Comparative analysis of the epidemiological profile of neglected pathologies in children in Brazil

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Abstract: Neglected diseases (DNs) are a group of diseases caused by infectious or parasitic agents that are strongly associated

with poverty, where the determinants for incidence are: inadequate housing, poor basic sanitation, insufficient drinking water, education and health services. Brazil is responsible for a large proportion of these diseases, especially in the northern and northeastern regions of the country, where there is a high rate of morbidity and mortality of the exposed population. The research aimed to compare the epidemiological profile of neglected pathologies in children in Brazil, between 2015 and 2017. As a method to obtain the data, a study was carried out through the Notification Disease Information System (SINAN).), provided by DATASUS / Ministry of Health, in which data were collected from the records in the notification forms for the diseases: schistosomiasis, dengue, visceral leishmaniasis, malaria, acute chagasic disease and pertussis. From the collected results, it was noticed that the southeast region predominated in cases of notification, considered one of the richest regions in the country, the incidence percentage was high, compared to the other regions, the predominant male gender and the susceptible age group. 10 to 14 years. It is concluded that DNs are a public health problem that mainly affects low-income families, causing morbidity and mortality in children exposed to the risk of infection or reinfection. Knowing the magnitude related to DNs is essential for monitoring, especially in regions where the incidence rate is high.

Keywords: Disease's notification. Schistosomiasis. Dengue fever. Visceral leishmaniasis. Malaria

1. Introduction

According to the World Health Organization (WHO, 2017), neglected infectious diseases mainly affect populations living in extreme poverty and cause suffering, permanent disability and death. In Latin America and the Caribbean, an estimated 46 million children live in areas at high risk of infection or reinfection with soil-borne helminths, while about 11 million people are at risk of trachea and 70.2 million are at risk of chagas disease.   Brazil is responsible for a large proportion of these diseases, especially in regions where the socio-economic level is low, mainly favoring its incidence in the north and northeast regions of the country, where there is a high morbidity and mortality rate of the exposed population (MELO *et al*., 2016).

The WHO classifies 17 pathologies as neglected diseases, being only 7 as priorities for the Ministry of Health, based on data on their impact in Brazil: dengue, Chaga disease, malaria, leishmaniasis, leprosy, schistosomes and tuberculosis.   NBs are a group of diseases caused by infectious or parasitic agents, which can lead to disability, disfigurement, impaired child growth and cognitive development, death and socio-economic damage in affected communities (MELO *et al*.,2015).   These diseases not only prevail in poverty conditions, but also contribute to the maintenance of the inequality situation, since they represent a strong obstacle to the development of countries (SANTOS *et al.*,2016).

The epidemiological profile of DNs consists of health indicators, which in turn provide reliable and valid data on the health situation of the country. Health professionals should act in the planning of care, with the use of indicators, epidemiological information and management information to support their actions and decisions, in a collective action, less prevalent or endemic conditions.   Measures are needed to better approach patients with such diseases, aiming to contribute to the planning, monitoring and evaluation of health actions (SENRA *et al.*,2017).

From the biological point of view, children and adolescents represent a vulnerable group of DNs, due to malnutrition and impairment of cognitive development, thus requiring more attention in health care (BRANDÃO *et*

al.,2017).   Knowing the magnitude of deaths related to DNs in endemic countries is essential for monitoring and evaluating the impact of interventions and effectiveness of specific control, especially in communities where the risk of contamination is high (MELO *et al*.,2015).

Describing neglected diseases in Brazil requires knowledge as to their legal basis. In the middle of the Pact for Health, the Sanar Program, which was established by Decree No. 39,497 of June 11, 2013.   The State of Pernambuco was the first Brazilian state to develop a specific program to cope with these diseases. The Sanar Program aims to reduce or eliminate neglected communicable diseases as a public health problem. We highlight the intensification of surveillance and control actions of these pathologies and focused on family health teams, aiming at the proper early detection and treatment (SES-PE, 2019).

From this perspective, the study has as a general objective, to compare the epidemiological profile of neglected pathologies in children in Brazil, between the years 2015 and 2017, and as a specific objective, to verify the percentage of incidence in children affected by ND in the regions of Brazil, to analyze the most susceptible age group and to evaluate the sex most affected by pathologies.

Despite the impacts, both on health and in the country's economy, Brazil develops systematic and comprehensive studies to quantify and compare the situation in endemic areas. An evaluation of epidemiological profile in endemic area, allows to better understand the impacts of DNs on children's lives, providing important information to health managers of specific affected regions, where it enables specific methods for the control and prevention of DNs, allowing healthy growth and development in this phase of life (MELO *et al*., 2016)..

2. Methodology

This is a descriptive epidemiological study of the descriptive type of cohort with quantitative approach, whose data were collected through the secondary database of the Notifiable Diseases Information System (SINAN), provided by DATASUS/Ministry of Health. Data were collected from the records in the notification forms for the following diseases:

schistosomes, dengue, visceral leishmaniasis, malaria, acute chagas disease and pertussis in the SINAN Database in 2015 and 2017, where the data collected were by region, gender and age group. The Informatics Department of the Unified Health System (DATASUS) provides information that can serve to support objective analyses of the health situation, evidence-based decision-making and the development of health action programs.

Data tabulation in the Department of Informatics of the Unified Health System (DATASUS) was carried out through the Notifiable Diseases Information System (SINAN), which is powered by the notification and investigation of cases of diseases and injuries that are on the national list of diseases of compulsory notification, which is the aim of the study. The variables studied in the data sample of schistosomiasis, dengue, visceral leishmaniasis, malaria, acute chagas disease and pertussis were: gender, age group, region and year of notification.

A Database was built in the Biostat Statistical Program with the variables included in the study. For the analysis of these data, percentage calculations were used to observe the dispersion among the collected variables, analyzed by simple percentage. The information was analyzed using the Statistical Program Biostat version 5.0 for the formatting of the data.

3. Results and Discussion

For presentation of the results, it was chosen to address the theme by region, gender, age group and reported disease. A total of 1,051 confirmed cases of schistosomiasis were reported between 2015 and 2017, with 74.59% of the cases in the southeast region, with 62.60% of the cases in males, with a higher percentage in the 10 to 14 years age group (table 1). In the same period of time, 299,794 confirmed cases of dengue were reported in the country, with more than 50% in the southeast region, where the male sex obtained 51.92% of the predominant cases in the age group 10 to 14 years (table 2).

In Northeast, 2,006 cases of Visceral Leishmaniasis were recorded between 2015 and 2017, with the most affected male sex and the age group most susceptible to the disease, were from 01 to 04 years (table 3). Acute Chagas disease recorded between these two time periods 143 cases of the disease, but only the northern region counted 133 registries cases, becoming the region with the highest incidence, with a percentage of 93%, where the most affected were male, with 55.24% and the most affected age group from 05 to 09 years, 39.16% (table 5). Once again, the southeast region predominated in cases, this time with pertussis, affecting mainly the male sex and the < age group (table 6).

The SINAN database was paramount for the distribution and relationship of the data obtained, for the diseases mentioned, where it was observed that the southeast region has the highest percentage for diseases, males are more affected and the age group more susceptible to 10 to 14 years.

Table 1 - Distribution of Schistossomosis cases by region, by gender and age group in Brazil in the years 2015 and 2017.

Region	2015	2017	N	%
North	3	13	16	1,52236
Northeast	136	104	240	22, 8354
Southeast	501	283	784	74,5956
South	3	4	7	0,66603
Midwest	3	1	4	0,38059
Sex				
Male	401	257	658	62,607
Female	245	148	393	37,393
Age group				
<1 Year	63	35	98	9,32445
01 to 04	50	39	89	8,46813
05 to 09	175	142	317	30,1618
10 to 14	358	189	547	52,0457
Total	**646**	**405**	**1.051**	**100%**

Source: Ministry of Health/SVS - Notifiable Diseases Information System - SINAN Net. Accessed: 15/09/2019.

Table 2 - Distribution of Dengue Cases by region, by gender and age group in Brazil 2015 and 2017.

Region	2015	2017	N	%
North	6.501	4,601	11.102	3,70321
Northeast	68.033	15.849	83.882	27,9799
Southeast	141.977	8,668	150.645	50,2495
South	6.803	474	7.277	2,42733
Midwest	34.738	12.150	46.888	15,6401
Sex				
Male	133.966	11,703	155.669	51,9253
Female	124.086	20.039	144.125	48,0747
Age group				
<1 Year	23.792	3.814	27.606	9,20832
01 to 04	40.938	7913	48.851	16,2949
05 to 09	72.634	12.424	85.058	28,3721
10 to 14	120.688	17.591	138.279	46,1247
Total	**258.052**	**41.742**	**299.794**	**100%**

Source: Ministry of Health/SVS - Notifiable Diseases Information System - SINAN Net. Accessed: 15/09/2019.

Table 3 - Distribution of Cases of Visceral Leishmaniasis by region, gender and age group in the years 2015 and 2017 in Brazil.

Region	2015	2017	N	%
North	269	374	643	19,0293
Northeast	979	1.027	2.006	59,3667
Southeast	236	320	556	16,4546
South	2	3	5	0,14797
Midwest	86	83	169	5,00148
Sex				
Male	819	1.055	1.874	55,4602
Female	753	752	1.505	44,5398
Age group				
<1 Year	305	330	635	18,7925
01 to 04	834	955	1.789	52,9447
05 to 09	287	343	630	18,6446
10 to 14	146	179	325	9,61823
Total	**1.572**	**1.807**	**3.379**	**100%**

Source: Ministry of Health/SVS - Notifiable Diseases Information System - SINAN Net. Access on 15/09/2019.

Table 4 - Distribution of Malaria Cases by region, by gender and age group in the years 2015 and 2017 in Brazil.

Region	2015	2017	N	%
North	0	0	0	0
Northeast	3	5	8	14,5455
Southeast	12	18	30	54,5455
South	4	1	5	9,09091
Midwest	5	7	12	21,8182
Sex				
Male	13	16	29	52,7273
Female	11	15	26	47.2727
Age group				
<1 Year	4	3	7	12,7273
01 to 04	6	9	15	27,2727
05 to 09	5	8	13	23,6364
10 to 14	9	11	20	36,3636
Total	**24**	**31**	**55**	**100%**

Source: Ministry of Health/SVS - Notifiable Diseases Information System - SINAN Net. Accessed 15/09/2019.

Table 5 - Distribution of Acute Chagas Disease cases by region, by gender and age group in the years 2015 and 2017 in Brazil.

Region	2015	2017	N	%
North	55	78	133	93,007
Northeast	7	0	7	4,8951
Southeast	0	3	3	2,0979
South	0	0	0	0
Midwest	0	0	0	0
Sex				
Male	39	40	79	55,2448
Female	23	41	64	44,7552
Age group				
<1 Year	4	4	8	5,59441
01 to 04	13	19	32	22,3776
05 to 09	24	32	56	39,1608
10 to 14	21	26	47	32,8671
Total	**62**	**81**	**143**	**100%**

Source: Ministry of Health/SVS - Notifiable Diseases Information System - SINAN Net. Accessed 15/09/2019.

Table 6 - Distribution of Pertussis Cases by Region, Gender and Age Group in Brazil in 2015 and 2017.

Region	2015	2017	N	%
North	236	87	323	7,13182
Northeast	924	357	1.281	28,2844
Southeast	975	593	1.568	34,6213
South	533	470	1.003	22,1462
Midwest	291	63	354	7,81629
Sex				
Male	1.384	736	2.120	46,8095
Female	1.575	834	2.409	53,1905
Age group				
<1 Year	2.016	1.004	3.020	66,6814
01 to 04	473	273	746	16,4716
05 to 09	314	179	493	10,8854
10 to 14	156	114	270	5,96158
Total	**2.959**	**1.570**	**4.529**	**100%**

Source: Ministry of Health/SVS - Notifiable Diseases Information System - SINAN Net. Accessed 15/09/2019.

Neglected diseases (DN) comprise a large group of tropical infections strongly associated with the social profile: poverty. Con focuses primarily on slums and remote rural areas of developing regions in Africa, Asia and the Americas. These diseases are characterized by their high prevalence, chronicity and disabling characteristics. The World Health Organization (WHO) recognizes 17 Nd that harm the lives of one billion people in 149 countries and threaten the health of millions of people (WHO, 2011).

The results of this research show that a high percentage of cases of neglected diseases (NDs) occurred in Brazil in

Brazil, since the regions suitable for NDs are the North and Northeast regions of the country. It is important to highlight that DNs mainly affect underdeveloped regions, where the determinants for the incidence are: inadequate housing, poor basic sanitation, insufficient drinking water, education and health services.

According to (WHO, 2017) it recognizes 20 communicable diseases prevalent in tropical and subtropical conditions worldwide, called neglected tropical diseases. These are associated with poverty and mainly impact populations in low- and middle-income countries with limited access to low-resource health services.

Approximately 207 million people may have schistosomes worldwide, with an over 779 million at risk of infection. In Brazil, 2.5 million individuals are considered infected and 25 million are at risk of infection. People are infected during contact with freshwater bodies infested by cerrias released by specific intermediate snails while conducting recreational, domestic and occupational activities (Steinmann *et al*., 2011).

Schistosomesis is distributed in several tropical regions of the world, caused by parasitic vermins, *schistosoma mansoni*, mainly affecting regions of low economic level, mainly related to the lack of basic sanitation (SILVA *et al*.,2015). According to Facchine *et al*., 2018 Pernambuco is one of the states where schistosomes is endemic, affecting 102 (50%) of the 185 municipalities, with high mortality and hospitalization rates, mainly among children and adults Dengue is a serious public health challenge, according to Luppe *et al*., 2019, recent annual estimates suggest that there are around 100 million symptomatic cases and about 38,000 deaths related to the disease. Brazil has obtained the highest number of dengue cases in the Americas, the spread of the virus was due to several factors, including urbanization, inadequate infrastructure, travel and international trade, its incidence is widespread throughout the country and causes an overload in the economy of Brazil.

Visceral leishmaniasis (VL) is the most serious form of human leishmaniasis. This disease is endemic in most of the state of Bahia, with increasing reports of cases in new areas (SANTANA, 2019). The Northeast, in most of its states, has endemic areas for VL due to geographical similarities: rainy precipitation, temperature. The results of the studies 59% are in line with the findings of Santana *et al*.

In a study by Brandão *et al*., 2017, leishmaniasis is considered to cause 1.6 million new cases worldwide each year, of which 1.1 million are cutaneous and 500,000 are visceral. The vast majority of reported cases occurred in the North region, more precisely in certain microregions of the states of Acre, Amazonas, Roraima and Amapá, with more than 11,946 cases per 100,000 inhabitants aged up to 19 years. Diverging from the reality of our study, where the region with the highest prevalence was the Northeast region. Demari-silva *et al*., 2019 when investigating a mosquito in Southeastern Brazil. In this region, recent studies have shown asymptomatic or sub-patent infection by Plasmodium falciparum. In areas of the Atlantic coast of Rio de Janeiro,

Plasmodium simium infection has recently been reported in human monkeys and howler monkeys. Considering that few cases of malaria are reported each year in areas of the Atlantic rainforest in southeastern Brazil. Even with these findings, the Southeast region of Brazil had the highest incidence of malaria cases 54% in 2015 and 2017.

Santana *et al*., 2019 related to outbreaks of Chagas disease have been reported by public health authorities, especially by SINAN, which consider the disease emerging in the Amazon. Most of the outbreaks reported, epidemiological investigation points to non-vector transmission, relating to the consumption of fruit juices, especially açaí. According to the findings of the research, the Northern region of Brazil has the highest incidence of 93% of the cases.

Between 2001 and 2006, 2,476 cases of acute Chagas disease (64.7% vector, 0.7% transfusion, 0.3% transplacental and 34.3% of unknown route of transmission) were reported in Brazil in Brazil. Acute Chagas disease, ND with the lowest number of reported cases, was responsible for 1.72% of deaths in inhabitants up to 19 years of age. The high mortality rate due to Chagas disease is a peculiar characteristic of endemic countries in Latin America. However, deaths attributed to Chagas disease are more common in individuals over 40 years of age, who probably acquired the infection earlier in their lives. Acute Chagas disease was also the most common cause of mortality in the general population in a study that evaluated reported cases from 2000 to 2011, revealing a significant public health problem in Brazil (Brandão *et al*., 2017).

Brosio *et al*., 2019 in Italy recorded 7,102 hospitalizations per per tustusis; the trend of hospitalizations progressively decreased from> 1 / 100,000 inhabitants in the years 2001-2004 to 0.64 / 100,000 inhabitants in 2014. Most hospitalizations (63.6%) involved individuals <1 year of life; almost 20% of the cases were recorded in the age group from 5 to 14 years. In Brazil, the predominant age group was less than 1 year (<1 year) in both years analyzed 2015 and 2017. Brandão *et al*., 2017 in a survey survey in SINAN from 2009 to 2013, there were 64,567 cases of cutaneous and visceral leishmaniasis, malaria, schistosomes and acute Chagas disease, representing a rate of 20.15 cases per 100,000 inhabitants. The mean age of the cases was 12.2 years and 62.32% were male. Four hundred and three deaths related to these parasites were reported, indicating a mortality rate of 0.62%. Visceral leishmaniasis and acute Chagas disease had the highest lethality rates. As a conclusion of the study, it was found that the number of cases show that these diseases still represent a serious public health problem in Brazil.

This brings us to the following perspective, although the existing research on the theme and the knowledge produced is not reverted to therapeutic advances, but in new drugs, diagnostic methods and vaccines. One of the reasons for this situation is the low interest of the pharmaceutical industry in this theme, justified by the reduced potential for profitable return for the industry, since the population affected is low income and present, mostly, in developing

countries (SANTOS *et al*.,2016).

Based on the data from the SINAM records for the DNs, together with the predominant factor for them, it presupposes that there may be a problem of notification in the North and Northeast regions of the country, considering the socioeconomic level of these regions, since the Southeast region is considered the richest in the country. Taking into account the high percentage of cases in the Southeast region, we can say that cases of NDs are being reported and evaluated by health indicators.

4. Conclusion

The present study, conducted in 2015 and 2017, revealed that DNs is a public health problem that mainly affects low-income families, where the main endemic factor for their proliferation is basic sanitation. It is known that the group of people most susceptible to these pathologies are children, because they are in the growth and development phase, and may extend several problems in this phase of life, causing morbidity and mortality when they are exposed to the risk of infection or reinfection. It is recommended that managers and multidisciplinary health teams can effectively act in health surveillance based on the use of this methodology as an important tool in the promotion of the population's health, as well as in prevention, diagnosis and control.

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