

Socioeconomic factors related to leprosy: an integrative literature review

Fatores socioeconômicos relacionados à hanseníase: revisão integrativa da literatura
Factores socioeconómicos relacionados con la lepra: revisión integrativa de la literatura

Heloisy Alves de Medeiros Leano¹

ORCID: 0000-0001-7337-4079

Kleane Maria da Fonseca Azevedo Araújo¹

ORCID: 0000-0001-8033-7305

Isabela de Caux Bueno¹

ORCID: 0000-0003-4501-5989

Eyleen Nabyla Alvarenga Niitsuma¹

ORCID: 0000-0002-5781-6313

Francisco Carlos Félix Lana¹

ORCID: 0000-0001-9043-3181

¹Universidade Federal de Minas Gerais.
Belo Horizonte, Minas Gerais, Brazil.

How to cite this article:

Leano HAM, Araújo KMFA, Bueno IC, Niitsuma ENA, Lana FCF. Socioeconomic factors related to leprosy: an integrative literature review. Rev Bras Enferm. 2019;72(5):1405-15. doi: <http://dx.doi.org/10.1590/0034-7167-2017-0651>

Corresponding Author:

Heloisy Alves de Medeiros Leano
E-mail: heloisymedeiros@hotmail.com



Submission: 09-27-2017 **Approval:** 01-27-2018

ABSTRACT

Objective: To investigate in the literature the relation of socioeconomic factors in the incidence of the disease and other outcomes related to leprosy. **Method:** Integrative review conducted in Lilacs, Medline, Scopus databases and SciELO online library with studies from 2000 to 2016. **Results:** 32 studies were included. Only studies that analyzed statistical associations of socioeconomic factors and outcomes related to leprosy were selected. **Conclusion:** Leprosy is greatly affected by the social context in which the patient is inserted, the chances of exposure to illness are the result of a set of not only individual aspects, but also of contexts or collective conditions. It is imperative for Nursing, as an essential part of the multiprofessional team entrusted with the care and surveillance of the disease, to recognize these factors to predict unfavorable outcomes and to develop new practices capable of reducing inequities.

Descriptors: Leprosy; Socioeconomic Factors; Public health; Review; Neglected Diseases.

RESUMO

Objetivo: Investigar na literatura a relação dos fatores socioeconômicos na ocorrência da doença e outros desfechos relacionados à hanseníase. **Método:** Revisão integrativa realizada nas bases de dados Lilacs, Medline, Scopus e na biblioteca on-line SciELO com estudos de 2000 a 2016. **Resultados:** Foram incluídos 32 estudos. Apenas pesquisas que analisaram associações estatísticas dos fatores socioeconômicos e os desfechos relacionados à hanseníase foram selecionadas. **Conclusão:** A hanseníase sofre grande influência do contexto social em que o doente está inserido, as chances de exposição ao adoecimento são resultantes de um conjunto de aspectos não apenas individuais, mas também de contextos ou condições coletivas. É imperativo à Enfermagem, como parte essencial da equipe multiprofissional incumbida, para o cuidado e vigilância da doença, reconhecer esses fatores para prever desfechos desfavoráveis e construir novas práticas capazes de reduzir iniquidades.

Descritores: Hanseníase; Fatores Socioeconômicos; Saúde Pública; Revisão; Doenças Negligenciadas.

RESUMEN

Objetivo: Investigar en la literatura la relación de los factores socioeconómicos en la ocurrencia de la enfermedad y otros resultados relacionados con la lepra. **Método:** Revisión integrativa realizada en las bases de datos Lilacs, Medline, Scopus y en la biblioteca en línea SciELO con estudios de 2000 a 2016. **Resultados:** Se incluyeron 32 estudios. Sólo las encuestas que analizaron las asociaciones estadísticas de los factores socioeconómicos y los resultados relacionados con la lepra fueron seleccionados. **Conclusión:** La lepra sufre una gran influencia del contexto social en que el paciente está inserto, las posibilidades de exposición al enfermo se derivan de un conjunto de aspectos no sólo individuales, sino también de contextos o condiciones colectivas. Es imperativo a la Enfermería, como parte esencial del equipo multiprofesional encargado, para el cuidado y vigilancia de la enfermedad, reconocer esos factores para predecir desenlaces desfavorables y construir nuevas prácticas capaces de reducir iniquidades.

Descriptorios: Lepra; Factores Socioeconómicos; Salud Pública; Revisión; Enfermedades Desatendidas.

INTRODUCTION

Leprosy, despite its declining prevalence in many countries, remains a public health problem through active transmission and discovery of new cases. This is especially true in developing countries that have characteristics that are conducive to the reproduction and spreading of diseases with complex patterns of transmission related to environmental, social, economic and even unknown determinants⁽¹⁾, such as leprosy.

The severity of this disease is present in the physical disabilities resulting from the untreated disease, which can reduce or eliminate opportunities for work and subsistence. In this way, in addition to providing stigma and social isolation, the disease contributes to the reduction of the socioeconomic development of a territory.

Thus, associated with human biology, the social inequalities and inequities present in the space in which people live favor the illness of leprosy and often hinders access to health services and consequently the timely diagnosis and appropriate treatment.

A recent study carried out in Brazil has associated the reduction of the disease burden with the improvement in living conditions, provided by income transfer programs⁽²⁾. In addition, countries such as Spain and Norway were able to eliminate leprosy even before the appearance of effective medicines against *Mycobacterium leprae*, and this fact was due to improved living conditions⁽³⁻⁴⁾.

In this sense, methodological proposals have been used to identify socioeconomic factors of individual and collective scope that favor illness and contribute to complications of leprosy, such as physical disabilities and recurrences.

Nursing professionals play an essential role in the leprosy work process and assume a decisive and proactive role in the planning and execution of care and control actions for patients and contacts⁽⁵⁾. Therefore, it can use the results of this study to recognize the influence of social determinants on the health-disease process, as well as to reflect its practice, aiming to improve leprosy control actions and better understand the socioeconomic factors that are associated with leprosy, in a broader manner in the literature.

OBJECTIVE

To investigate the relation of socioeconomic factors in the incidence of the disease and other outcomes related to leprosy.

METHOD

The method used to analyze and synthesize the literature was the integrative review methodology of Whittemore and Knafl⁽⁶⁾. There are five phases for the collection, analysis and synthesis of data⁽⁶⁾. They are problem identification; literature research; data evaluation; data analysis; and presentation. The initial step was to identify the problem to be addressed, an important time for decision making for data extraction. The problem to be addressed in this review is to identify the socioeconomic factors that are associated with the incidence of leprosy among those who are susceptible and other outcomes among patients. The next four phases are described in the following sections, beginning with literature research.

Literature research

The survey was conducted in November 2016. The search took place in Lilacs, Medline, Scopus and the SciELO online libraries. The descriptors were selected from the Health Sciences Descriptors (DeCS - decs.bvs.br/) or Medical Subject Headings (Mesh- www.ncbi.nlm.nih.gov/mesh), consolidating the search strategy (Table 1).

Table 1 – Search strategy for each database

BVS-ILACS E MEDLINE	("Social Class" OR "Clase Social" OR "Classe Social" OR "Socioeconomic Factors" OR "Factores Socioeconómicos" OR "Fatores Socioeconômicos" OR "poverty" OR "pobreza" OR "Social Conditions" OR "Condiciones Sociales" OR "Condições Sociais" OR "Social Indicators" OR "Indicadores Sociales" OR "Indicadores Sociais") AND (leprosy OR lepra OR hanseníase) AND (instance: "regional") AND (db: ("MEDLINE" OR "LILACS") AND (la: "en" OR "pt" OR "es") AND (year_cluster: "2012" OR "2011" OR "2013" OR "2010" OR "2014" OR "2009" OR "2015" OR "2008" OR "2003" OR "2000") AND (type: "article" OR "thesis"))
PUBME- MEDLINE	((("Social Class" [Title/Abstract] OR "Socioeconomic Factors" [Title/Abstract] OR "Poverty" [Title/Abstract] OR "Social Conditions" [Title/Abstract] OR "Social Indicators" [Title/Abstract])) OR (((("Social Class" [Mesh:noexp] OR "Socioeconomic Factors" [Mesh:noexp] OR "Poverty" [Mesh:noexp] OR "Social Conditions" [Mesh:noexp]))) AND ("Leprosy" [Title/Abstract] OR "Leprosy" [Mesh:noexp]))
SCOPUS	("Social Class" OR "Clase Social" OR "Classe Social" OR "Socioeconomic Factors" OR "Factores Socioeconómicos" OR "Fatores Socioeconômicos" OR "poverty" OR "pobreza" OR "Social Conditions" OR "Condiciones Sociales" OR "Condições Sociais" OR "Social Indicators" OR TITLABLESKEY ("Indicadores Sociales" OR "Indicadores Sociais")) AND (TITLABLESKEY ("leprosy" OR "lepra" OR "hanseníase")) AND (LIMITTO (LANGUAGE, "English") OR LIMITTO (LANGUAGE, "Portuguese") OR LIMITTO (LANGUAGE, "Spanish")) AND (LIMITTO (PUBYEAR, 2016) OR LIMITTO (PUBYEAR, 2015) OR LIMITTO (PUBYEAR, 2014) OR LIMITTO (PUBYEAR, 2013) OR LIMITTO (PUBYEAR, 2012) OR LIMITTO (PUBYEAR, 2011) OR LIMITTO (PUBYEAR, 2010) OR LIMITTO (PUBYEAR, 2009) OR LIMITTO (PUBYEAR, 2008) OR LIMITTO (PUBYEAR, 2007) OR LIMITTO (PUBYEAR, 2006) OR LIMITTO (PUBYEAR, 2005) OR LIMITTO (PUBYEAR, 2004) OR LIMITTO (PUBYEAR, 2003) OR LIMITTO (PUBYEAR, 2002) OR LIMITTO (PUBYEAR, 2001) OR LIMITTO (PUBYEAR, 2000)) AND (LIMITTO (DOCTYPE, "ar"))
SCIELO	("Social Class" OR "Clase Social" OR "Classe Social" OR "Socioeconomic Factors" OR "Factores Socioeconómicos" OR "Fatores Socioeconômicos" OR "poverty" OR "pobreza" OR "Social Conditions" OR "Condiciones Sociales" OR "Condições Sociais" OR "Social Indicators" OR "Indicadores Sociales" OR "Indicadores Sociais") AND ("leprosy" OR "lepra" OR "hanseníase")

Publications were extracted from 2000 to 2016, selecting original articles, brief communications, theses and dissertations. The inclusion criteria were presence of abstracts (in Portuguese, English or Spanish) and description of the quantitative approach regarding analysis of statistical association between leprosy and socioeconomic factors. Qualitative and quantitative studies were excluded, with descriptions regarding only frequency measurements. Also excluded were book chapters, event summaries, case reports, editorials and opinion articles.

Data was searched in the Virtual Health Library Brazil (VHL), with 145 publications in Medline and 45 in Lilacs identified; after that, 15 were found in SciELO, 188 in Scopus, and finally, in Pubmed, 188 articles were identified in Medline, totaling 581 articles. After the removal of duplicates, there were 388 records. After sorting by title and summary, 312 additional records were excluded. Following the application of the inclusion and exclusion criteria, and in full peer reading, 32 articles remained (Figure 1).

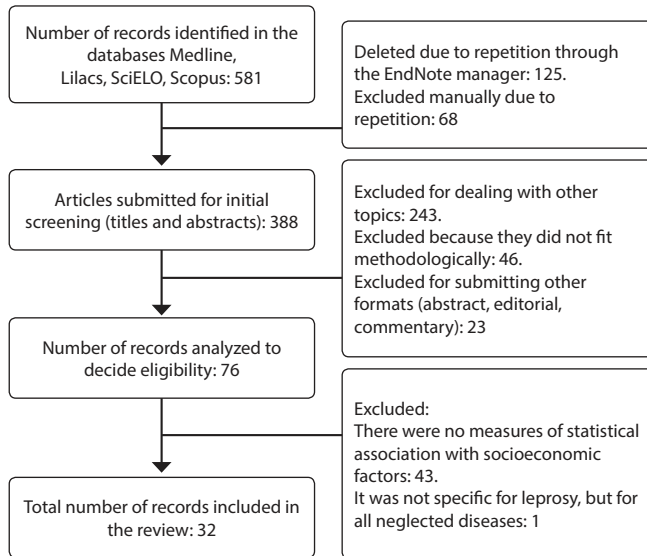


Figure 1 – Diagram of the process of identification, screening, eligibility and inclusion of the studies

For the management of bibliographic references, the online software EndNote (<http://www.myendnoteweb.com>), made available by Thomson Reuters/Clarivate Analytics, was used.

Assessment and analysis of data

The next step was the assessment of data. According to Whittemore and Knafl⁽⁶⁾, there are four steps of data analysis: data reduction; data display; comparison of data; and design and verification of conclusions. The 32 articles were initially read for an overview of their response to the research problem. After that, following information was collected: reference, research site, year of study, type of study, sample or aggregate, dependent variable, and socioeconomic factors/indicators associated with the outcome. The studies were discussed in pairs until topics became evident for the formation of categories.

The last stage of the integrative review, the presentation, was displayed in tables in the topic of results, following below.

RESULTS

Of the 22 studies that analyzed the socioeconomic factors associated with the incidence of the disease and other leprosy-related outcomes at the individual level, seven were case-control studies, four were cut-offs, and eleven were cross-sectional (Chart 1). Six categories were extracted from the results presented.

At the ecological level, of the ten studies selected for this review, five sought association with municipalities as a unit of analysis, one with micro-regions and four using the census divisions (Chart 2). Of these, two categories were compiled.

Chart 1 – Individual-level studies on the association between socioeconomic factors and leprosy

References	Country	Year	Type of Study	Sample	Dependent variable	Associated indicators
DIFFEY et al, 2000 ⁽⁷⁾ .	India	1997	Cross-sectional	871 subjects, of these, 155 cases with deformity, 100 cases without deformities and 616 household contacts.	Presence or absence of physical impairment.	Age of the index case (test t p<0.0005), number of wage earners (test t p <0.05), income from inside houses contacts (test t p<0.01), weekly expenses on food (test t p<0.05), proportion of deformity in the lowest socioeconomic classes (4 and 5) (x ² p<0.01), proportion of male contacts in lower socioeconomic classes (x ² p<0.006), educational level among male cases (x ² p<0.002), illiteracy among women (x ² p<0.001), wage among sex (p<0.01), and unemployment among groups (p<0.0005).
FERREIRA; IGNOTTI; GAMBA, 2011 ⁽⁸⁾ .	Brazil.	2005–2007	Case control	53 cases with recurrence from 2005 to 2007. 106 controls with discharge for cure in 2005.	Recurrence cases	They were associated with the recurrence: -those who lived in rented places (OR= 4.1; CI95%: 1.43, 12.04), in a place made of wood/ wattle and daub (OR= 3.2, CI95%: 1.16, 8.76) -they lived with more than five people (OR= 2.1; CI95%: 1.03, 4.36) -with alcohol disorders (OR= 2.8; CI95%: 1.17, 6.79) -with treatment irregularities (OR= 3.8; CI95%: 1.44, 10.02) -without clarification about the disease/treatment (OR= 2.6; CI95%: 1.09, 6.13) -they used public transportation to access the health care unit (OR= 5.5; CI95%: 2.36, 12.63), -clinical form of the disease (OR= 7.1; CI95%: 2.48, 20.52) -therapeutic scheme (OR= 3.7; CI95%: 1.49, 9.11)
FABRI, 2011 ⁽⁹⁾ .	Brazil	2010-2011	Cross-sectional	2,726 people	Seropositivity	-Family income <1 minimum wage (p=0.035, CI95%, 1.06–4.86) -Number of people living in the house 4 – 7 (p=0.04, CI95%, 0.07–0.94) ≥8 (p=0.075, CI95%, 0.09–1.12) -Number of rooms in the house 1 – 5 (p=0.122, CI95%, 0.85–3.84)

To be continued

Chart 1

References	Country	Year	Type of Study	Sample	Dependent variable	Associated indicators
HEGAZY et al., 2002 ⁽¹⁰⁾ .	Egypt	1999-2001	Case control	24 Cases of leprosy, 124 contacts inside the house, 30 contacts outside the house	Incidence	Prevalence of leprosy among illiterates (OR= 3.69, CI= 0.83-23.02, p=0.103); regarding elementary education (OR= 1.41, CI= 0.22-11.09, p=1); more than 4 people sharing a room (OR= 1.3, CI= 0.49-3.33, p=0.556), hand pump water supply (OR= 1.39, CI= 0.56-3.54, p=0.444), lower class (OR= 2.43, CI= 0.86-7.44, p=0.067)
NARDI et al., 2012 ⁽¹¹⁾ .	Brazil	1998-2006	Cross-sectional	335 patients treated	Physical impairment	Average of people who are of age (χ^2 p=0.029), education (χ^2 p=0.051)
ARAUJO et al., 2014 ⁽¹²⁾ .	Brazil	2010-2011	Cross-sectional	155 cases	Neural changes and physical impairment	Education: -No education OR 1 -Low education levels OR 0.75 (p=0.81, 0.07-8.09) -Average education levels OR 1.78 (p=0.30, 0.60-5.27) -High education levels OR 1.23 (p=0.68, 0.43-3.56) Family income (minimum wage) - >3 OR 1; >1-2 OR 0.57 (p=0.156, 0.26-1.24); <1 OR 1.20 (p=0.729, 0.42-3.45)
KERR-PONTES et al., 2006 ⁽¹³⁾ .	Brazil	2002	Case control	200 cases and 800 control	Incidence	High School (OR=1.50, CI= 0.91-2.50), lower education level (OR= 1.87, CI= 1.29-2.74), having experienced food shortages (OR=1.54, CI=1.45-1.63).
MURTO et al., 2014 ⁽¹⁴⁾ .	Brazil	2009	Cross-sectional	1,074 cases of leprosy	Migration status	Male sex vs. migration after diagnosis (OR= 2.71, CI= 1.26-6.32, p=0.007), age ranging from 30 to 44 vs. migration after birth (OR=3.04, CI= 1.76-5.42, p<0.0001), migration before diagnosis (OR= 2.77, CI= 1.24-7.00, p=0.01), age ranging from 45 to 59 vs. migration before birth (OR= 7.84, CI= 4.23-14.54, p<0.0001), illiteracy vs. migration after birth (OR= 3.86, CI= 2.38-6.53, P<0.0001), retired/pensioner people vs. migration after birth (OR= 4.95, CI= 2.50-10.88, p<0.0001), migration after diagnosis (OR= 0.15, CI= 0.0-0.97, p=0.03), student/housewife/other work status vs. migration after birth (OR= 0.45, CI= 0.32-0.65, p<0.0001), no access to electricity vs. migration after birth (OR= 0.57, CI= 0.33-1.03, p=0.049), vs. migration before diagnosis (OR= 2.05, CI= 1.09-3.72, p=0.02), no access to the service of solid waste collection vs. migration before diagnosis (OR= 1.70, CI= 1.2-2.41, p=0.003), house that is not a brick house vs. migration before diagnosis (OR= 1.57, CI= 1.01-2.32, p=0.022), living alone vs. migration after birth (OR= 4.28, CI= 1.55-16.44, p=0.002), no water supply vs. migration before diagnosis (OR= 1.65, CI= 1.12-2.43, p=0.012).
SANTOS et al., 2013 ⁽¹⁵⁾ .	Brazil	1987-2010	Prospective cut	7,174 contacts (incidence) 7,012 (prevalence)	Prevalence among contacts	Education (prevalence) >10 years OR 1; 4 to 10 years OR 1.33 (0.81-2.18); <4 years OR 2.18 (1.42-3.35) Skin color (prevalence): White OR 1; Brown/Black OR 1.32 (1.02-1.70) (incidence): White OR 1; Brown/Black OR 1.66 (1.14-2.42)
SAMUEL et al., 2012 ⁽¹⁶⁾ .	India	2004-2008	Cross-sectional survey	222 cases of leprosy were not treated	Migration	Age adult vs. child (χ^2 = 1.635, p=0.200), married vs. single (χ^2 = 1.588, p=0.207), education illiterate people vs. people with some level of education (χ^2 = 0.024, p=0.961)
FEENSTRA et al., 2011 ⁽¹⁷⁾ .	Bangladesh	2009	Case control	99 patients (cases) and 199 controls	Manifestation of leprosy	A recent period of food shortage was identified as the only socioeconomic factor significantly associated with the clinical manifestation of leprosy, not poverty itself (OR 1.79 (1.06-3.02), p=0.030). There is a declining trend in the prevalence of leprosy with a growing socioeconomic status, measured with an active index, but not statistically significant (test for a trend: OR 0.85 (0.71-1.02) p=0.083).
HEUKEL-BACH, et al., 2011 ⁽¹⁸⁾ .	Brazil	2009	Cross-sectional population study	936 people/patients	Treatment interruption	2.42 (1.02-5.63) - Family income/month less than 465 Brazilian reais

To be continued

Chart 1 (concluded)

References	Country	Year	Type of Study	Sample	Dependent variable	Associated indicators
RIBEIRO, 2012 ⁽¹⁹⁾ .	Brazil	2005-2010	Prospective cut	71 participants	Level of physical impairment in diagnosis	In the bivariate analysis there was a statistical relation between education ($p=0.032$) Education $P=0.031^{**}$ Fisher's test Family income $P=0.860$ Number of people in the house $P=0.267$ Occupation $P=0.835$ Current occupation $P=0.122$
SANTOS; CASTRO; FALQUETO, 2008 ⁽²⁰⁾ .	Brazil	2003-2006	Case control	90 cases 270 controls	Incidence of the disease	Education: Elementary school OR: 1.092 (0.616–1.937); High school OR: 1.455 (0.684–3.096); Undergraduate school OR: 1.682 (0.289–9.804) Income: Between 1 and 3 OR: 0.698 (0.393–1.240); Greater than 3 OR: 1,070 (0,360–3,179)
WAGE-NAAR et al., 2015 ⁽²¹⁾ .	Bangladesh	2013	Case control	52 cases 100 controls	Incidence of the disease	Having higher food expenses per capita(log) (OR: 0.03 – CI 0.00-0.36), being a farmer (OR: 0.24 CI: 0.07, 0.83) and owning a business (OR: 0.31 CI: 0.07-1.34) were protection factors
MONDAL et al., 2015 ⁽²²⁾ .	India	2015	Cut	50 patients with leprosy	Prevalence of reactions	Living in rural areas (χ^2 , $p=0.9345$), socioeconomic condition (χ^2 , $p=0.6137$), education (χ^2 , $p=0.7842$)
SANYAL, et al., 2011 ⁽²³⁾ .	India	2001-2002	Survey	93 patients with leprosy	Social harm and mental illness	Impairment present vs. living in urban areas vs. rural areas ($\chi^2=5.455$, adjusted $p=0.02$).
COSTA et al., 2012 ⁽²⁴⁾ .	Brazil	2007 to 2008	Cross-sectional	120 patients	Quality of life of patients with leprosy reactions	People married ($p=0.001$), education level ($p>0.05$), occupation and quality of life regarding physical, psychological and environmental aspects ($p<0.05$), interference of the disease in occupation ($p<0.001$), interference in the professional activity and family income ($p<0.001$), family income and physical aspect ($p=0.001$), family income and psychological aspect ($p=0.026$), family income and environmental aspect ($p=0.025$)
KAR; PAL; BHARATI, 2010 ⁽²⁵⁾ .	India	2002 to 2005	Retrograde cut	1,020 cases of leprosy	Adherence to pharmacological therapy	Male sex ($\chi^2=5.873$, $p=0.0154$), education level ($\chi^2=32.350$, $p<0.0001$), monthly income per capita ($\chi^2=22.150$, $p=0.0005$), socioeconomic status ($\chi^2=66.735$, $p<0.0001$).
KUMAR et al., 2004 ⁽²⁶⁾ .	Nepal	2001 to 2003	Cross-sectional	580 patients with leprosy	Adherence to treatment	Sex (OR= 2.05, CI= 1.07–3.94), Age (OR= 1.76, CI= 0.81–3.80), Education status (literate vs. illiterate) (OR= 2.37, CI= 1.12–4.99), Caste level (OR= 1.23, CI= 0.40–3.74), Religion (OR= 0.45, CI= 0.14–1.43), Occupation: farmer vs. unemployed (OR= 1.29, CI= 0.49–3.40), employed vs. unemployed (OR= 0.42; CI= 0.14–1.20), business/ service vs. unemployed (OR= 1.00, CI= 0.27–3.70), Family type (OR= 0.75, CI= 0.38–1.45), Annual family income (OR= 1.18, CI= 0.29–4.75), Hectares of land belonging to the family (OR= 0.60, CI= 0.29–1.23).
MURTO et al., 2013 ⁽²⁷⁾ .	Brazil	2010	Case control	394 cases and 391 controls	Incidence	Monthly income less than 1 minimum wage (OR: 2.12, CI: 0.97–4.71, $p=0.049$), little access to public cleaning services (OR: 3.1, CI: 1.1–10.02, $p=0.03$), illiteracy in family (OR: 2.67, CI: 1.13–6.51, $p=0.02$).
WITHINGTON et al., 2003 ⁽²⁸⁾ .	India	1996	Cut	2,364 new cases of leprosy	Physical impairment and stigma	Factors associated with physical impairment Female sex ($\chi^2=46.5$, $p<0.00001$), adulthood ($\chi^2=54.1$, $p<0.00001$), dependents ($\chi^2=60.9$, $p<0.00001$), no education ($\chi^2=14.9$, $p=0.0006$), income ($\chi^2=10.4$, $p=0.006$), handwork ($\chi^2=69$, $p<0.00001$), member of credit groups ($\chi^2=1.2$, $p=0.26$), permanent or rented house ($\chi^2=4.2$, $p=0.23$), use of medication ($\chi^2=32.3$, $p<0.00001$), type of water supply ($\chi^2=1.7$, $p=0.63$), use of medication by the female sex ($\chi^2=5.8$, $p=0.016$), impairment and adulthood ($p<0.01$). Factors associated with Stigma: Male sex ($\chi^2=8$, $p=0.005$), adulthood ($\chi^2=1.4$, $p=0.23$), having dependents ($\chi^2=7.5$, $p=0.024$), no education ($\chi^2=3.7$, $p=0.16$), family income ($\chi^2=1.3$, $p=0.52$), handwork ($\chi^2=5$, $p=0.08$), member of credit groups ($\chi^2=3.2$, $p=0.07$), non-permanent house ($\chi^2=16.5$, $p=0.001$), use of medication ($\chi^2=2.2$, $p=0.32$), water supply ($\chi^2=10.5$, $p=0.015$). Factors associated with selection for socioeconomic assistance: Male sex ($\chi^2=12.3$, $p=0.0004$), adulthood ($\chi^2=19.4$, $p<0.00001$), dependents ($\chi^2=43.2$, $p<0.00001$), no education ($\chi^2=6.65$, $p=0.04$), family income ($\chi^2=1.49$, $p=0.47$), handwork ($\chi^2=38.8$, $p<0.00001$), member of credit groups ($\chi^2=6.1$, $p=0.014$), non-permanent house ($\chi^2=19.9$, $p=0.0002$), use of medication ($\chi^2=95.8$, $p<0.00001$), water supply ($\chi^2=7.9$, $p=0.047$).

Chart 2 - Environmental-level studies on the association between socioeconomic factors and leprosy

Reference	Country	Year	Type of study	Damage aggregation	Dependent variable	Associated indicators
AMARAL, 2008 ⁽²⁹⁾ .	Brazil	1998 to 2006	Ecological, retrospective	Census Tracts	Average of detection rate	The use of the Kruskal-Wallis test showed that the average of leprosy detection coefficients in the Low Risk category is higher than in the other categories, and that the average of Medium Risk category is higher than that of High-Risk category and Very High ($p < 0.05$). There were no statistically significant differences between the averages of the last two categories.
KERR-PONTES et al., 2004 ⁽³⁰⁾ .	Brazil	1991 to 1996	Ecological	165 Cities	Incidence	Inequality level – Theil index ($\beta = 1.67$, CI= 0.389–2.944, $p=0.011$), average years of study of the population ≥ 25 years ($\beta = 1.35$, CI= 0.620–2.081, $p=0.007$), population growth from 1991 to 1996 ($\beta = 0.02$, CI= 0.006, 0.038; $p=0.028$).
QUEIROZ et al., 2010 ⁽³¹⁾ .	Brazil	1995 to 2006	Ecological	Census Tract	Cases of leprosy	Factor 1 (basic sanitation – existence of piped water, presence of toilets in the house and collection of garbage) $\beta = 0.0978$, $p=0.0331$ Factor 2 (level of literacy and income – average family income, years of education and number of bathrooms in the house) did not associate. Factor 3 (poverty level – lack of access to bank loans, and the number of people living in a house) $\beta = 0.01027$, $p=0.0240$
LANA et al., 2009 ⁽³²⁾ .	Brazil	2003 to 2006	Cross-sectional	City	Detection rate	Low HDI ($p=0.002$)
NERY et al., 2014 ⁽²⁾ .	Brazil	2004 to 2011	Ecological	Cities	Detection rate of leprosy	The reduction in the detection rate in cities with consolidated coverage of the Child Benefit Program (<i>Programa Bolsa Família - CBP</i>) was 27% in the period (RR= 0.73, CI95%= 0.69–0.77) in the gross model, and 21% in the adjusted model for selected covariates (RR= 0.79, CI95%= 0.74–0.83). The analysis shows a significant increase in the new case detection rate (NCDR) of leprosy as the Child Benefit program coverage increases. In the adjusted model, compared to the low third of the Family Health Program (FHP) coverage, there was an increase of 5% in the mean third of FHP coverage (72.03–95.08%) (RR= 1.05, CI95%= 1.02–1.09) and for the upper third and 12% increase during the period (RR= 1.12, CI95%= 1.08–1.17). Values adjusted by CBP and FHP: Illiteracy rate > = 20.42% *RR: 1.12, CI95%: 1.07–1.18 Gini coefficient > = 0.54 *RR: 1.07, CI95%: 1.04–1.11 Unemployment rate > = 7.47% *RR: 1.20, CI95%: 1.16–1.23 Average number of people per house > = 3.6 *RR: 1.04, CI95%: 1.01–1.08 % of the population under 15 > = 31.1%*, RR: 1.12, CI95%: 1.08–1.15 Percentage of poor people in the city > = 27.42%, RR: 1.13, CI95%: 1.08–1.18
CURY et al., 2012 ⁽³³⁾ .	Brazil	1998 to 2007	Ecological	Census tracts of São José do Rio Preto City	Spatial distribution of leprosy incidence per 100,000 inhab.	Index composed of socioeconomic conditions: average years of study of the father and mother, average income of the father and mother, percentage of illiterate people, percentage of illiterate women and percentage of houses with 5 or more residents ($\chi^2 = 180.7$; $p < 0.0001$)
IMBIRIBA et al., 2009 ⁽³⁴⁾ .	Brazil	1998 to 2004	Ecological	Census tracts of Manaus City	Detection rate of leprosy	Social deprivation index (ICS) composed of variables: number of people per house, houses without a toilet, without a sewage system, without water supply, illiterate head of household, no education or less than 1 year of study, monthly income of up to 1 minimum wage, head of household with no monthly income, years of education of the head of household and average monthly income. Average life expectancy (OR= 1.665, CI= 1.136–2.441, $p=0.009$), average to low life expectancy (OR= 3.048, CI= 2.152–4.317, $p=0.000$), low life expectancy (OR= 4.427, CI= 3.140–6.242, $p=0.000$).

To be continued

Chart 2 (concluded)

Reference	Country	Year	Type of study	Damage aggregation	Dependent variable	Associated indicators
FREITAS; DUARTE; GARCIA, 2014 ⁽³⁵⁾ .	Brazil	2009 to 2011	Ecological	City	Average smoothed incidence rate	Illiteracy rate: >8 to <13% (IRR: 1.51, CI95%: 1.37, 1.66); >=13% to <24 (IRR: 2.41, CI95%: 2.12, 2.74); 24 (IRR: 2.15, CI95%: 1.83, 2.53) Urbanization rate >=47% to <65% (IRR: 1.27%, CI95%: (1.17, 1.37); >=65% (IRR: 1.53, CI95%: 1.40, 1.67) Gini coefficient: ≥0.50 to <0.55 (IRR: 1.10, CI95%: 1.02, 1.18); ≥0.55 (IRR: 1.26, CI95%: 1.16, 1.37) Average number of people per room ≥0.51 to <0.57 (IRR: 1.14, CI95%: 1.05, 1.24), ≥0.57 to <0.65 (IRR: 1.25, CI95%: 1.14, 1.37) ≥0.65 IRR: 1.41, CI95%: 1.26, 1.58) Family Health Coverage ≥50 to <80% (IRR: 1.19, CI95%: 1.07, 1.32); ≥80% (IRR: 1.29, CI95%: 1.17, 1.41)
SILVA et al., 2010 ⁽³⁶⁾ .	Brazil	2006	Ecological	105 microregions of the Brazilian Amazon forest	Detection rate of leprosy	Proportion of people in houses with rudimentary cesspits (ANOVA Average= 3.979, p=0.000), HDI year 2000 (ANOVA Average= 0.233, p=0.000), proportion of people living in houses with well-water supply (ANOVA Average= 0.056, p=0.880)
CABRAL-MIRANDA; CHIARAVALLOTTI NETO; BARROZO, 2014 ⁽³⁷⁾ .	Brazil	2005 to 2011	Ecological study	Cities	Detection rate of leprosy in children under 15	>average number of inhabitants per city ($\beta= 0.43$, $p=0.04$); Gini coefficient ($\beta= 3.84$, $p<0.001$); % of urban population ($\beta= 0.02$, $p<0.001$); % of population born in Bahia State ($\beta= -0.04$, $p<0.001$).

It is important to highlight that, although there was a study with measures of association between leprosy reactions and socioeconomic factors⁽²²⁾, a significant statistical association was not demonstrated and was not considered among the categories.

Categories for studies at the individual level

Socioeconomic factors related to the incidence of leprosy

In relation to incident cases of leprosy, all studies presented a case-control study (Brazil, Egypt and Bangladesh) and showed a positive association for low educational level⁽¹³⁾, experience of food shortage^(13,17), whereas having higher expenses with food, being a farmer and owner of the business, itself was a protective effect⁽²¹⁾. Other studies did not show the association of this disease with socioeconomic factors^(10,20).

Socioeconomic factors related to the incidence of physical impairment

As for the factors associated with impairment, studies indicated an association with low or no schooling^(7,10-11,19,28) and low family income^(7,28). Only one study did not show any association with socioeconomic variables⁽¹²⁾.

Migration was also found as an important factor for the maintenance of the disease chain, demonstrating among migrants an increased risk of illness due to the social or household contact of a patient, alcohol user, not having access to public services of waste collection⁽²⁷⁾ and being illiterate^(16,27). For migration after diagnosis, we observed an association with the male, retired or pensioner, who migrated five years before diagnosis, from zero to five years living in the current residence. For the migration before diagnosis the age range from 30 to 44 years was associated, as well as not having access to electricity, not living in a brick-made

house, being migrant after diagnosis, and living in the current residence from zero to five years or six to ten years⁽¹⁴⁾.

Socioeconomic factors related to the incidence of leprosy among inside and outside the person's house

Regarding the incidence and prevalence of leprosy, among inside and outside the person's house contacts, of the cases diagnosed in a referral service⁽¹⁵⁾, the prevalence was associated with black/brown skin color; years of study less than four, living in the same house, having more than five years of living with the index case, and presenting bacterial index >3. The incidence was also associated with black/brown color, bacterial index >0; and the BCG vaccine showed a protective effect on both the incidence and the prevalence of leprosy among the contacts. For the contacts, there was an association with seropositivity for the PGL1 antigen among those with a family income below a minimum wage and the number of residents ranging from four to seven people⁽⁹⁾.

Socioeconomic factors related to adherence to treatment

Regarding adherence to the polychemotherapy treatment, there was an association between discontinuation of treatment for males and low educational level⁽²⁵⁻²⁶⁾, in addition to the higher risk of abandonment among those with low per capita income⁽²⁵⁾ and income less than 465 Brazilian reais⁽¹⁸⁾.

Socioeconomic factors related to recurrence

Regarding recurrence, a control case study found a greater chance among those living in rented houses, with more than five people, houses made of wood or wattle and daub, with alcohol-related disorders, presenting an irregularity in the treatment, no

information about the disease, and using collective transportation for access to the health unit⁽⁸⁾.

Socioeconomic factors related to the quality of life of patients with leprosy

As for quality of life, better results were shown among married patients. Retired people, with lower family income, and having reported disease interference in professional activities had a worse score⁽²⁴⁾. When there is physical impairment, the social and mental harm to those living in rural areas is higher⁽²³⁾.

Categories for studies at the ecological level

Socioeconomic factors related to the detection rate in aggregates

A relation of higher incidence of cases with worse Human Development Index (HDI)^(32,36) was shown. The studies that sought to analyze the incidence of leprosy and socioeconomic factors, having as a level of aggregation the municipalities, observed an association with the following variables: The Theil index, average of study of population ≥ 25 years, percentage of children who are between seven and fourteen years old and do not go to school⁽³⁰⁾; the Gini coefficient, education, illiteracy rate^(2,35); rate of urbanization, average number of inhabitants per room⁽³⁵⁾; number of residents per house, unemployment rate and percentage of poor people⁽²⁾.

The coverage of the Child Benefit program is inversely associated with detection, and its increase is attributed to a decrease in new cases of leprosy⁽²⁾.

Investigations on the relationship between socioeconomic factors and the detection of leprosy, using the census tracts as a spatial aggregation of data, pointed to a direct association with composite indicators^(29,33-34). Another study made a correlation analysis and factorial load of variables. Three factors were extracted for analysis, and two of them were associated: basic sanitation and poverty rate⁽³¹⁾.

A study conducted by Silva⁽³⁶⁾ in micro regions of the Amazon forest showed an association between the rate of detection of the disease and a higher proportion of houses with a rudimentary cesspit and well-water supply.

Socioeconomic factors related to the detection rate among people under 15 in aggregates

For the dependent variable "rate of detection among those under 15," an association with the following socioeconomic factors was demonstrated: average number of inhabitants per house, the Gini coefficient, and the highest percentage of urban population⁽³⁷⁾.

DISCUSSION

At the individual level, socioeconomic conditions were related to a higher incidence of leprosy, worsening of quality of life, poor adherence to treatment and evolution to physical impairment. In addition, they contributed to the prevalence of the disease among inside and outside the person's house contacts. The socioeconomic factors that were related to a greater individual risk

were: schooling, unemployment, income less than a minimum wage, food shortage, non-permanent residence, houses made of wood or wattle and daub, number of rooms and people at home, collection of solid waste and existence electricity.

In the case of recurrence there is evidence that it is more likely to occur due to individual conditions, adult/elderly life stage, male gender, and multibacterial operational classification⁽³⁸⁾.

Illiteracy and few years of study have been identified as risk factors for illness and evolution for physical impairment, since they make it difficult to recognize the clinical manifestations of the disease, access to the health system and the understanding of health education guidelines^(11,39). It is common for illiteracy and low schooling to occur more frequently among those with low socioeconomic conditions^(13,40).

There was a higher rate of unemployment, lower wages and the receipt of government financial aid among individuals with leprosy, especially those with physical impairment, contributing to a deterioration in the quality of life. Unemployment and low income are associated with monetary loss, employability due to limitations in the performance of professional activities by impaired individuals^(7,39), prejudice of employers, decreased social acceptance due to visible deformities, and social isolation of the patient after diagnosis⁽²⁴⁾.

The experience of food shortages has increased the risk of illness and the occurrence of physical impairment. Low-income families may have fewer resources to obtain food of adequate nutritional value, resulting in food shortages and even hunger. Consequently, nutritional deficiencies increase susceptibility to infectious diseases⁽¹³⁾.

It is known that poor nutrition impairs cell-mediated immunity, which increases susceptibility to disease in individuals with subclinical infections⁽¹⁷⁾. Respiratory infections, diarrhea and malaria have been associated with malnutrition reported in the literature⁽⁴¹⁾.

Housing conditions also influenced the risk of infection, illness and recurrence of the disease. Poor housing conditions and a greater number of people in houses intensify exposure to the bacillus among home contacts of patients with leprosy⁽²⁷⁾ and may even contribute to exogenous and recurrent reinfection⁽⁸⁾.

Lower home density contributed to the reduction of *M. leprae* infection among inside house contacts from anti-PGL1 seropositivity analysis⁽⁹⁾. The relation of insufficient or lack of access to basic sanitation, water supply, garbage collection and electric power supply with leprosy remains contradictory, with studies reporting a higher risk^(14,27-28) and others with no significant association⁽¹⁰⁾.

However, clusters of leprosy among neighboring houses are observed in areas with high population density, which bring together families with low socioeconomic status and do not have access to public services⁽⁴²⁾.

The distance between houses and health facilities is indicated as a risk factor for the late diagnosis and the evolution for severe physical impairment⁽⁴³⁾. Recurrence of this disease was more frequent among patients who used public transportation to arrive at the health facility, so factors associated with transportation difficulties reinforce the need for decentralization of leprosy control actions. Decentralized care facilitates access to health services and contributes to the timely diagnosis, adherence to treatment and greater equity in the assistance to cases of leprosy^(8,44).

At the ecological level, it was possible to verify that indicators related to low schooling, urbanization, lack of basic sanitation, high number of people per house and low Human Development

Index (HDI), measured by longevity, income and education were associated with the occurrence of leprosy.

Before the strong relation between leprosy and unfavorable socioeconomic factors^(32-33,35), it is important to emphasize that the poverty condition does not lead to the transmissibility of the disease itself, but rather to the poverty condition with population densities in non-ventilated and places with lack of natural light, lack of adequate food to meet nutritional needs⁽¹⁷⁾, difficulty to access health services, among others.

Thus, once the material conditions necessary for human subsistence, related to food, housing, education, basic sanitation, environmental conditions, access to health services, among others^(33,35,37) are not provided, they condition the occurrence of leprosy, when someone under these conditions lives with a sick person without proper treatment. In general, people affected by leprosy have low levels of schooling, which may lead to a lack of understanding about the disease, duration of treatment, perception of illness, and other health-related attitudes. Failure to recognize signs and symptoms of the disease in its initial stage leads to physical impairment and deformities, in addition to fueling the chain of transmission of this disease.

In the same train of thought, income is placed as a factor that reflects consumer power. When resources are insufficient for the acquisition of goods and services essential to human survival the chances of illness of the population multiply by the situation of vulnerability to which it is exposed. A study carried out in the state of Belo Horizonte shows higher rates of detection of leprosy in places of greater vulnerability⁽⁴⁵⁾.

In studies of different levels of spatial aggregation, housing conditions are strongly related to the transmissibility of leprosy, both in the general population and in children; this is because the number of people living in a house with limited space and without healthy conditions, promotes the vulnerability of the environment and favors illness⁽⁴⁶⁾. Children who share these spaces with people with no established diagnosis and appropriate treatment are at increased risk of falling ill.

Collective actions, such as the implementation of Family Health Strategy (*Estratégia de Saúde da Família*) services, alongside government poverty reduction programs such as the Child Benefit program, have shown positive impacts on epidemiological indicators of leprosy in Brazil^(2,47).

Therefore, actions that promote greater improvement in education and reduction of socioeconomic inequalities may increase the control of leprosy⁽¹⁾.

Study limitations

Some limitations of this review should be considered: the restriction of the period of data coverage and the inclusion of articles available only in English, Portuguese and Spanish. Research restricted to some databases may have obscured available studies on less usual bases, despite the concern to explore diverse bases the choice may have directed the results. In addition, it is important to note that many surveys have used secondary data sources, which depend directly on the organization of local services and filling quality.

Contributions to the Nursing, Health or Public Policy Sectors

As a contribution, the review points out as strategies the coping of inequalities to the provision of health services capable of promoting equity of access and health care quality. The construction of innovative Nursing practices considering the context must be based on evidences. The adoption of the principle of equity is a decisive step in the elaboration of public policies that aim to reduce social and health inequalities.

CONCLUSION

When analyzing the association studies between leprosy and socioeconomic factors in different localities, differences were found in the results. This fact may be related to the characteristics of the population and/or level of aggregation of the studies.

It is concluded that leprosy suffers a great influence of the social context in which the patient is inserted, because the chances of exposing people to illness are the result of a set of not only individual aspects, but also of contexts or collective conditions. Thus, it is necessary to transcend the set of individual actions for a collective approach to health problems, considering the implementation of intersectoral actions to reduce social inequalities and improve living conditions. It is imperative to foster investments in social policies, in addition to train health professionals, given the importance of services of health care quality as minimizers of social inequities.

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