitiba region has a better socioeconomic index with a lower illiteracy rate; however, it presents a larger population and the incidence of congenital syphilis is similar to that of Pato Branco.

Considering the results regarding maternal characteristics, there was a predominance of cases among pregnant women with schooling between 0 and 8 years old and white skin color. A study in the municipality of Monte Carlo, Minas Gerais, conducted between 2007 and 2013, identified the prevalence of syphilis in pregnant women with schooling over 8 years, which differs from the data found in the state of Paraná.[16] A similar result to the present study was the population-based study conducted in Brazil between 2003 and 2008, in which the higher incidence of congenital syphilis is associated with social strata that have lower educational level and socioeconomic disadvantage.[17]

Regarding the race/color of women with congenital syphilis, a population-based study conducted in Brazil identified a predominance of brown race/color [17], which differs from data found in this study. The characteristics found here show that the occurrence of syphilis does not present a defined profile of the population and varies according to the Brazilian region. In Paraná, based on the data found, the importance of preventive actions is emphasized with greater attention to women with low educational level.

The maternal age verified in the present study was 20 to 39 years, which corroborates with the result of other studies.[5,13,18-9] The concentration in this age group can be justified by the fact that this age is the peak of the reproductive phase.[4] It is important to emphasize the importance of carrying out health education actions, encouraging safe sex practices with instruction for the use of condoms, both to avoid unplanned pregnancies and to avoid the transmission of sexually transmitted infections, regardless of age group of women.

In the present study, there were predominant cases of congenital syphilis in newborns of pregnant women who had undergone prenatal care and the syphilis was diagnosed during this phase. The same result was found in another study, in which 57% of the mothers of children with congenital syphilis had undergone prenatal care, suggesting deficiencies in the functioning of primary care networks or in the integration thereof with the health system, thus constituting a sentinel event.[15] The occurrence of congenital syphilis in newborns of women diagnosed during the prenatal period points to the fragility of the health services in carrying out disease control measures, whether due to the neglect of the treatment by the staff or due to non-adherence by the pregnant woman and her partner[2-3], being evidenced, in the present study, that there was no implementation of the treatment of the partner in 69.4% of the cases.

The pregnant woman is considered to be adequately treated, reducing the chances of vertical transmission, when she is given doses of penicillin appropriate to the stage of infection, ending the treatment within 30 days before delivery, with concomitant treatment of the partner, with the same regimen. The partner of the pregnant woman with syphilis should be called to perform the treatment and should be the object of an active search by the epidemiological surveillance and by the family health unit of

the correspondent area, and he should be considered as having the same disease and receive treatment, even if there is no clinical symptoms.[19]

Practitioners of primary health care teams have been reluctant regarding the treatment of syphilis in the units, which point out the lack of technical conditions for the management of anaphylaxis cases after the administration of penicillin. However, the very low incidence of anaphylactic reactions does not justify the cost that the non-administration of the medication brings.[17] In order to control the disease, an early diagnosis associated with immediate treatment should be performed, which has not been performed in a timely manner, as verified in the results of the present study, in which 86% of the pregnant women has undergone prenatal care and 63.6% % had the diagnosis of syphilis still during prenatal care, presenting the outcome of congenital syphilis.

The inclusion of partners in educational activities during prenatal care is a condition for reaching the control of congenital syphilis. The reasons for the non-treatment of the partners are unknown because this study is based on secondary data. The participation of the partner in this process must be guaranteed, as foreseen in the National Policy of Man, with emphasis on the importance of the accomplishment of the prenatal care of the man concomitantly. Gestation should be a space for the reception of both involved, seeking quality in prenatal care, in which the guidance provided to the partner regarding the treatment is of paramount importance to avoid reinfection of the woman.[3,20]

It is important to draw up a line of care that considers the adequate management of syphilis through the continuity of the care initiated during prenatal care, in primary care, until delivery and follow-up of the newborn in the hospital environment. According to the Clinical Protocol and Therapeutic Guidelines for Prevention of Vertical Transmission of HIV, Syphilis and Viral Hepatitis, the treatment of the pregnant woman should be started soon after a reagent test, either treponemal or non-treponemal. One should not await the result of the second test, and the partner testing should be performed the soon as possible, followed by treatment. The pregnant women is considered as inadequately treated if the sexual partner presents positive symptoms or tests without treatment or inadequately treated.[21]

As to the syphilis stage at the time of diagnosis, primary syphilis predominated, evidencing recent infections with a higher number of spirochetes of *Treponema pallidum*, increasing the risk of vertical transmission. It is highlighted the need for the treatment of the pregnant woman and the partner as soon as possible. A similar result was found regarding the Brazilian population in 2015, but there is the possibility of classification errors in the diagnosis, in which, when there is no possibility to establish the stage of the disease, the therapeutic approach for latent syphilis, of unknown duration and treated with three doses of benzathine penicillin should be adopted.[4] These data show that due to failure in the classification of syphilis in the pregnant woman, the treatment may not be performed adequately, contributing to the occurrence of congenital syphilis, which evidences the importance of carefully evaluating the stage of the disease.

In the diagnosis of congenital syphilis of the newborn, it was noticed that this was done in a timely manner, until the 6 days of life, thus allowing initiating treatment early. The classification of the cases was, as a matter of priority, for recent congenital syphilis, with a higher evolution of the cases for cure, showing that the treatment was effective. However, through adequate prenatal care, the outcome of congenital syphilis with the need for hospitalization could have been avoided, thus reducing the suffering of those involved.

The experience of puerperal women in relation to the treatment of congenital syphilis is surrounded by feelings of fear, suffering and blame in witnessing the procedures that the children are submitted to.[22] Adequate prenatal care contributes to the prevention of the various possible adverse outcomes in pregnancy, as well as to the reduction of expenses with newborn care, especially when it comes to syphilis in pregnant women that may contribute to the occurrence of several sequelae in the newborn.[20]

CONCLUSION

The incidence of congenital syphilis has increased gradually until 2012, with a higher lethality rate in 2007. The incidence in the Pato Branco region was higher than the state rate, with 20.3/10,000 live births. Maternal syphilis was predominant in women with low schooling, age between 20-39 years, with syphilis diagnosed during prenatal care and infection in the primary phase. As for the newborn, the diagnosis was made until the sixth day of life and there was evolution to cure.

In view of the results, it can be concluded that the high incidence of congenital syphilis in Paraná, associated with maternal and newborn characteristics, evidenced the existence of failures in prenatal care and the effectiveness of preventive measures. Thus, we propose to offer subsidies for health planning, suggest the realization of further studies for a detailed investigation of the causes of the high incidence of congenital syphilis in the state of Paraná, as well as investments by state and municipal managers in training of practitioners to raise awareness about health education actions and the achievement of quality prenatal care, with the inclusion of sexual partners to reach comprehensiveness of care.

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