

Endemic disease in children under 15 years and the expansion of primary care in Juazeiro, Bahia: Time series, 2003-2012

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Accepted 27 January 2015

Abstract

In Brazil, leprosy remains a serious public health problem, due primarily to the involvement of children and all physical, functional, social and psychological consequences. This paper aims to describe the endemic disease in Juazeiro, Bahia and analyze the importance of the expansion of primary care policy for disease control. This is an exploratory ecological study design with time series, involving all cases of leprosy diagnosed in children less than fifteen (15) in Juazeiro, Bahia, between the years 2003 and 2012. For the analysis of time series regression was applied linear using the R3.0.3 software and georeferencing of units was used, healths Terra View 4.2.2 software. Yet the indicators for monitoring and evaluation of leprosy were calculated. Of the 1691 cases of leprosy, 7.8% (132) occurred in children under 15 years. There was no significant trend insignificant decrease in detection rate in children under 15 years ($p>0.05$). A significant increase in the number of health facilities following leprosy cases ($p < 0.05$), as well as expand the coverage of basic health care, making more than 90% in 2012. Cure rate for the period was 97.6%, taking the test contact was 78% and the rate of noncompliance was found to be only 1.6%. From these results, we conclude that the expansion policy of primary health care has favorably influenced the scenario of leprosy in children under fifteen (15) years in the county.

Keywords: leprosy; health policy; endemic

INTRODUCTION

In Brazil, leprosy remains as an infectious process of high magnitude and transcendence, and the country, world second absolute number of cases and the first in detection rate. In extended mode, the neglected disease of character has consistently compromised their control, despite the progress made since the implementation of elimination and control plans of multidrug therapy and working groups (WHO, 2005a; WHO, 2008b; SHETTY et al., 2013).

Caused by *Mycobacterium leprae*, is a chronic infectious disease that has affinity for skin and peripheral nerves, with high disabling potential, especially in vulnerable populations, such as those under fifteen (15) years. In this population, leprosy generates much more than physical injuries. The prejudice, exclusion, the expansion of vulnerability and stigma are elements that can not be forgotten (Thakkar and Patel, 2014; Cunha, 2002; WHO, 2010c).

The presence of the disease in children under fifteen (15) years is also one of the most important indicators, since it signals the maintenance of the epidemiological chain of transmission. For this reason, children and adolescents should take care of public policy and health services (BRAZIL, 2008; Ortiz et al., 2012).

The General Coordination for Disease Leprosy Elimination in (CGHDE) of the Ministry of Health have undertaken efforts to achieve the goal of eliminating leprosy as a public health problem in Brazil, having oriented actions in states and municipalities priority, based on criteria defined, among which is the magnitude of the endemic.

The city of Juazeiro, Bahia, is considered one of the 253 priority municipalities in Brazil, according to the Integrated Strategic Action Plan 2011-2015 of the Ministry of Health, through Decree 2556 of 28 October 2011 (BRAZIL, 2012). In 2013, 40 municipalities, among which is Juazeiro, Bahia, concentrated 24% of the disease burden of Brazil, being considered by Executive Order 3097 of 16 December 2013, as the highest priority, and awarded federal funds for intervention projects (BRAZIL, 2013).

The fight against leprosy as a public health problem should include policies that go beyond specific actions and should be attended by all instances of the health system, as advocates Cunha et al., (2007). At this point, comes in primary care as patients gateway in health services (BOSSERT, 2000; BRAZIL, 2012). According to the National Primary Care Policy (BANP), primary care "is developed with the highest degree of decentralization and capillarity, close to the lives of people" (BRAZIL, 2012).

Thus, this study aims to describe the endemic disease in children under 15 in Juazeiro, Bahia, and analyze the importance of the expansion of primary health care policy to improve the quality of care services to individuals affected by leprosy.

MATERIALS AND METHODS

This is an exploratory ecological study with time-series design, using data relating to cases of leprosy in children under fifteen (15) years in Juazeiro, Bahia, diagnosed between the years 2003 and 2012.

For trend analysis of the analyzed time series, linear regression was performed using the R software and significance <0.05 , for the detection rates in the general population and in children under fifteen (15) year, number of family health teams, health facilities notifying, health facilities followed patients during the study period and primary care coverage ratio. For the spatial distribution of family health teams were collected geographic coordinates (latitude and longitude) "in situ" with the use of GarminEtrex GPS device. Next, a database was created and health facilities georeferenced using free software Earth View 4.4.2, provided by National Institute for Space Research - INPE. We used the cartographic grid provided by the department of public works in the city, updated in 2014.

Were also calculated the monitoring and evaluation of leprosy indicators: proportion of leprosy cure among new cases diagnosed proportion of new leprosy cases with physical disability assessed at diagnosis, proportion of cured cases in the year, with physical disability evaluated proportion of examined among household contacts of registered new cases of leprosy in the year and proportion of cases of leprosy in treatment dropout among new cases diagnosed.

For the calculation of the indicators were collected data from national Diseases Resulting System - SINAN using the TABWIN tab tool without nominal identification of cases. Demographic data on the distribution of the population needed to calculate the indicators were obtained through online query to the home page of the Brazilian Institute of Geography and Statistics - IBGE.

The present study, by use of publicly available data, waived the need for informed consent and informed, as required by Ordinance 466/2012. It is noteworthy that there is no risk, only bringing benefits to society, beyond the intrinsic social relevance. So if dispensed authorization from the Research Ethics Committee. The researchers took the faithful commitment to comply in all stages of the work, with different laws with regard to scientific research.

RESULTS

The first important observation is given based on the analysis of time series of cases reported in the general population and the representativeness of cases in children under fifteen (15) years. Between the years 2003 and 2012 were diagnosed in Juazeiro, 1,691 new cases of leprosy in residents, with 132 of them in children under fifteen (15) years, which corresponds to 7.8% of all cases reported in the period, as notes in Table 1.

Table 1. Number of new cases reported in the general population and in patients under 15 years and the proportion of this population relative to the total, Juazeiro, Bahia, 2003-2012

Ano	Nº casos pop. > 15 anos	Nº casos pop. <15 anos	Total	% de casos < 15 anos
2003	177	16	193	8,3
2004	185	12	197	6,1
2005	146	12	158	7,6
2006	137	3	140	2,1
2007	155	19	174	10,9
2008	154	11	165	6,7

Continuation of Table 1

2009	144	8	152	5,3
2010	166	22	188	11,7
2011	159	14	173	8,1
2012	136	15	151	9,9
Total	1.559	132	1.691	7,8

Also in accordance with Table 1, the number of cases in the population under age fifteen (15) years is non-uniform in time series, ranging from 3 cases (2.1%) in the year 2006-22 cases (11.7%) in 2010.

In order to measure the recent power transmission of endemic and its trend, we calculated the detection rates in the general population and in children under 15 years. Throughout the study period, Juazeiro kept the overall detection rate greater than 40 cases per 100 thousand inhabitants, being classified as hyperendemic, as parameters adopted by the health ministry, under the decree 3,125, of October 7, 2010.

With regard to the occurrence of the disease in children under 15 years, city presented detection rate above 10 cases per 100 thousand inhabitants, and is also considered hyperendemic. An exception is found in 2006, where this value was 4.4 / 100,000 inhabitants, ranking as high endemicity, as can be seen in the time series shown in Figure 1.

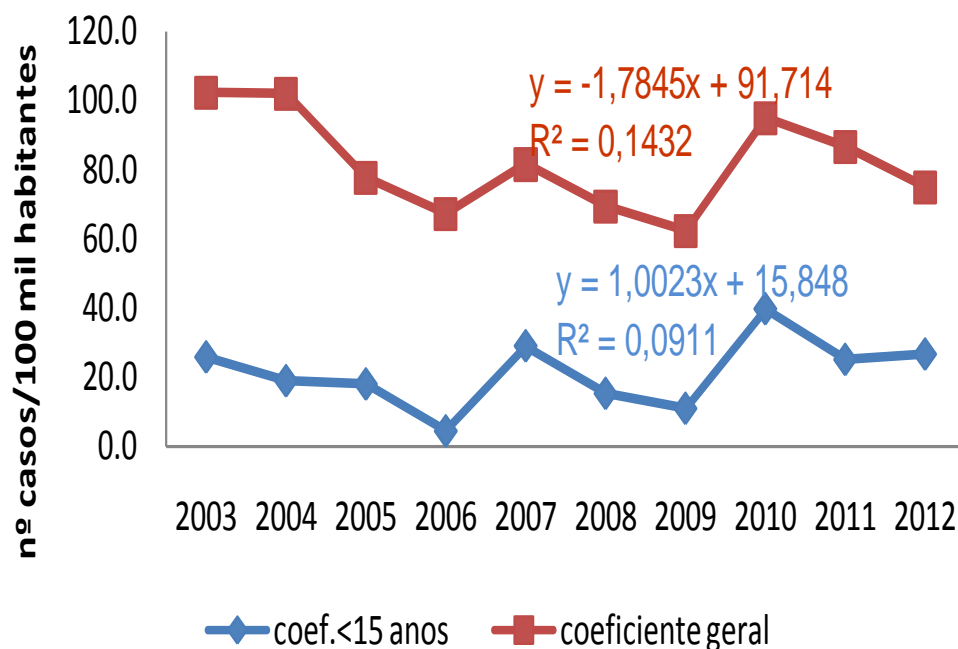


Figure 1. Time series of general detection rates and under 15, Juazeiro, Bahia, 2003-2012

Parâmetros – Coef. Detecção Geral Hiperendêmico: $\geq 40/100$ mil hab. Muito alto: 20 a 39,99/100 mil hab. Alto: 10 a 19,99/100 mil hab. Médio: 2 a 9,99/100 mil hab. Baixo: $< 2/100$ mil hab.	Parâmetros – Coef. Detecção < 15 Hiperendêmico: $\geq 10,00/100$ mil hab. Muito alto: 5,00 a 9,99/100 mil hab. Alto: 2,50 a 4,99/100 mil hab. Médio: 0,5 a 2,49/100 mil hab. Baixo: $< 0,5/100$ mil hab.
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By analyzing the endemic diseases in the time series, epidemiological chain maintenance is verified transmission and the magnitude of the disease for both the general population and for those under fifteen (15) years, as there is no significant trend change in the temporal behavior ($p = 0.3196$ / slope = -0.2021 for the time series of the overall detection rate $p = 0.4971$ / slope = 0.05025 for the detection rate in children under fifteen (15) years). On the other hand, the slope of the temporal behavior reveals reducing the overall detection rate and increased detection rate in children under fifteen (15) years.

When stratifying leprosy detection rate under fifteen (15) by sex and age, as Figure 2, it is clear that the coefficient is at least three times higher in girls younger than 05 years than in boys of the same age. While in children under five (05) years the endemic girls is classified as high in boys, is classified as medium endemicity. In the age groups 5-9 years and 10-14 years, the situation is hyperendemic for both sexes.

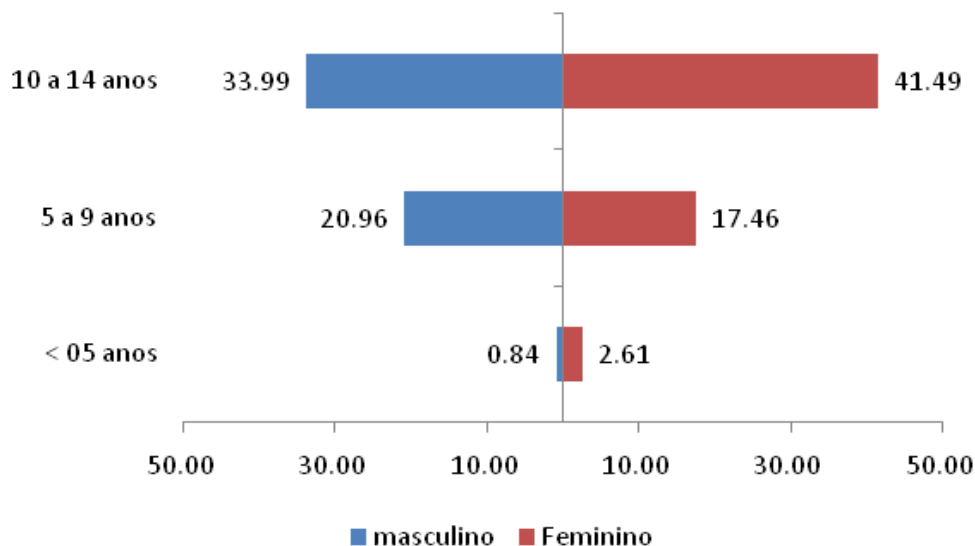


Figure 2. leprosy detection coefficients (per 100,000 inhabitants) in under 15 by sex and age group, Juazeiro, Bahia, 2003-2012

The maintenance of the epidemiological chain of transmission can be a result of improved municipal health network. As shown in Figure 3, the coverage of primary health care increased from 67.4% (thirty six (36) family health teams in twenty seven (27) health units) in 2003 to 93.26% (fifty six(56) teams in forty six (46) units) in 2012. the trend analysis of the time series showed a significant increase ($p = 0.00331$ / slope = 0.037239).

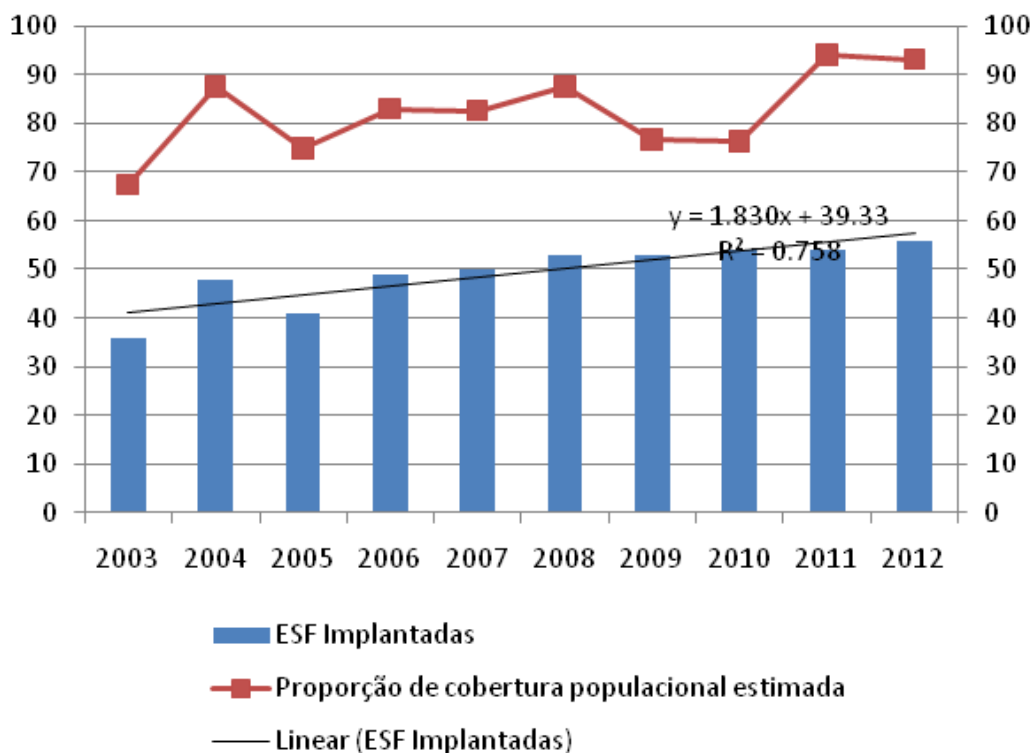


Figure 3. Time series of the number of health teams deployed family and percentage of coverage, Juazeiro, Bahia, 2003-2012

In the urban area, in 2003, the city had twenty four (24) health teams working in seventeen (17) units. In 2012, thirty seven (37) teams in twenty seven (27) health units performed service to the population. Figure 4 shows the spatial evolution of the units and family health teams in the urban area of the city of Juazeiro, between 2003 and 2012.

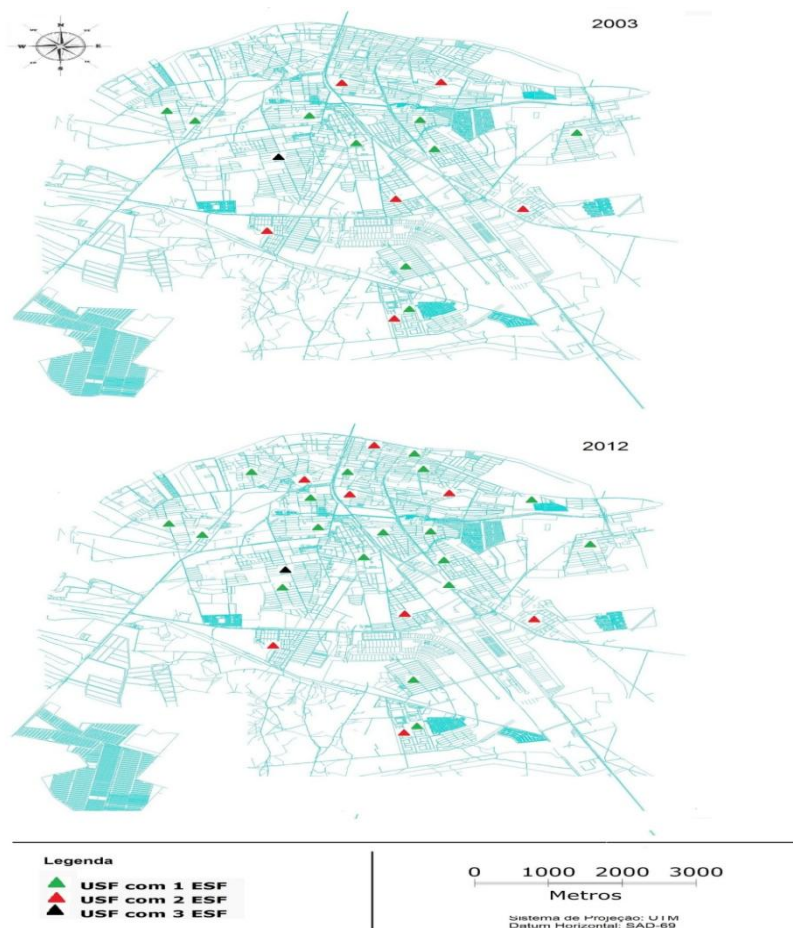


Figure 4. Evolution of spatial primary care network in the urban area of the city of Juazeiro, Bahia, between 2003 and 2012

Another finding is evident from analysis of the figure 5, where there has been a significant upward trend in the number of units following new cases of leprosy ($p = 0.04380 / 0.12684 = \text{slope}$). While there increase in the number of health facilities with new cases reported over the time series, this trend is not significant ($p = 0.07372 / 0.11393 = \text{slope}$). These findings suggest two important findings. The first is a decentralization trend in monitoring patients; the second is a deficiency in the decentralization of diagnosis, since we observed fewer units notifying / diagnosing new cases than watching.

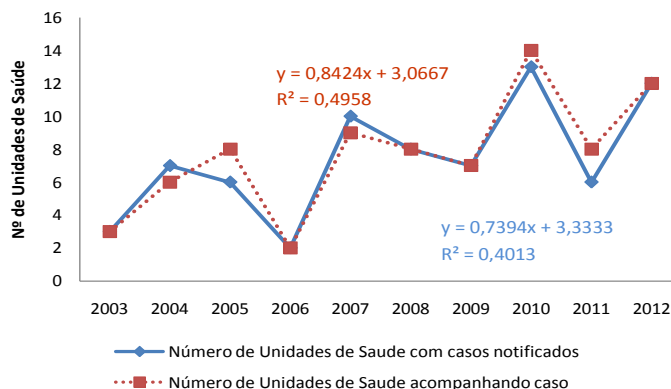


Figure 5. Time series of the number of health units that reported and monitored cases of leprosy in children under 15, Juazeiro, Bahia, 2003-2012

The public policies of coping with a disease go far beyond the operational structure of the health network. It is necessary that the service has offered quality and meets the demands imposed on it. With regard to leprosy, quality indicators of actions and services, considered outcome indicators were calculated to assess the quality of care (Table 2).

Table 2. Indicators of quality of actions and coping services to leprosy, Juazeiro, Bahia, 2003-2012

Indicator	year										Indicator Cumulative (%)
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Healing proportion	100	100	90,9	100	88,9	100	100	100	100	100	97,6
Proportion of cases with physical disability assessed at diagnosis	93,8	91,7	100	100	100	100	100	100	100	100	99
Proportion of cured cases with physical disability assessed	66,7	75	70	33,3	87,5	90,9	100	90	100	86,7	83,6
Proportion of contacts	34	81	68	100	68	66	94	94	95	92	78
Proportion of abandonment	0	0	9,1	0	5,6	0	0	0	0	0	1,6

DISCUSSION

The presence of leprosy in children under fifteen (15) years reflects not only the magnitude and trend of the disease, but also the recent power transmission of the endemic. In this study, 7.8% of reported cases were in children less than fifteen (15) years, signaling to maintain the chain of transmission of endemic disease in the municipality (Table 1). In India, 9.7% of cases were found in children under fifteen (15) years, according to Shetty et al. (2013).; in Egypt, the proportion was 9.7%. According Dawela et al. (2012).; Philipinas and the second Scheelbeek et al.(2013), the ratio was 11%.

Brazilian studies show similar to those found in this study, Lana et al. (2007), in Jequitinhonha Valley, the proportion of children under fifty (15) patient was equal to 7.8%. In studies of Aquino et al. (2003) and Gomes et al.(2005) emphasize that the finding that in endemic areas children are exposed early to high bacterial load.

Still as regards the presence of leprosy in childhood, no trend change in magnitude. The observed decline in the overall detection rate (102.3 / 100,000 in 2003 to 74.9 / 100,000 in 2012), as Figure 1, is not observed in the detection rate in children under 15 years (from 25.8 / 100,000 in 2003 to 26.8 / 100,000 in 2012) with no significant trend change in the temporal behavior. The values found classify the municipality as hyperendemic, which entails the adoption of public policies to control the disease.

Leprosy of cargo handling in children under fifteen (15) years, especially from the year 2010 is related to the coping policies to disease deployed in the city. During this period, the active search for project leprosy in school, funded through the Education Program for Health - PET / HEALTH between 2010 and 2012 identified early new cases. The project involved a dermatology professional local university, academics and professionals in the care network to municipal health.

Similar, results are presented by Coelho Junior (2010) in a study conducted in Jacundá, state of Pará, where the implementation of the first health facilities family allowed the diagnosis of leprosy cases, from the municipality, to be considered hyper-endemic for the disease in children under fifteen (15) years. Integrated actions demonstrate result in achievements impossible to achieved when actions are implemented in isolation.

In 2013, the Municipal Plan to Combat Leprosy was developed and implemented in the municipality and leprosy targets were included in the Municipal Health Plan. That same year, was held the National Campaign for Active Search Leprosy and collective treatment of Geo-helmitiases in school and the project "Network schools Intervention publishes Juazeiro, Bahia for empowerment: Health Education as leprosy burden reduction measure in children under fifteen (15) years," developed in partnership with a private College of the City and the Health Program school.

The analysis of the endemic disease by age group and sex, even with a long incubation period disease was classified as high in females aged less than five (5) years and average in boys in the same age range. This finding points to active transmission of the disease, deficiency in the control systems and lack of public policies to combat the disease that consider this population as more vulnerable to illness, as talks Amador et al. (2001). Furthermore, the difficulty in diagnosis may further enhance the chance of progression and complications deformities (Pires et al., 2012).

According to Ignotti et al. (2006), the high load signals the existence of a reservoir of adults who are undiagnosed contacts of children diagnosed cases, and therefore index cases. These cases are not identified early transmitting sources of the disease to the child population, resulting in maintenance of the epidemiological chain of the disease.

On the one hand, the magnitude measured by the coefficient detection in children under 15 years suggests a possible

gap in programs for disposal, on the other could indicate a greater capacity of health services to identify new cases. In this context, the increase in the number of family health teams seems to have its share of responsibility in this process, according to Pena et al., (2009), in a study comprising around the country and Cunha (2012), a study conducted in Rio de Janeiro, where the disease is now hyperendemic after the implementation of family health units.

The expansion of the primary care network and the increased coverage, as Figure 3 and Figure 1, is also considered an opportunity for improvement in the technical ability to identify new cases (Brazil, 2012; Cunha, 2012). On the one hand, this expansion increases the detection coefficients and prevalence of the disease, on the other breaks the epidemiological chain of transmission, whose results will be seen in subsequent years, maybe five or ten years later.

The increased coverage, while demonstrating impact on epidemiological indicators of leprosy, especially in magnitude, to be analyzed with due attention because alone, according to a study of Atkinson and Haran (2004) does not mean improvement in the health service. Thus, it is important that health units are able to diagnose, especially in a timely manner and treat accordingly.

In our study, we observed a significant increase in units accompanying patients, which signals to the decentralization of treatment, although still deficient, since less than 30% of municipal followed patients in 2012. While there is increase in the number of health units notifying this trend shows no statistical significance.

The deficiency in the decentralization of diagnosis is also evidenced in many services, such as the study by Pereira et al. (2008) conducted in Bauru, in São Paulo, where the diagnostic confirmation is still centralized in a reference unit. This difficulty for individuals to find a service that makes the diagnosis, puts Nascimento et al. (2011) can be one of the factors that influence the late identification of the disease.

On the other hand, the expansion of primary care coverage enables the assistance given to patients occurs closest to your residence, so that adherence to treatment is facilitated (Cunha, 2012). This approach of the health service with the reality experienced by the patient in the socio-cultural context is whether utmost importance to guide health practices that reduce the social damage caused by leprosy, according to Pereira et al. (2008); Pestana and Mendes (2004). Opromolla et al. (2005) states that among the functions of the most basic services for leprosy, as in the case of health facilities, are collecting material for bacteriological examination, medication administration, besides driving disability prevention techniques.

In this sense, the municipality has been conducting annually since 2010, training with all professionals of primary care teams, from doctors, nurses and dentists to community health workers and nursing technicians, each category with a specific focus. Similar actions are presented by Cunha (2012), a study conducted in Rio de Janeiro.

The way the team conducts actions against leprosy is crucial to the success of coping plans to illness. In this context, one should note the quality indicators recommended by the Ministry of Health of Brazil, under the decree 3125 of 07 October 2010. These indicators are considered, currently, excellent tools for monitoring actions against leprosy in Brazil.

The proportion of cured cases among new cases diagnosed in the period objectively evaluate the quality of care and monitoring of new cases diagnosed until it is complete treatment medicine. In the years analyzed, this indicator was considered as "good", ie healing ratio greater than 90%, which was the minimum value recommended by the Ministry of Health. The cure rate in our study, considering the period was 97.6%, according to rating scale proposed by the ministry of health: good: $\geq 90\%$; regular: 75 to 89.9%; Bad: $< 75\%$.

The proportion of cases healed in Juazeiro city is much higher than that in other parts of the country, which may be a result of improved health care network. In a study of Imbiriba et al, (2008), the cure rate in Manaus, Amazonas, between 1998 and 2005 was 87.8%; Serra et al.(2011) presents cure rate of 85.18% in Maranhão, between 1994 and 2008 even lower indicator is presented by Souza et al.(2013) in Fortaleza, Ceará, according to which the proportion between 2007 and 2008 was only 72.8%.

Other important indicators to mediate the quality of care provided to patients are the proportion of new leprosy cases with physical disability assessed at diagnosis and the proportion of cured cases in the year with physical disability assessed. While in the first indicator, the city was rated "good" (99%) in the second, the rating was "average" (83.6%), according scale classificaçãoproposta by the ministry of health: good: $\geq 90\%$; regular: 75 to 89.9%; Bad: $< 75\%$.

In a study of Flach et al.(2010), the proportion of individuals evaluated at diagnosis was lower to that found in our study. According to these authors, the values found when less than 90%, demonstrate operational weakness that must urgently be corrected, since physical disabilities in children under 15 years can lead to extensive negative damage. In this indicator, Juazeiro shows good operational capacity.

It is not enough that this evaluation would only be performed at the time of clinical diagnosis, but also of healing. In this study, there was a progressive improvement of the indicator, although when considering the period, still demonstrate deficiency of service because it reflects the ability of continuity of patient care. The evolution of this indicator is also shown as a study Flach et al.(2010).

In addition to the above results, the proportion of cases of leprosy in treatment dropout among new cases diagnosed in the cohort is an indicator used to assess the quality of care and monitoring of new cases to the completeness of

treatment. From 2008, the rate of noncompliance was 0% and, considering the period, the abandonment was 1.6% (good: 10%; adjusted: 10 to 24.9%; bad: $\geq 25\%$). Unlike our findings, Alencar et al.(2008) reported dropout rate in Fortaleza ranging from 9.6% in 2000 and 34.9% in 2004. These findings reinforce the improvement of health services in the city Juazeiro, Bahia.

The investigation of contacts of new leprosy cases is one of the most important indicators for the early diagnosis of individuals as well as to reduce the risk of future illness. The proportion of contacts examined among the registered allows the evaluation of services to conduct surveillance of household contacts of new cases of leprosy. During the study period, there has been considerable improvement in this indicator, as from the year 2008, the city was always rated as "good" (Table 2), according to the classification adopted by the ministry of health: good: $\geq 75\%$; regular: 50 to 74.9%; Bad: $< 50\%$.

The proportion of contacts examined from the recorded found in our study is much higher than that by Alencar et al.(2008), between the years 2002 and 2007, in Fortaleza, Ceará, the proportion was only 45.5 %. For the same author, the expansion of primary care network may be a factor contributing to the improvement of contacts exam. In our study, the expansion of the network is accompanied by an increase in the proportion of contacts, reflecting operational efficiency of the service.

The good quality of the indicators in the city, far above indicators presented in other studies, appears to have close links with the expansion of primary health care network in the city of Juazeiro and disease to coping policies, although we know that much remains to be done in qualification of the services provided to patients.

CONCLUSION

Leprosy still is a serious public health problem in Juazeiro, the magnitude of which remains very high, deserving special attention to the population under 15 years sick, especially because of the high disabling potential.

As shown, the municipality has improved its quality indicators over the past ten years. One of the associated factors is the expansion of the network of municipal primary care, both with the installation of new health units and with the expansion of the Family Health Strategy coverage, and implementation of the Federal University of São Francisco Valley that by shaft extension-education has impacted the local reality.

Although many actions have been developed to increase access of the population to health facilities, as well as early diagnosis and timely treatment, the region still intensifying demand actions to eliminate the disease, justified by hyperendemicity pattern observed.

It is necessary for managers to be aware of the importance of consolidation of primary health care policy and expanding the network as a coping element to leprosy and other diseases neglected since, as have been demonstrated, the quality indicators of services improved as these services are positioned closer to the population. Although this is not the only and definitive solution, it is clear that is the first step.

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