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Causes and Solution Strategies for Hanseniasis in Children: Ishikawa Diagram

Causas e Estratégias de Soluções para Hanseníase em Crianças: Diagrama de Ishikawa

Causas y Estrategias de Soluciones para Hanseniasis en Niños: Diagrama de Ishikawa

*Deysianne Ferreira da Silva[1]; Geovana Cristiane Viana Santos[2]; Maria Hellena Ferreira Brasil[3]; Anna Cláudia Freire de Araújo Patrício[4]**

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ABSTRACT

Objective: The study's target has been to analyze the causes and solutions strategies for leprosy in children using the Ishikawa Diagram. **Methods:** It is a literature review based on the Ishikawa Diagram production, which was carried out over April 2017 in the databases of PubMed, Virtual Health Library (VHL), EBSCO and SciELO. **Results:** It was identified that the prevalence of leprosy in children is due to social, environmental and cultural factors, where: socioeconomic conditions, population cluster and lack of professional qualification correspond to 70% of the mentioned causes. **Conclusion:** It was evidenced the need for intensifying epidemiological surveillance, promoting larger investments in preventive actions, such as health education, including the adoption of professional training towards the professionals directly responsible the disease diagnosis.

Descriptors: Leprosy, Child, Causality.

[1] Nursing Undergraduate by the *UNIPÊ. Centro Universitário de João Pessoa (UNIPÊ)*, Brazil. E-mail address: dey13jp@hotmail.com

[2] Nursing Undergraduate by the *UNIPÊ. Centro Universitário de João Pessoa (UNIPÊ)*, Brazil. E-mail address: geovanacviana@gmail.com

[3] Nursing Undergraduate by the *UNIPÊ. Centro Universitário de João Pessoa (UNIPÊ)*, Brazil. E-mail address: hellenamhfb@gmail.com

[4] Nurse, PhD student enrolled in the Nursing Postgraduate Program by the *UFRN*. *Universidade Federal do Rio Grande do Norte (UFRN)*, Brazil. E-mail address: anna.freirearaujo@gmail.com

RESUMO

Objetivo: Analisar por meio do Diagrama de Ishikawa as causas e as estratégias de soluções para hanseníase em crianças. **Método:** Revisão da literatura baseada na construção do Diagrama de Ishikawa, realizado em abril de 2017 nos bancos de dados do Pubmed, Biblioteca Virtual de Saúde (BVS), Scielo e Ebsco. **Resultados:** Identificou-se que a prevalência da hanseníase em crianças se dá por fatores sociais, ambientais e culturais, onde: condições socioeconômicas, aglomerado populacional e ausência de capacitação profissional correspondem a 70% das causas apontadas. **Conclusão:** Evidenciou-se a necessidade de intensificar a vigilância epidemiológica, realizar maiores investimentos nas ações preventivas, como a educação em saúde, incluindo também a adoção de capacitações dos profissionais responsáveis pelo diagnóstico.

Descritores: Hanseníase, Criança, Causalidade.

RESUMEN

Objetivo: Analizar por medio del diagrama de Ishikawa las causas y estrategias de las soluciones para la lepra en los niños. **Método:** Revisión de la literatura basada en la construcción del Diagrama de Ishikawa, realizado en abril de 2017 en los bancos de datos del Pubmed, Biblioteca Virtual de Salud (BVS), Scielo y Ebsco. **Resultados:** Se identificó que la prevalencia de la hanseniasis en niños se da por factores sociales, ambientales y culturales, donde: condiciones socioeconómicas, aglomerado poblacional y ausencia de capacitación profesional corresponden al 70% de las causas señaladas. **Conclusión:** Se evidenció la necesidad de intensificar la vigilancia epidemiológica, realizar mayores inversiones en las acciones preventivas, como la educación en salud, incluyendo también la adopción de capacitaciones de los profesionales responsables del diagnóstico.

Descriptores: Lepra, Niño,Causalidad.

INTRODUCTION

Leprosy is a chronic infectious disease caused by the bacterium manifested in the form of the bacillus *Mycobacterium Brazil*, characterized as an obligate intracellular parasite that has a predilection for the Schawnn cell (the type of glial cell that forms the axon of the neurons in the peripheral nervous system) and skin. Therefore, the main manifestations of the disease are related to peripheral nerves and cutaneous lesions.[1]

It is emphasized that despite the availability of powerful therapies with the association of several drugs, physical incapacity can occur in the patients. The prevalence of leprosy can be influenced by biological, socioeconomic and emotional aspects.[2]

In the earliest reports of leprosy (period of old and average age), because the deformation caused by the disease was unknown, men believed that it was related to divine punishment, referring to sins and practices of malicious attitudes.[3]

Segregation of patients with leprosy occurs from the earliest stages of the disease. Although it is a curable disease, patients may suffer from psychological disorders related to prejudice and discrimination, and therapeutic workshops are effective in preventing psychological manifestations in patients with leprosy.[4]

Transmission of the disease occurs through direct and prolonged contact with an infected person through the elimination of bacilli by the respiratory tract. Infection after the bacillus reaches the lymph nodes can last from months to years in a silent struggle with the immune system.[5]

There are several clinical forms of leprosy infection: indeterminate; tuberculoid; borderline or virchowian. Although there are differences, the symptoms are similar, from spots on the skin to changes in the skeletal muscles, causing deformities in the limbs.[6]

Brazil, despite advances against the proliferation of leprosy, still has a high rate, described by the World Health Organization (WHO) in 2013, as one of the countries with the highest number of cases of the disease, as well as India. Socioeconomic and housing (geographic) factors are essential to understand the reason for not either eradicating or at least stabilizing the number of cases of this pathology.[7]

Due to the high incidence of leprosy cases and the lack of specific protection for this disease, the Brazilian Health Ministry indicates some actions to be taken, including: treatment until cure; prevention and treatment of disabilities; epidemiological investigation for the timely diagnosis of cases; examination of contacts, guidelines and application of BCG (despite being a vaccine for tuberculosis, there is a relation in the efficacy against leprosy).[8]

A study carried out in Bangladesh/Asia aimed to observe the influence of the BCG vaccine on the prevention of leprosy, and it was detected that it performs inductions to cross-reactive immune responses to *M. Brazil*.[9]

Concerning the cases of leprosy in Brazil, in 2015 the *Sistema de Informações de Agravos de Notificação* (SINAN) [Information System of Notification Aggravations] recorded 35,131 cases, of which 2,384 were in persons within the age group from 0 to 14 years old.[10]

Undoubtedly, the number of infected persons in this age group is considerable in the country, especially in the North, Northeast and Midwest States.[11]

Analyzing the factors related to leprosy is of extreme importance for society. The disease, still endemic in the country (Brazil), can have the number of cases reduced through health education. Nursing professionals are an important link between clinical treatment and care. Then, knowing this infection is essential to designing both prevention and treatment strategies.

Given this perspective, this study pursues to answer the following question: What are the causes and strategies of solutions for leprosy in children?

Hence, this work seeks to analyze the causes and strategies of solutions for leprosy in children.

METHODS

Integrative review using the Ishikawa Diagram also known as cause and effect diagram or fishbone in order to directly expose the causes and solutions for leprosy in children. Three phases were followed to build the diagram, as described below.[12]

First phase: After defining the theme to be worked, a brainstorming was carried out, composed of three nursing undergraduates attending the parasitology discipline, allowing the identification of possible causes and solutions for the studied problem. Brainstorming is a method of brainstorming.

Second stage: Construction of the Ishikawa Diagram, following the stages of the Integrative Review through the PICOS strategy, where: P = problem population; I = intervention; C = comparison; O = outcome. This strategy has the capacity to expand the search for evidence in the databases, avoiding unnecessary searches.[13] In this study, intervention and comparison were not used because it is not adequate for the objectives of the study. The "P" was represented by children and "O" by leprosy.

Herein, it was sought to answer the following guiding question: What are the causes and the solution strategies for leprosy in children?

Third phase: Literature search strategies in the databases: Virtual Health Library (VHL), PUBMED (NHI), EBSCO and SciELO. We used controlled descriptors to perform the searches: children AND leprosy.

Inclusion criteria were as follows: articles available in full, with humans, no cost for access, summary available, children with leprosy, published in Portuguese, English or Spanish between 2007 and April 2017.

The exclusion criteria were as follows: do not approach the topic, review articles, case study, pilot study, repeated articles, articles whose subjects are not children with leprosy, paid articles, articles completely unavailable.

Table 1 describes the search strategies performed in each of the databases, which occurred in April 2017. Boolean operators AND were respected. After identifying the articles, reading the titles and summaries of the 383 articles, 346 articles were excluded. 37 articles were selected for reading in full. All 37 articles were read in their entirety and afterward, four articles were excluded, being the final sample of 33 articles.

Table 1 - Strategies of the explorations carried out in the searched databases.

Search strategy	Children AND leprosy			
Databases	Number of articles by databases	Articles excluded after reading titles and abstracts	Articles excluded after reading in full	Final sample
PUBMED NHI	255	247	02	06
BIBLIOTECA VIRTUAL HEALTH LIBRARY (VHL)	94	80	01	13
EBSCO	09	05	-	04
SCIELO	25	14	01	10
TOTAL	383	346	04	33

REASONS FOR EXCLUSION AFTER READING TITLES AND ABSTRACTS	PUBMED	VIRTUAL HEALTH LIBRARY	EBSCO	SCIELO
It does not address the main topic.	147	27	03	04
It does not have leprosy bearing children as the subject of the study.	67	08	01	04
Review or meta-analysis articles.	08	02	-	-
Repeated articles.	07	32	01	04
Pilot study.	04	-	-	-
Case study.	12	07	-	02
Paid articles.	-	02	-	-
Articles unavailable in full text.	-	02	-	-
REASONS FOR EXCLUSION AFTER READING THE ARTICLES IN FULL				
It does not have leprosy bearing children as the subject of the study.	01	01	-	01
Review or meta-analysis articles.	01	-	-	-

Fourth phase: Building the results and the Ishikawa Diagram.

The results were obtained following a data collection instrument.[14] For each article analyzed, a data collection instrument was filled out, with the articles identified in **Table 2**.

We observed the level of evidence of the articles ranging from one to seven, being number one, five and seven excluded, according to the exclusion criteria of the study. Level two is considered strong and corresponds to clinical trials, randomized, controlled and well-delimited studies; level three is moderate and consists of controlled clinical trials without randomization; level four is moderate and concentrates trials of controls and cohort cases; level six is weak and encompasses a single, descriptive and qualitative study.[15]

RESULTS AND DISCUSSION

After reading the entirety of the 33 articles that composed the sample, **Table 2** was then built with characteristics of the studies, and the professional training of the authors of this integrative review was represented by 39.4% (13) physicians, 27.3% (9) nurses, 21.2% (7) physiotherapists, 3% (1) biologist, and 9.1% (3) other academic areas. The most prevalent levels of evidence were level 6 with 81.8% (27), level 3 with 9.1% (3), level 4 with 6.1% (2), level 5 with 3% (1). The highest quantitative countries were Brazil with 81.9% (27), India with 12.1% (4), the Philippines and Paraguay presented 3% (1), respectively.

Table 1 - Characteristics of the studies found in the Literature Review.

*A	AT	T/Y	J/Y	C/C	S	T	D
SOUZA, C.D.F. et. al.	Physiotherapy	Distribuição especial da endemia hansênica em menores de 15 anos em Juazeiro - BA, entre 2003 e 2012.	Revista brasileira de geografia médica e da saúde/2014.	Juazeiro/ Brazil.	132	Exploratory	EBSCO
PASSOS, C.E.C., et al.	Medicine	Hanseníase no estado do Maranhão: análise das estratégias de controle e os impactos nos indicadores epidemiológicos	Revista brasileira de geografia médica e da saúde/2016.	Maranhão /Brazil.	45,815	Descriptive	EBSCO

SOUZA, C.D.F., et. al.	Physiotherapy	Magnitude, tendência e espacialização da hanseníase em menores de 15 anos no estado da Bahia, com enfoque em áreas de risco: um estudo ecológico.	Revista brasileira de geografia médica e da saúde/2015.	Bahia/Brazil.	594	Exploratory Retrospective	EBSCO	
LUNA, I.C.F. et. al.	Nursing	Perfil clínico-epidemiológico da hanseníase em menores de 15 anos no município de Juazeiro-BA.	Revista brasileira em promoção da saúde/2013.	Bahia/Brazil.	145	Quantitative, Exploratory Descriptive.	EBSCO	6
BUHRER-SÉKULA, et. al.	Pharmacy and Biochemistry	A relação entre soroprevalência de anticorpos contra o glicolipídeo fenólico-I entre crianças em idade escolar e endemicidade da hanseníase no Brasil.	Revista da sociedade brasileira de medicina tropical/2008.	Espirito Santo, Minas Gerais, Santa Catarina/Brazil.	750	Exploratory	SCIELO	6
FERREIRA, I.N., et al.	Nursing	Distribuição espacial da Hanseníase na população escolar em Paracatu - Minas Gerais, realizada por meio da busca ativa (2004-2006).	Revista brasileira de epidemiologia/2007.	Paracatu, Minas Gerais/Brazil.	16,623	Epidemiological	SCIELO	6
LANA, F.C.F. et. al.	Nursing	Hanseníase em menores de 15 anos no Vale do Jequitinhonha - Minas Gerais, Brasil.	Revista brasileira de Enfermagem / 2007.	Jequitinhonha, Minas Gerais/Brazil.	1,461	Cross-sectional	SCIELO	
ALENCAR, C.H.M. et. al.	Biological Sciences	Hanseníase no município de Fortaleza, CE, Brasil: aspectos epidemiológicos e operacionais aspectos epidemiológicos e operacionais em menores de 15 anos (1995-2006).	Revista brasileira de enfermagem / 2008. 2008.	Fortaleza, Ceará/Brazil.	451	Cross-sectional	SCIELO	
BARRETO, J.G. et. al.	Physiotherapy	High rates of undiagnosed leprosy and subclinical infection amongst school children in the Amazon Region.	Memorial Instituto Oswaldo Cruz/2012.	Pará, Belém/Brazil.	1,592	Cross-sectional	SCIELO	6
SANTOS, S.D. et al.	Nursing	Leprosy in children and adolescents under 15 years old in an urban centre in Brazil.	Memorial Instituto Oswaldo Cruz/2016.	Salvador, Bahia/Brazil.	145	Epidemiological	SCIELO	5
NEDER, L. et. al.	Medicine	**Musculoskeletal manifestations and autoantibodies** in children and adolescentes with leprosy.	Sociedade brasileira de pediatria/2014	Mato Grosso, Cuiabá/Brazil.	50	Exploratory	SCIELO	6
IMBIRIBA, E. B., et al.	Medicine	Perfil epidemiológico da hanseníase em menores de quinze anos de idade, Manaus (AM), 1998-2005.	Revista de saúde pública/2008.	Manaus, Amazonas/Brazil.	4,541	Descriptive Retrospective	SCIELO	6
NEDER, L. et. al.	Medicine	Qualidade de vida relacionada a saúde avaliada pelo inventário pediátrico de qualidade de vida 4.0 em pacientes pediátricos com hanseníase e manifestações musculoesqueléticas.	Revista brasileira de reumatologia/2015.	São Paulo/Brasil.	92	Cross-sectional	SCIELO	6
BRITO, A. L., et. al.	Nursing	Temporal trends of leprosy in a Brazilian state capital in Northeast Brazil: epidemiology and analysis by joinpoints, 2001 to 2012.	Revista brasileira de epidemiologia/2014.	Fortaleza, Ceará/Brazil.	9,658	Epidemiological	SCIELO	6
BARRETO, J.G. et. al.	Physiotherapy	Spatial epidemiology and serologic cohorts increase the early detection of leprosy.	BMC Infectious Diseases/2015	Castanhal e Oriximiná-PA/Brazil	754	Ecological Cross-sectional	PUBMED	3
BARRETO, J.G. et. al.	Physiotherapy	Spatial Analysis Spotlighting Early Childhood Leprosy Transmission in a Hyperendemic Municipality of the Brazilian Amazon Region.	PLOS Neglected Tropical Diseases/2014	Castanhal-PA/Brazil	499	Experimental Ecological Retrospective	PUBMED	3
SOUZA, V.F.M., et. al.	Medicine	Report of three new leprosy cases in children under fifteen in the municipality of Itaguaí, Rio de Janeiro - event alert for epidemiological investigation.	An Bras Dermatol/2011	Itaguaí-RJ/Brazil	3	Descriptive	PUBMED	6
BHAT, R.M., et al.	Medicine	Posteliminationon Status of Childhood Leprosy: Report from a Tertiary-Care Hospital in South India.	BioMed Research International / 2013	Karnataka/Índia	36	Retrospective Descriptive	PUBMED	6
SCHEELBEEK, P.F.D. et al.	Epidemiology	A Retrospective Study of the Epidemiology of Leprosy in Cebu: An Eleven-Year Profile.	PLOS Neglected Tropical Diseases/2013	Cebu/Filipinas	3,288	Retrospective Quantitative	PUBMED	3

		Profile.						
GITTE, S.V., et al.	Medicine	Childhood Leprosy in an Endemic Area of Central India.	Indian Pediatrics/ 2016	Chhattisgarh / índia	551	Prospective Longitudinal	PUBMED	
RAO, R., et al.	Medicine	Multiple Grade II Deformities in a Child: Tragic Effect of Leprosy.	Journal of Tropical Pediatrics/ 2010	-- /Índia	1	Descriptive	BVS	6
CABRAL-MIRANDA, W., et al.	Geography	Socio-economic and environmental effects influencing the development of leprosy in Bahia, north-eastern Brazil	Tropical Medicine and International Health/2014	Bahia/Brazil	21,278	Ecological Cross-sectional Exploratory	BVS	4
ALDAMA, Arnaldo et al.	Medicine	Lepra multibacilar en niños	Pediatr. (Asunción) /2011.	Paraguai	2	Descriptive Exploratory Retrospective	BVS	6
BORGES, M.G.L, et al.	Physiotherapy	O cuidado hospitalar na hanseníase: um perfil do estado do Pará de 2008 a 2014.	Revista Hansenologia Internationalis/2015.	Pará/Brazil.	740	Descriptive	BVS	6
MATOS, E.V.M., et al.	Nursing	Conjuntura Epidemiológica da Hanseníase em menores de quinze anos, no período de 2003 a 2013, Belém-PA.	Revista Hansenologia Internationalis/2015.	Belém, Pará/Brazil	477	Quantitative Retrospective Descriptive	BVS	6
PIRES, C.A.A., et al.	Medicine	Hanseníase em menores de 15 anos: a importância do exame de contato.	Revista Paulista de Pediatria/2012	Belém, Pará/Brazil	2	Descriptive	BVS	6
LOBO, J.R., et al.	Medicine	Perfil epidemiológico dos pacientes diagnosticados com hanseníase através do exame de contato no município de Campos dos Goytacazes, RJ.	Revista Brasileira de Clínica Médica/2011.	Campos dos Goytacazes, Rio de Janeiro/Brazil	82	Cross-sectional	BVS	6
SANTINO, L.S., et al.	Medicine	Hanseníase Dimorfa Reacional em criança.	Revista Hansenologia Internationalis/2011.	Salvador, Bahia/Brazil	1	Descriptive	BVS	6
FLACH, D.M.A.M., et al.	Nursing	Análise do protocolo complementar de investigação diagnóstica dos casos de hanseníase em menores de 15 anos nos municípios prioritários do estado do Rio de Janeiro em 2009 e 2010.	Revista Hansenologia Internationalis/2011.	Niterói, Rio de Janeiro/Brazil	172	Retrospective Descriptive	BVS	6
MORAIS, S.G., et al.	Physiotherapy	Avaliação das ações de controle da hanseníase no município de Governador Valadares - Brasil, no período de 2001 a 2006.	Revista Hansenologia Internationalis/2010.	Governador Valadares, Minas Gerais/Brazil.	1,873	Epidemiological Descriptive Cross-sectional	BVS	6
FERREIRA, I.N., et al.	Nursing	Uso do teste ML Flow em escolares diagnosticados com hanseníase no município de Paracatu, Minas Gerais.	Revista da Sociedade Brasileira Medicina Tropical/2008.	Paracatu, Minas Gerais/Brazil.	16,623	Epidemiological Descriptive Exploratory	BVS	6
SHETTY, V.P., et al.	Medicine	Clinical, bacteriological, and histopathology characteristics of newly detected children with leprosy: A population based study in a defined rural and urban area of Maharashtra, Western, Índia.	Indian Journal of Dermatology, Venercology and Leprosy/2013.	Mumbai/Índia	196,694	Explanatory	BVS	6
FLACH, D.M.A.M., et al.	Nursing	Análise da série histórica do período de 2001 a 2009 dos casos de hanseníase em menores de 15 anos, no estado do Rio de Janeiro.	Revista Hansenologia Internatiolalis/2010.	Niterói, Rio de Janeiro/Brazil.	1,447	Retrospective	BVS	6

*A= article authors. AT= academic training of the first author. T/Y= title of the article and publication year. J/Y= journal/year. C/C= city/country. S= sample. T= type of study. D= database. E= evidence level.

Note - The titles were kept as in their original language.

Table 3 – Characteristics, causes and solutions for children with leprosy according to studies found in the Literature Review.

Causes	Solutions
-Population clusters; -Low socioeconomic situations.	-Set of policies and actions aiming to limit transmission cores.
-Late diagnosis; -Fragility in the control actions developed in healthcare services.	-Implementation of specific prevention and control measures for the target group of the population.
-Population clusters; -Unfavorable socioeconomic and health conditions.	-Development and implementation of public policies and programs aimed exclusively at this population.
-Early contact with bacilliferous patients; -Population with lower levels of schooling and income.	-Health education; -Professional training; -Early diagnosis; -Incentive to correct notification; -Patient follow-up.
-Socioeconomic factors; -Exposure to *Mycobacterium Leprae*.	-Development and implementation of public policies and programs exclusively for this population; -Patient follow-up.
-Low family income; -Low schooling level.	-Health education; -Training of health teams in the control of the disease.
-Early contact of the population with the bacillus; -Passivity of healthcare services.	-Addition of more specific prevention and control measures; -Active search; -Realization of lectures clarifying the signs and symptoms.
-Socioeconomic/nutritional status; -Exposure exposure to *Mycobacterium Brazil*; -Late diagnosis.	-Addition of more specific prevention and control measures; -Training of the health teams in the control and diagnosis of the disease.
-Socioeconomic conditions; -Low rate of contact examination.	-Training of the health teams in the control and diagnosis of the disease; -Early diagnosis.
-Late diagnosis; - Actions to control the ineffective leprosy program/actions focused only on healing. -Migratory movement.	-Intensifying the active search and the contact and neurological exams.
-Early contact of the population with the bacillus;	-Active search.
-Long incubation period; -Early contact with an ill person.	-Addition of more specific prevention and control measures.
-People agglomeration; -Schools in a risky area; -Population in areas of difficult access.	-Focused screening; -Continuous, individual and family surveillance.
-Population cluster in endemic areas; -Inefficiency of local control programs for the early detection of new cases.	-Performing interventions more systematically; - Performing surveillance of individuals in endemic areas.
-Difficulty in controlling the disease; -Unfavorable social conditions; -Migratory movement.	-Active search.
-Active bacillary circulation; -Discontinuation of treatment; -Lack of dissemination of the disease and its long incubation period.	-Strengthen screening activities - periodic screening.
-Development of drug-resistant leprosy; -Difficult early diagnosis.	-Interventions of chemoprophylaxis; -Good coverage with BCG.
-Late notification; -Long incubation period.	-Early detection; -Regular treatment.

-Delay in performing the diagnosis; -Low average range; -People agglomeration.	-Strengthening the control program and greater vigilance to catch the cases early.
-Poor living conditions; - High number of residents per residence.	-Increase, educational levels and access to high-quality health services.
-Contacting someone contaminated; -Ineffective diagnosis in children; -Source of infection by the parents.	-Early diagnosis.
-Lack of dissemination of the disease and its long incubation period.	
-Development of drug-resistant leprosy; -Difficult early diagnosis.	-Interventions of chemoprophylaxis; -Good coverage with BCG.
-Late notification; -Long incubation period.	-Early detection; -Regular treatment.
-Delay in performing the diagnosis; -Low average range; -People agglomeration.	-Strengthening the control program and greater vigilance to catch the cases early.
-Poor living conditions; - High number of residents per residence.	-Increase, educational levels and access to high-quality health services.
-Contacting someone contaminated; -Ineffective diagnosis in children; -Source of infection by the parents.	-Early diagnosis.
-Lack of both information and actions in health education; -Unfavorable socioeconomic situation.	-Elaboration of preventive measures.
-Active and continuous transmission.	-Active search; -Health education.
-Difficulty of diagnosis.	-Professional training.
-Late diagnosis; - Absence of contact exams.	-Adopting both prevention and control measures; -Effective treatment; -Early diagnosis.
-Early exposure to bacillus.	-Monitoring of endemic areas.
-Passivity of healthcare services.	-Investing in training for those responsible for collecting the information.
-Long incubation period. -Untrained staff to make the diagnosis.	-Intensifying epidemiological surveillance. -Performing control actions.
-Elevated exposure to the bacillus.	-Active search.
-Active transmission of the bacillus.	-Early diagnosis; -Health education.
-Late diagnosis.	-Early diagnosis; -Health education.

The method used to build the Ishikawa Diagrams, as shown in both **Tables 1** and **3**, is exhibited in the following **Figures 1** and **2**.

Figure 1- Ishikawa Diagram regarding the causes of leprosy in children.

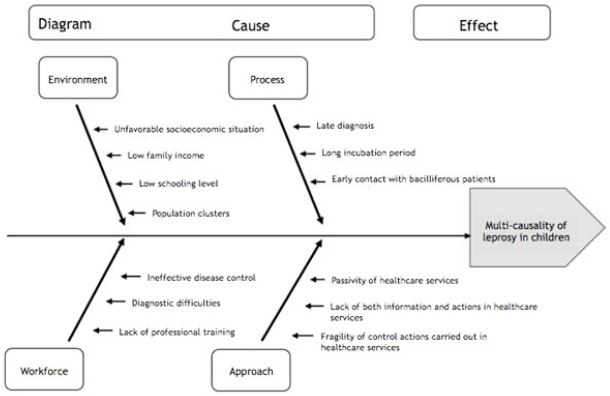
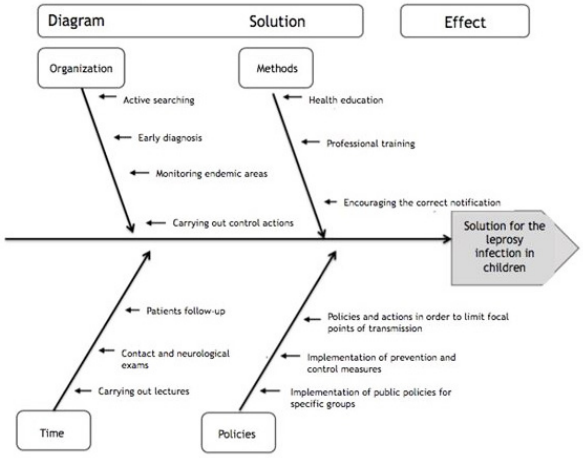


Figure 2- Ishikawa Diagram considering the solutions of leprosy in children.



Causes of leprosy infection in children

The focal behavior of leprosy occurs in urban space, this statement is related to a set of elements that contribute to its emergence, such as income distribution, social cohesion, as well as environmental and cultural factors.[16]

The municipalities with the greatest social inequality have the highest coefficients of detection and prevalence of leprosy, reinforcing that socioeconomic and environmental indicators are also important predictors of leprosy. Nevertheless, the relationship between leprosy and social inequality should be highlighted. By observing the geographical distribution of the disease in the world and in different regions of the same territory with areas of lower Human Development Index, they present higher leprosy indicators.[17]

Leprosy is considered an adult and young adult disease, however, there are a large number of cases in age groups younger than 15 years old. They indicate early exposure and persistent transmission of the disease, becoming a sensitive element to assess its size, contributing to the perception of the endemic pattern of leprosy in a particular place.[16]

The young population with leprosy identifies fragilities in the health services, besides showing multibacillary cases without diagnosis and treatment, as well as public policies that do not attend the confrontation with the disease. Because of the long incubation period, clinical manifestations in children rarely occur before the age of five. Still, cases of leprosy have been reported in children under the age of two, aged seven months, six months and up to two months.[18]

Brazil is today the only country in the world not to eliminate leprosy, say reduce its prevalence to less than one case per 10,000 inhabitants.[19] Thinking about leprosy as a public health problem implies multiple analyzes, mainly due to the social problems that can be generated in people affected, with emphasis on those related to physical disabilities and consequent functional, social and emotional injuries. In this sense, it is worth highlighting the transcendence of the disease, understood here as the social impact caused in the patient's daily life, such as prejudice, suffering and abandonment.[18]

In endemic countries, the general population of children is in early contact with the bacilliferous patient. A large number of cases of leprosy in the age group of less than 15 years old indicates hyperendemicity in the community, as well as a deficiency in surveillance and control of the disease, which causes a possible lack of implementation of effective health policies aimed at the diagnosis precocious disease, especially in this age group.[20]

The diagnostic difficulty favors the maintenance of the sources of infection. Most patients, when diagnosed early, do not present with disabilities.[21]

Due to the lack of intensification in the strategies and activities of health education in schools and in home visits, as a way of improving the knowledge of the disease in the population, leprosy is spreading.[22]

It is necessary to intensify the actions of leprosy surveillance, aimed at greater effectiveness in the diagnosis and treatment of the disease, especially in the regions of greater

concentration of the country. Moreover, it is important to continually improve information systems, a fundamental activity to ensure the adequate monitoring of the epidemiological situation of leprosy in the country, with a view to achieving the goal of eliminating the disease as a public health problem.[23]

Solution strategies for combating leprosy in children

There are several methods for combating leprosy in children, but for them to be carried out competently it is necessary to improve the quality of health services, better management system, improved quality of case records and accessibility to specialized services; resources to ensure disability prevention and rehabilitation where necessary, and promote integration and partnerships with other institutions.[24]

Furthermore, professional training is needed to enable early diagnosis and immediate and appropriate treatment, family follow-up, and active search of transmission outbreaks. Nonetheless, only active search will not solve the problem of leprosy, a continuation of actions is still important. Interventions are needed such as continuing education with an effective, simple and objective approach with adjustment to the social level of the clientele and expansion of the coverage of care with the help of the Family Health Strategies (FHS).[24]

The surveillance of contacts in endemic areas becomes useful for the discovery of new cases among those who live or live together in a prolonged way, with the new case of leprosy diagnosed. It also aims to discover possible sources of infection in or out of the home.[8]

Usually, with active search for cases of leprosy to perform early diagnosis, evaluation of the communicators of all cases found, administration of the BCG vaccine, dissemination of leprosy control actions, and commitment of the multi-professional team to ensure continuous treatment for each patient will be found to control the disease, interrupting the transmission cycle and reducing cases in children.[25]

Health education is an indispensable process to obtain control of leprosy, especially in the school age group, in which the detection rates are high and are indicative of active transmission cores.[26]

It aims to collaborate in the formation of a critical conscience, resulting in the acquisition of practices aimed at promoting, maintaining and recovering the health and health of the community of which it is a part. More attention is needed in cases of leprosy in children due to difficult diagnosis.[27]

It is also necessary to train professionals to act effectively in the fight against disease, responsible for the processes of practice and care, with greater preparation for the reception, paying attention to the bond created with the users and also to the education and encouraging the correct notification when the disease is confirmed, as leprosy is a compulsory notifiable and mandatory disease.[8]

Lessons learned through efforts to eliminate leprosy show that the reduction in treatment time made possible by multidrug therapy has been insufficient to achieve the goal proposed by the World Health Organization in 1991.[28]

The lack of any specific and effective vaccine against this disease has hampered control actions that continue to focus exclusively on reducing the sources of infection by treating patients.[29]

The major obstacles to the development of control actions relate to individuals who are unable to provide any information about their source of contact. In these situations, the source of infection may indeed be unknown or the information may not be readily available due to the social stigma attached to the disease, which often prevents the patients from revealing the disease in the family.[29]

The fact that children under 15 years old are infected with leprosy makes this scenario even more worrying, since it indicates that a significant proportion of cases are not being detected or treated in a timely manner to at least decrease the sources of infection and also either prevent or reduce transmission of the agent.[29]

The limitation of the transmission focuses also occurs from the identification of the areas of greater risk. A set of policies and actions should be implemented, thereby reducing the burden of disease in the community. Leprosy mappings also demonstrate that the space category cannot be forgotten when the desire is to know the epidemiological scenario of a disease and its temporal behavior. It is therefore understood that leprosy does not occur randomly in the municipality.[16]

Among the strategies for leprosy control carried out by the *Secretaria Estadual de Saúde do Maranhão* (SESMA) [State Health Department from the Maranhão State] are as follows: epidemiology, management, integral care, communication and education, as well as municipal supervisions.[30]

The first important intervention is the decentralization of care, which adds actions of diagnosis, treatment and surveillance of the household contacts to the FHS in order to improve patients' access. At the same time, there is a strengthening of human resources training for leprosy. Concomitant to this action, the municipality actions were also performed aiming the assessment and local monitoring of the epidemiological and operational indicators.[30]

CONCLUSIONS

This study meant to investigate the causes and solution strategies for leprosy in children, and among the causes are the following: low family income, schooling, late diagnosis, lack of professional training, fragility of control actions. Regarding the solutions, the following stand out: active search, early diagnosis, health education, lectures, and policy implementation for the target population.

Therefore, interventionist actions should not only focus on the patient but on the forms of transmission, avoiding other individuals to acquire the disease, especially those under the age of 15 years old. The commitment of the team to investigate, treat and make the notifications, together with

actions carried out by the Ministry of Health, are the main steps for the leprosy eradication.

Bearing this in mind, it is a challenge to control the contagion and the nursing team included in the multi-professional team must act severely in the search for professional qualification. Through holistic humanized work teams should assist patients in the various stages of the disease, from detection and acceptance to healing.

It is necessary to address this issue in Nursing Graduation Courses in order to train professionals capable of attending to this population in an effective and resolute manner, besides eliminating the prejudice and stigma of people diagnosed with leprosy.

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***Corresponding Author:**
Anna Cláudia Freire de Araújo Patrício
Avenida Senador Salgado Filho, s/n
Lagoa Nova, Natal, Rio Grande do Norte, Brasil
E-mail address: anna.freirearaujo@gmail.com
Telephone number:+55 84 3215-3196
Zip Code: 88.054-260

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