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REVIEWS

Measles vaccination coverage in children in Latin America: a scoping review

Cobertura vacunacional contra el sarampión en niños de América Latina: una revision de alcance

Francisco Mardones dos Santos Bernardo[1*]
Jamile Domingos do Nascimento[1]
Lígia Maria Ferreira da Silva[1]
Lucía Castillo Lobos[2]
Lívia Moreira Barros[1]
Emilia Soares Chaves Rouberte[1]

[1] Universidade da Integração Internacional da Lusofonia Afro-Brasileira, Redenção, Brasil.
[2] Universidad de Santiago de Chile, Santiago, Chile.

(*) Autor de correspondencia. Email: mardones.enf@gmail.com

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ABSTRACT:

Objective: To identify advances and setbacks in measles vaccination coverage in children in Latin America.
Material and Method: This is a scoping review carried out in the PubMed, Web of Science, Scopus, SciELO, BVS and EMBASE databases in February 2025. Full articles, without a time frame, were included in Portuguese, English and Spanish.
Results: 11 studies were selected to compose the final sample. The A10 research indicates that the rate found in the vaccination programs of Latin American countries in the period from 2000 to 2015 presented coverage values of 91.1% for measles. Another A11 mentions the coverage rate in 9 countries of the Americas (Bolivia, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Trinidad and Tobago, Venezuela) the coverage of the first dose against measles ranged between 87% and 97% between 2006 and 2016. This research indicates that measles vaccination coverage in Latin American countries has varied in recent decades.
Conclusion: The data presented show that there are success stories in the implementation of measures to increase vaccination coverage, but there is also a need to advance in several aspects, including the political, economic, and seek to strengthen public policies that prioritize the prevention of diseases through the supply of immunobiologicals to the population. and the intensification of immunization programmes either at the local or national level.

Key words: Measles; Nursing; Latin America; Vaccination; Vaccination Coverage.

RESUMEN:
Objetivo: Identificar avances y retrocesos en la cobertura de vacunación contra el sarampión en niños de América Latina.
Material y Método: Se trata de una revisión de alcance realizada en las bases de datos PubMed, Web of Science, Scopus, SciELO, BVS y EMBASE en febrero de 2025. Se incluyeron artículos completos, sin marco temporal, en portugués, inglés y español.
Resultados: Se seleccionaron 11 estudios para componer la muestra final. La investigación A10 señala que la tasa encontrada en los programas de vacunación de los países de América Latina en el período de 2000 a 2015 presentó valores de cobertura de 91,1% para sarampión. Otro A11 menciona la tasa de cobertura en 9 países de las Américas (Bolivia, Colombia, Ecuador, Guyana, Paraguay, Perú, Surinam, Trinidad y Tobago, Venezuela) la cobertura de la primera dosis contra el sarampión osciló entre 87% y 97% entre 2006 y 2016. Esta investigación indica que la cobertura de vacunación contra el sarampión en los países de América Latina ha variado en las últimas décadas.
Conclusión: Los datos presentados muestran que existen casos de éxito en la implementación de medidas para aumentar la cobertura de vacunación, pero también existe la necesidad de avanzar en varios aspectos, entre ellos el político, el económico, y buscar fortalecer las políticas públicas que prioricen la prevención de enfermedades a través del suministro de inmunobiológicos a la población, y la intensificación de los programas de inmunización ya sea a nivel local o a nivel nacional.

Palabras clave: Sarampión; Enfermería; América Latina; Vacunación; Cobertura de Vacunación.

INTRODUCTION

Measles is still among the leading causes of child death, due to its high transmissibility, causing epidemics that have caused around 2.6 million deaths per year worldwide, mainly affecting children aged five years or younger[1]. Measles is a disease caused by a virus, is highly contagious and is transmitted through aerosols caused by person-to-person contact. It is often considered a benign disease, however, mortality caused by the above remains high in developing countries (>5%). In this disease, some complications can be observed, the most common are: diarrhea, otitis, pneumonia or encephalitis[2].

The Pan American Health Organization (PAHO) is an emblematic organization in the Region of the Americas with actions aimed at protecting children, covering vaccine-preventable diseases. The region has historically high levels of vaccination coverage (VC) in countries, with an emphasis on polio elimination, interruption of endemic transmission of the measles virus, in addition to the most recent initiatives to end rubella and congenital rubella syndrome, which are considered important regional milestones of this progress [3].

In this context, it is worth highlighting the existence of National Immunization Programmes (NIPs), whose objectives are to avoid stagnation in vaccination coverage rates, as well as to increase it progressively and ensure homogeneity in coverage throughout the territory of each country. In addition, it seeks the sustainable incorporation of new vaccines and new combinations, and the extension of children's calendars to other stages of life[3].

To meet its basic objectives, in 1974 the World Health Assembly approved the Expanded Program on Immunization (EPI), whose purpose was to expand the use, improve technology and encourage the production of immunizers worldwide. In the context of the Americas, this program was reinforced by the initiative of the Pan American Health Organization, in conjunction with the governments of each country, which had already been discussing ways to expand vaccination coverage[4].

Despite efforts at the global and national levels to advance the goals of the NIP and the EPI, it is identified that access to vaccines and VC at the national and district levels remains very heterogeneous, which represents a constant challenge for the surveillance and control of vaccine-preventable diseases. The systematization of immunization data and their analysis, through the creation of computerized nominal vaccination records, aim to overcome the great challenge of having their implementation distributed in a uniform manner[3]. However, it is worth noting that inequalities still exist between and within countries[5].

Another aspect to take into account in relation to vaccination coverage is communication with society about the importance of the vaccination process at each stage of life, in which the so-called fake news and anti-vaccine groups have been influenced. Currently, due to the lack of awareness about the risks and severity of Vaccine-Preventable Diseases (VPDs), coupled with the existence of false information about the safety and efficacy of vaccines through social networks[6], the goals of each country's program are threatened. Given this, the scenario is complex and requires greater attention from the authorities, as well as from the various entities of society and the population in order to promote the strengthening of immunization programs.

Corroborating the above, they affirm[7] that even with scientific evidence that ratifies the effectiveness of vaccines to combat and eradicate several vaccine-preventable diseases, the accreditation and acceptance of vaccines is not common to all. With this, the number of vaccinated people has been reduced worryingly in recent years, due to several factors: among them we can mention the strengthening of the aforementioned anti-vaccine movement supported by the irruption of the so-called fake news.
It is important to note that in several countries there has been a resurgence of other vaccine-preventable diseases, in times of low vaccination coverage, and as an aggravating factor, in the course of the COVID-19 pandemic, other factors, such as increased social inequities and restrictions on access to health, intensified low vaccination coverage[1].

Between 1971 and 1979, before mass vaccination, epidemics caused by the measles virus were responsible for about 206 million deaths per year worldwide and approximately 101.8 thousand deaths in the Americas alone. A study conducted on the effectiveness of measles elimination in Latin America and the Caribbean indicated that, thanks to vaccination, countries in the region avoided 3.2 million cases of measles and 16 thousand deaths between 2000 and 2020[8]. In this context, health professionals play a crucial role in meeting the objectives and goals established for the NIP. In particular, nursing assumes a leading role, as it is responsible for the implementation of vaccination programs in several countries, including in this task the dissemination of knowledge and the generation of evidence on the effectiveness of vaccines and their impact on people's health. Therefore, it is essential to reinforce that the individual and collective benefits are greater than the alleged risks[6].
Against this backdrop, PAHO establishes that some measures/strategies are necessary to deal with measles outbreaks, including: vaccinating contacts of confirmed and susceptible cases; conducting and maintaining epidemiological surveillance, through the detection and investigation of cases; having rapid response teams to intervene in confirmed cases[9].

In this context, the following question arises: What advances and setbacks have occurred in measles vaccination coverage in children in Latin America between 1983-2019? Thus, the objective of the study is to identify advances and setbacks in measles vaccination coverage in children in Latin America.

MATERIAL AND METHODS

This is an exploratory review, whose scheme aims to map the existing knowledge and concepts on a given topic, field or concept in the literature, providing the opportunity to identify possible knowledge gaps[10,11]. The development of the review followed PRISMA with the recommendations of the Joanna Briggs Institute (JBI)[12].

In accordance with the JBI's recommendations, the research protocol was registered in the *Open Science Framework* at: https://osf.io/dfu84/. To carry out this study, the following steps were carefully followed: 1) identification of the research question; 2) identification of relevant studies related to measles; 3) selection of studies that answer the research question; 4) data mapping; 5) synthesis and presentation of data [10,13].

The research question was formulated based on the PCC strategy[14], whose P- refers to the population (Vaccination of Children), C- concept (Vaccination Coverage) and C to the outcome/results/context (Latin America). Thus, the following research question was developed: What studies exist in the scientific literature on the advances and setbacks of measles coverage of children in Latin America?
Searches were conducted in February 2025 in the following databases: PubMed, Web of Science, Scopus, SciELO, BVS, and EMBASE. Access to research sources was made through the Federated Academic Community (CAFe), using the journal portal of the Coordination for the Improvement of Higher Level Personnel (CAPES), linked to the Ministry of Education (MEC) of Brazil.

The selection of the studies was carried out using keywords and relevant terms in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH), in addition to keywords identified through the previous reading of studies on the topic, such as: "*Vaccination*", "*Public Health*", "*Vaccination coverage*", "*Measles-Mumps-Rubella Vaccine*", "*Measles*", "*Latin America*", "*Measles Vaccine*". To improve the quality of the search results, the data were cross-referenced using the Boolean connectors "AND" and "OR" between the terms used, as shown in Table 1.

Table 1. Search strategies in *Scoping Review*. Redenção, Ceará, Brazil, 2025.

Bases	**Search strategy**
PubMed	(((*Vaccination coverag*e) AND (*Measles*)) AND (*Latin Americ*a)) AND (*Measles Vaccine*)
Web of Science	*Vaccination coverage* (All Fields) AND *Measles* (All Fields) AND *Latin America* (All Fields) AND *Measles Vaccine* (All Fields)
Scopus	(TITLE-ABS-KEY (*public* AND *health*) AND TITLE-ABS-KEY (*vaccination* AND *coverage*) AND TITLE-ABS-KEY (*measles*) AND TITLE-ABS-KEY (*latin* AND *america*) AND TITLE-ABS-KEY (*measles* AND *vaccine*))
SciELO	(((*Latin Americ*a) AND (*Vaccination coverage*)) AND (*Latin America*))

Bases	Search strategy
BVS	((((*Vaccination coverag*e) AND (*Measles*)) AND (*Latin America*)) AND (*Measles Vaccine*))
EMBASE	('*vaccination coverage*'/exp OR '*vaccination coverage*' OR (('*vaccination*'/exp OR *vaccination*) AND ('*coverage*'/exp OR *coverage*))) AND *measles*:ti,ab,kw AND '*latin america*':ti,ab,kw

Source: Survey data, 2025.

After searching the databases, the results obtained were exported to the Rayyan® software, where the exclusion of duplicate studies was initiated, followed by the screening of the publications found, by reading the title and abstract of the articles, considering the eligibility criteria and the suitability of the study to answer the objective and the research question.

The following were included in the review: original scientific articles in their entirety, which answered the guiding question, in Portuguese, English or Spanish, without a time frame, with the aim of reaching a larger list of studies. Regarding the exclusion criteria, these were: editorials, letters to the editor, annals of events, monographs, theses, dissertations, reports, case studies, reports of experiences, duplicate productions and those that did not respond to the guiding question.

Articles selected by title and abstract were peer-reviewed, and in case of disagreement, a third investigator was involved and consulted to assist in the selection decision. After this stage, the studies that met the inclusion criteria were read in their entirety and those that made up the final sample were selected. The selected articles were analyzed and data extraction was performed. It should be noted that the reverse search was not carried out, as it was understood that the recovered articles already contained information necessary to provide the data.

For the data analysis stage, an illustrative table was created in *Microsoft Word*® to extract the relevant information. The data were extracted by the two researchers and the information was confirmed by the third reviewer. The table included the following information: authors, year, country of study origin, countries of vaccination coverage, title, database, study design, vaccination coverage data (Table 2). Both the analysis and the synthesis of the data extracted from the articles were carried out in a descriptive way, allowing the observation, quantification, description and classification of the information, with the aim of compiling the knowledge produced on the topic addressed in the review and minimizing the risk of bias.

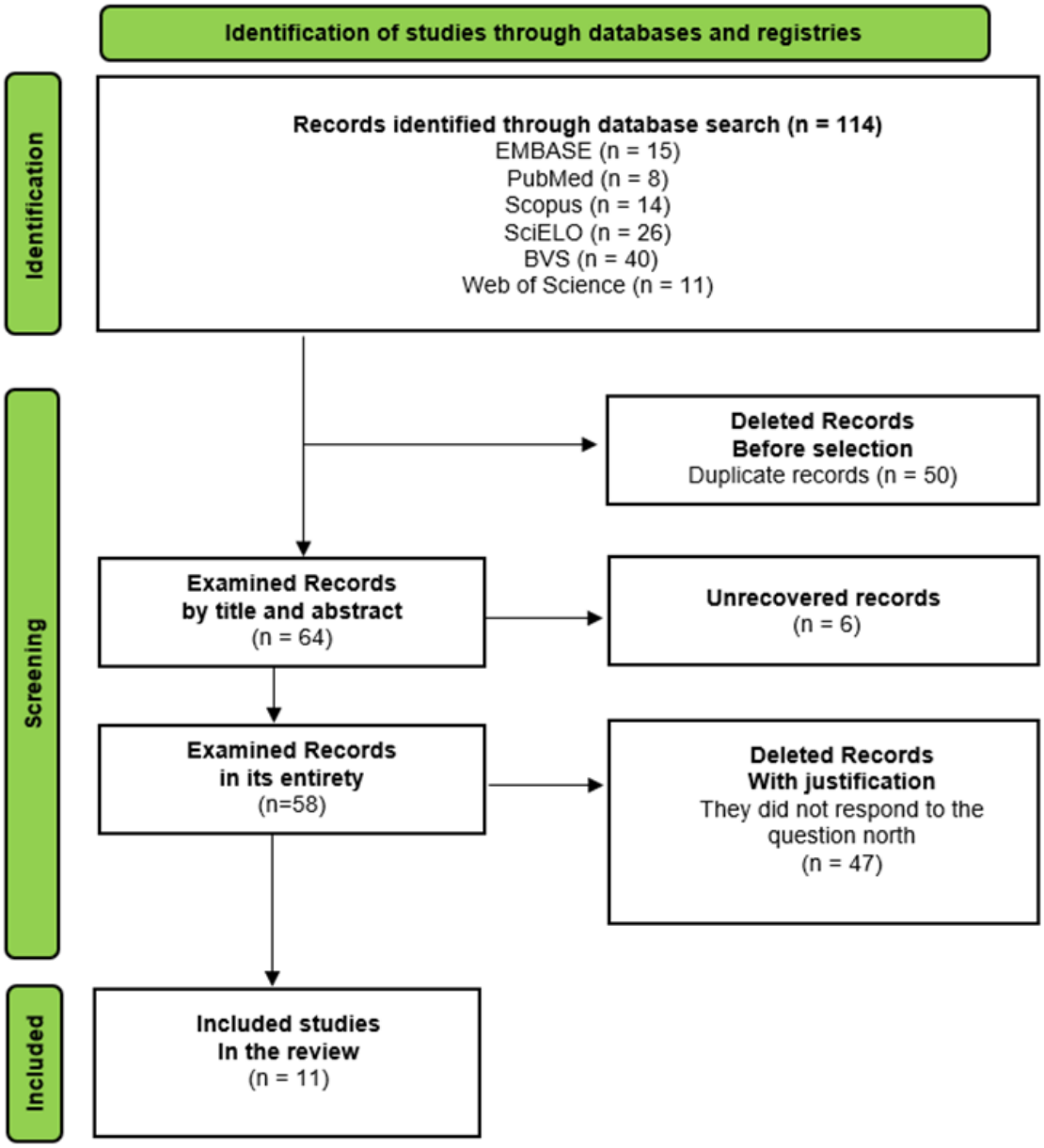
The study did not require the approval of the Research Ethics Committee because it used only secondary, anonymized, and publicly accessible data, which is in accordance with Article 1 of Resolution 510/2016 of the National Research Ethics Committee.

RESULTS

In the searches in the database, 144 articles were identified, according to the search strategies shown in (Figure 01). The distribution of studies with potential eligibility in the databases was as follows: Embase (n=15), PubMed (n=8), Scopus (n=14), SciELO (n=26), BVS (n=40), Web of Science (n=11). We excluded 50 duplicate studies and 47

studies that did not meet the inclusion criteria. After the complete reading of the 58 articles, 11 of them were selected to compose the final sample, as seen in the PRISMA flowchart in figure 1.

Figure 1: Flowchart of the process of identification, selection, eligibility and inclusion of studies. Redenção, Ceará, Brazil, 2025.



Source: Survey data, 2025.

In the articles, the following Latin American countries whose VC was addressed in the studies were identified: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

Figure 2 refers to the eleven countries of origin of the studies included in this review. The sample revealed that the years of publication ranged from 1983 to 2019, and the countries of origin of the studies were: United States of America (6 articles, 1984, 1995,

1996, 1998, 2011, 2019), El Salvador (1 article, 2014), Colombia (1 article, 2019), Peru (1 article, 1999), Chile (2 articles, 1983, 2000).

Figure 2. Distribution of articles by country and year of publication. Redenção, Ceará, Brazil, 2025.

Source: The information was prepared by the authors and the MapChart.net, 2025 was used to prepare the map.

Table 2. Main results on vaccination coverage in Latin America, Redenção, Ceará, Brazil, 2025.

Article	Author/Year/Country of Study	Countries included in the study	Title	Data base	Study design	Key findings on vaccination coverage
A01	Borgoño, JM./1983/ Chile[15]	Argentina, Bolívia, Brasil, Chile, Colômbia, Costa Rica, Cuba, Ecuador, El Salvador,	Current Impact Of Measles in Latin America.	Scopus	Epidemiological/ retrospective	Despite the availability of good coverage since 1963, only two countries, Chile and Cuba, have reached the goal of the 10-year health plan for the Americas. Regarding coverage rates for

Article	Author/Year/Country of Study	Countries included in the study	Title	Data base	Study design	Key findings on vaccination coverage
		Honduras, Panamá, Perú, Uruguay, Venezuela				children under one year of age, few countries had coverage rates greater than 80% during the years surveyed. However, when the EPI was implemented in 1980, there was a positive impact on the VC of most Latin American countries.
A02	PAHO/1984/ United States of America[16]	Argentina,Bolívia,Brasil, Chile, Colômbia,Costa Rica, Cuba, Dominican Republic, Equador, El Salvador, Guatemal, Haití, Honduras, México, Nicaragua, Panamá, Paraguay, Perú, Uruguay, Venezuela	Latin American countries set 1985 EPI targets at Lima meeting.	Scopus	Descriptive study	Argentina (85%), Bolivia (60%), Brazil (95%), Chile (95%), Colombia (80%), Costa Rica (95%), Cuba (95%), Dominican Republic (60%), Ecuador (60%), El Salvador (85%), Guatemala (40%), Haiti (55%), Honduras (85%), Mexico (80%), Nicaragua (80%), Panama (80%), Paraguay (80%), Peru (43%), Uruguay (95%), Venezuela (60%). The study reports that immunization coverage in Latin America has improved considerably in recent years. The 20 countries at the Lima meeting set vaccination coverage targets in 1985 for vaccines such as DTP, polio, measles and BCG.
A03	PAHO/1995/ United States of America[17]	Bolívia, Colômbia, Costa Rica, Equador, El Salvador, Guatemala, Haiti, Honduras, México, Nicarágua, Panamá, Peru, República	Progress of EPI Programs Reviewed in Central American and Andean Regions	BVS	Descriptive study	The meetings highlighted progress in measles elimination. Although immunization has reduced the incidence, there is still a risk of outbreaks due to the accumulation of susceptible people. To mitigate this, Central American countries plan vaccination campaigns targeting children under

Article	Author/Year/Country of Study	Countries included in the study	Title	Data base	Study design	Key findings on vaccination coverage
		Dominicana, Venezuela.				five years of age by March 1996.
A04	PAHO/1996/ United States of America[18]	Chile, Colômbia, Peru	Andean region: measles on the way out	BVS	Descriptive study	"Follow-up" campaigns were essential to prevent the accumulation of measles-susceptible cases. In 1995, Colombia vaccinated children aged 1 to 3 years, while Peru focused on children under 5 years of age. In 1996, Chile concluded its campaign, which covers children aged 1 to 14 years. Coverage rates were high: Chile 100%, Peru 97% and Colombia 90%.
A05	Sniadack D.H. et al./ 1999/ Peru[19]	Peru	Measles epidemiology and outbreak response immunization in a rural community in Peru	BVS	Community Research	Measles vaccination coverage prior to the July 1993 outbreak was only 37.5% among children ±23 months, 49.1% among children ±4 years, and 39.6% among children ±10 years (test w2 = 1.61, df = 2, p = 0.45).

Article	Author/Year/Country of Study	Countries included in the study	Title	Data base	Study design	Key findings on vaccination coverage
A06	PAHO/1998/ United States of America[20]	Venezuela	Measles Update	BVS	Descriptive study	In 1994, Venezuela carried out a recovery vaccination campaign aimed at the entire population between 9 months and 14 years of age, reaching 98% coverage. Between 1994 and 1996, vaccination coverage through routine immunization services averaged about 75 per cent.
A07	Valenzuela B., MT, OïRyan, G.M./2000/ Chile[21]	Argentina, Uruguay, Brasil, México, Chile, Costa Rica, Paraguay, Perú, Guatemala, Bolivia, Haití	Achievements and Challenges of the Expanded Program on Immunization in the Region of the Americas	BVS	Descriptive	Between 1990 and 1998, measles vaccination coverage in certain countries varied significantly. At the beginning of the decade, Haiti, Bolivia and Guatemala had the lowest coverage, with 31.1%, 52.6% and 66.4%, respectively. By the end of the period, these figures had risen to 40 per cent in Haiti, 85 per cent in Bolivia and 81 per cent in Guatemala. On average, vaccination coverage fluctuated between 77% and 85% in this period.
A08	Castillo-Solorzano C., et al./ 2011/ Estados Unidos da América[22]	Brazil, Guadeloupe, Argentina, Bolívia, Dominican Republic, Haití, Venezuela, Colombia	The Americas: Paving the Road Toward Global Measles Eradication	Web of Science	Epidemiological with a retrospective approach	Vaccination coverage has increased significantly over the years, reaching more than 90% since 1998. More than 440 million people have been vaccinated in 157 national campaigns. Endemic transmission of measles was interrupted in 2002, but imports of the virus continued to require the maintenance of surveillance and

Article	Author/Year/Country of Study	Countries included in the study	Title	Data base	Study design	Key findings on vaccination coverage
						vaccination strategies. The study shows that the regional average annual coverage for the first dose of measles vaccine was: **1980-1986** (42-59%), **1987-1994** (61-83%), **1995-2002** (86-92%), **2003-2009** (92-94%).
A09	Suárez-Castaneda, E. et al./ 2014/ El Salvador[23]	El Salvador	Routine childhood vaccination programme coverage, El Salvador, 2011—In search of timeliness	Web of Science	Epidemiological	At 13 months of age, 75.3% were vaccinated with MMR (90% at 153 months and 95% at 221 months). The overall VC with MMR was nearly 100%, which is a very positive result and reflects regional efforts to keep the Americas free of measles and rubella.
A10	Mendoza-Mendoza A, La Torre KC, Domínguez, LH./2019/ Colômbia[24]	Argentina, Bolívia, Brasil, Chile, Colômbia, Costa Rica, Cuba, Equador, El Salvador, Guatemala, Haití, Honduras, Jamaica, México, Nicaragua, Panamá, Paraguay, Perú, República Dominicana, Uruguay, Venezuela.	Child Immunization Programs in Latin America, 2000-2015	SciELO	Retrospective descriptive study	The results found from vaccination programs in Latin American countries in the period 2000-2015 show coverage values of 91.1% for measles. The average coverage during the study period is as follows: measles, 76% of the countries in the region.

Article	Author/Year/Country of Study	Countries included in the study	Title	Data base	Study design	Key findings on vaccination coverage
A11	Adrien, N., et al./2019/ Estados Unidos da América[25]	Bolivia, Colômbia, Ecuador, Guyana, Paraguay, Perú, Suriname, Trinidad and Tobago, Venezuela	Differences between coverage of yellow fever vaccine and the first dose of measles-containing vaccine: A desk review of global data sources	Embase	Document Review	Estimation of routine average coverage of the MCV1 vaccine for the period 2006-2016 in nine countries of the Region of the Americas. Bolívia (91%), Colômbia (92%), Ecuador (93%), Guyana (97%), Paraguay (88%), Peru (91%), Suriname (87%), Trinidad and Tobago (91%), Venezuela (87%)

The findings of the A01[15] study reinforce that, despite the offer of an efficient vaccine since 1963, only two countries, Chile and Cuba, had managed to reduce the mortality rate, which consisted of the occurrence of one death per 100,000 inhabitants, that is, thus reaching the goal of the 10-year health plan for the Americas. The study in question shows that few countries in South and Central America had >80% coverage rates for measles in children under one year of age, however, in 1980 there was an improvement in most countries (Argentina-1980 (60%), Bolivia-1980 (23%), Brazil-1980 (58%), Chile-1980 (88%), Colombia-1980 (11%), Costa Rica-1980 (68%), Cuba-1980 (48%), Ecuador-1980 (67%), El Salvador-1980 (44%), Honduras-1980 (23%), Panama-1980 (47%), Peru-1980 (19%), Uruguay-1980 (18%), Venezuela-1980 (40%)) where the EPI of the World Health Organization was launched.

The data present in study A2[16] mention that after the second Regional Meeting of PPE Managers held in Lima, Peru, objectives were set to achieve the vaccination goals for 1985 for each country, aiming at the reduction of the disease, analyze the strategies and activities programmed to achieve the goals of the 1984-1985 work plan, and provide participants with up-to-date information on certain immunization topics. In view of this, 20 countries stipulated coverage targets in 1985, including measles, which presented the following rates: Argentina (85%), Bolivia (60%), Brazil (95%), Chile (95%), Colombia (80%), Costa Rica (95%), Cuba (95%), Dominican Republic (60%), Ecuador (60%), El Salvador (85%), Guatemala (40%), Haiti (55%), Honduras (85%), Dominican Republic (85%), Mexico (80%), Nicaragua (80%), Panama (80%), Paraguay (80%), Peru (43%), Uruguay (95%), Venezuela (60%). These data show that about half of the countries had coverage rates of at least 50% for measles in 1983, in line with this, there was little that reached coverage of 70% or more. The study states that there has been progress, i.e. an increase in coverage between 1978 and 1983 that culminated in an improvement, and that all countries committed themselves to achieving their target by 1985.

The meeting held by the heads of the EPP and the Central American Region was held in Caracas, Venezuela and Guatemala in August 1995, with the participation of representatives of the Ministries of Health, UNICEF, USAID, PAHO/WHO, Project Hope, Rotary International and the Embassy of Japan. On the occasion, a general assessment was made that brought the panorama that although current immunization efforts have contributed to drastically reducing the incidence of the pathology, on the other hand the number of accumulated cases represents a risk of the emergence of new outbreaks in the short and medium term. To change this picture, countries plan monthly immunization campaigns for children under 5 years of age by March 1996.

Study A03[17] also highlights the XXXVIII meeting of the Directing Council of the Pan American Health Organization held in Washington, D.C., where the Measles Elimination Plan, prepared by PAHO's special vaccine program, was unanimously approved. The goal is to achieve and maintain 95% coverage of the measles vaccine in all municipalities and districts of the countries of the region through periodic complementary vaccination campaigns.

Study A04[18] mentions the measles elimination strategy as critical, and yet, in order to avoid the accumulation of susceptible cases, periodic "*follow-up*" campaigns were conducted. These were carried out in 1995 in Colombia, reaching children from 1 to 3 years old, and in Peru, aimed at all children under 5 years old. During 1996, Chile completed its follow-up campaign, reaching children between 1 and 14 years of age. The coverage rates of the campaigns were 90% (Chile 100%, Colombia 90%, Peru 97%). In addition, other strategies have been carried out, such as that of the SVI/PAHO to eliminate measles, all countries in the Andean Region have already carried out catch-up vaccination campaigns aimed at all children between 9 months and 15 years of age, achieving coverage of more than 90%.

Study A05[19] deals with the use of Immunization in Response to Outbreaks as a response measure to a measles outbreak resulting from food contamination that occurred in 1993 in Espíndola, located in a community in the Peruvian Andes. Vaccination coverage against the measles outbreak prior to July 1993 was only 37.5 per cent among children ± 923 months, 49.1 per cent among children ±4 years, and 39.6 per cent among children ±10 years. The data indicate that of the 140 children aged 4 to 10 years who were susceptible to measles before the outbreak, 73 (52.1%) remained asymptomatic after the IRS; 86 (56.6%) of the 152 susceptible adults also remained asymptomatic.

Study A06[20] indicates that in 1994 Venezuela carried out a vaccination campaign focused on the recovery of the population between 9 months and 14 years of age, in this period 98% coverage was obtained. The years from 1994 to 1996 averaged about 75 per cent vaccination coverage.

The data presented in study A07[21] reinforce the VC against measles in the countries of Haiti, Bolivia and Guatemala in the period between 1990 and 1998 obtained less coverage at the beginning of the decade, reaching the figure of 31.1%, 52.6% and 66.4%, respectively; and at the end of this period, Haiti reached only 40%, while Bolivia and Guatemala account for 85% and 81%, respectively. Compared to these values, coverage fluctuated between 77% and 85% in this period.

Study A08[22] indicates that there was a change in vaccination strategies, including the transition from the monovalent measles vaccine to the incorporation of the MMR vaccine (measles, mumps and rubella) that began to be administered in the routine program. Thus, during the years 1987-2010 there was an increase in the regional VC, sustained by ≥90% since 1998. As a result, efforts have been made since that period to eliminate measles, which has led to the implementation of 157 national vaccination campaigns, vaccinating a total of 440 million people. The author notes that the endemic interruption of measles virus transmission occurred in 2002. However, after the elimination, there were cases of imports of this and also associated outbreaks. As for the incidence of this vaccine, it has remained at 1 case per 1 million inhabitants since 2002.

Study A08[22] shows that the average annual regional coverage of the first dose of the measles vaccine promoted by the EPI in the years 1980-1986 (42-59%); in its initial phase, before the official elimination target, 1987-1994 (61-83%); in its formal phase, 1995-2002 (86-92%); and in the post-elimination maintenance phase, 2003-2009 (92-94%).

The data presented in the A9[23] study of El Salvador refer to vaccination at 13 months of age, which corresponds to 75.3% of those vaccinated with the MMR vaccine (90% at 153 months and 95% at 221 months). The study reinforces that the total number of VC with MMR was almost 100%, which is a very positive result and reflects regional efforts to keep the Americas free of measles and rubella.

Regarding study A10[24], it is noted that the rate found in the vaccination programs of Latin American countries in the period from 2000 to 2015 presented coverage values of 91.1% for measles. The average coverage during the study period is as follows: measles, 76% of the countries in the region. The study shows that in Latin America there are differences between the childhood vaccination programs of each country. Countries such as Argentina, Brazil, Cuba, Mexico and Uruguay are benchmarks in this type of program, with emphasis on the VC rate and also reflecting on the survival rate of children under five years of age.

Study A11[25] mentions the coverage rate in 9 countries of the Americas (Bolivia, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Trinidad and Tobago, Venezuela) and the coverage of the vaccine containing the first dose of measles (MCV1) ranged between 87% and 97% between 2006 and 2016. In countries that reported significant differences in vaccination coverage, some factors may play a role, including vaccine availability. However, the authors confirm that this factor was not sufficient to fully elucidate the differences observed.

DISCUSSION

The study[3] highlights that the EPI has brought advances to the region of the Americas in terms of overall protection against vaccine-preventable diseases in children, by providing the interruption of endemic transmission of the measles virus. In their study[26], they emphasize that the advances of VC come from actions, management, technical, political and social realities.

The Region of the Americas has great support and leadership from PAHO, which coordinates the EPI, which has made it possible to advance and overcome difficulties in

immunization actions. The EPI contributed several achievements, including the elimination of vaccine-preventable diseases and the incorporation of new vaccines into routine schedules[26].

On the other hand[27], it identifies low VC rates in the State of Minas Gerais, Brazil for the MMR vaccine (75.7%). Likewise, only 57.2% of the municipalities in the aforementioned State reached VC rates of 35.3%. The findings, according to the same authors, could be related to problems in the country's immunization information system, which was updated during 2014, as well as the lack of supply of the MMRV, which could have generated confusion in the registration of the second dose of the MMR.

In view of the low VC rates that occur in different realities of Latin America,[28] they point out the importance of understanding it from a multifactorial perspective, where the historical, sociocultural and environmental context significantly influence the behavior of the indicators, as well as the political and economic aspects of each country.

The study[29] shows that it is one of the main problems that have occurred in Brazil, with the existence of underreporting of information in the SI-PNI, and these episodes need to be better considered in each capital, seeking to identify factors and limitations. Therefore, these under-reports have a negative impact on obtaining evaluations, in addition to impacting the monitoring of vaccination coverage.

In a study[30], it states that MMR coverage (first dose) dropped significantly between 2015 and 2020, from 95% to 79% coverage in Brazil. The North and Northeast regions had the worst coverage rate, reaching 68% and 78%, respectively. The southern region of the country was the one that had the smallest drop in coverage, reaching 85%, however, it still remains below the goal.

Another important context to cite is the Venezuelan reality that, due to the political scenario in this country, the epidemiological surveillance systems were inactivated and, as a result, there was a weakening of the national immunization programs, thus contributing negatively to the resurgence and increase of different vaccine-preventable diseases, including measles, with significant differences in Venezuela's VC compared to the rest of the countries during the year 2018. This drop in the indicators of the VC of that country led PAHO and its allies to initiate a national immunization campaign with the mass vaccination of about 8.8 million children between 6 months and 15 years of age and consequent control of the epidemic outbreaks of measles in Venezuela. However, even with these actions, it remains a challenge to achieve an ideal coverage goal of 95%[31].

The data show that Chile has a highly immunized population, reaching coverage levels of 89% to 96% for the period 2016-2021 related to the first dose of MMR. As for the coverage of the second dose in the same period, it ranges between 55.3% and 93%. In 2021, there was a decrease in VC, possibly attributed to the arrival of COVID-19[32].
The significant reduction in measles cases in Latin America between 2000 and 2017 reached a decrease of up to 80%, according to ([33], which can be attributed to the intense control and eradication efforts carried out during this period by governments, such as mass vaccination campaigns and surveillance strategies. played a crucial role in this context. However, sporadic outbreaks, which occurred in Bolivia and Haiti in the early 2000s, highlight the persistent vulnerability and difficulties of complete eradication. The cases of Bolivia and Haiti, in particular, demonstrate how socioeconomic and logistical

factors can contribute to the resurgence of measles, challenging previously implemented eradication strategies.

In study A11[25], a different scenario is presented for coverage from the first dose to the first dose of the MMR vaccine, reaching levels of 87% to 97% in the period from 2006 to 2016. In contrast, the study[34] reinforces that Paraguay showed a variation in VC between 2016 and 2022, with a decrease. In this context, the country had a reduction in the first dose of the MMR vaccine, from 91% to 42% in the same period. Some factors may have contributed to this result, such as reduced demand for immunizers, the spread of information about false contraindications, the scarcity of vaccination strategies, or inappropriate tactics that negatively contributed to this scenario, among other factors.

The study[35] reinforces that the EPI created in 1977 represented numerous advances over the years, including increasing the number of six vaccines that year to 16% in 2023, thus expanding the arsenal of immunobiologics offered for the entire life cycle. With the advent of measles vaccination in 1962, this feat contributed to reducing the occurrence of outbreaks, as well as increasing the time interval for new outbreaks. In this scenario, Venezuela, following PAHO guidelines, joined the initiatives to eliminate measles in 1984.

In study A11[25], they bring the estimated average routine coverage for MCV1 for the period from 2006 to 2016, which mentions that Venezuela had a VC rate of 87%. The study[36] shows that Venezuela has undergone some modifications throughout history in the context of measles. A major episode occurred in July 2017, when the measles outbreak of unknown origin occurred. The transmission of the virus lasted more than 12 months, which represents the reestablishment of endemic transmission of the disease in the country. This sad event contributes to the spread of the virus to other countries in the Americas. Brazil is an example of this, as it re-established endemic transmission in 2018, due to transmission between countries. In addition, other epidemiological surveillance and case control actions were necessary. After facing this period, in 2023 it was again verified that Venezuela is free of measles, being considered an achievement in the area of immunization and public health.

In this context, the measles outbreak in Venezuela represented a major health challenge in the national scenario, in view of the situation that the country was already experiencing with unilateral economic restrictions that made it difficult to purchase and administer immunobiologicals, thus contributing to increasing susceptibility to VPD, in addition to increasing epidemiological risks for other countries in the region[35].

Costa Rica, with a coverage rate of 95% of the population, the decrease in seropositivity for measles and rubella is more effective in people under 50 years of age, which can be explained by the combination of an epidemiological transition with less frequent and intense epidemics, and by the vaccination strategies implemented over the years. The introduction of the double viral measles and rubella vaccine in 1973, and the creation of IAP, played a key role in the expansion of VC, followed by the MMR vaccine in 1986, which were crucial in reducing the incidence of these diseases[37].

These combined actions helped to significantly reduce the incidence of measles and rubella, contributing to the epidemiological control of these diseases in the population. In this context, the protection acquired by this population is mostly vaccine, although IgG antibody concentrations decrease over time, immunological memory persists and,

in the event of exposure to the virus, most vaccinated people generate a rapid and effective response. This helps to contain the spread of the virus, reduce viremia and reduce viral shedding[37].

In study A03[17], they showed that El Salvador's immunization rate in 1994 was 83%. The data show that in the years 2019 to 2023 the country had a rate of more than 95% of VC. In addition, it recorded no confirmed cases of measles during the same period, even in a COVID-19 pandemic scenario. As a result, the country ranked first in notifications of suspected measles cases in Central America and fourth in the Region of the Americas, behind only Paraguay, Cuba, and Barbados. Throughout this period, the country maintained a notification rate of suspected cases expressly above the standard established by PAHO, thus demonstrating the effectiveness of epidemiological surveillance. In addition, in 2022, the country also had an 87% rate of suspicious notifications in the municipalities that make up the region, thus demonstrating the effectiveness of epidemiological monitoring[38].

In this way, El Salvador implements actions such as micro-planning, which makes it possible to search for risk conditions, and an active institutional search, as well as at the community level, which contribute to the country's good performance in terms of immunization. This vigilant and attentive commitment places the country among the few in Latin America that remained above the PAHO standard throughout the five-year period, strengthening its position as an example of surveillance and monitoring of vaccine-preventable diseases[38].

Studies A02[16], A03[17], and A10[24] refer to VC data in Mexico, A02[16] shows that VC in 1983 was 85%, A3[17] brings data from 1994 with VC of 90% and 1995 with 86%, and A10[24] reports an average coverage of 76% between 2000 and 2015. The data presented by[9] indicate that MMR vaccine coverage in Mexico was at least 95% referring to the first two doses of the vaccine in the periods of 2019 and 2020. For the progress of the VC in this period, it was considered important to strengthen the coordination, training, supervision and rapid response of the teams, as well as the adoption of remote communication that made it possible to strengthen surveillance, improve the epidemiological surveillance system, have a financial contribution, physical tools, human and digital resources for the operation, and conduct ongoing training and supervision

As a limitation, we have the restriction of the number of databases, because the institutional login allows a search limited to databases. Thus, it is not possible to carry out a broader search in other databases, thus reducing the possibility of finding more scientific evidence and exploring the selected topic to the maximum. In this sense, the development of new research is encouraged, in addition to the choice of more rigorous criteria that allow the topic to be revealed.

CONCLUSIONS

This research indicates that the VC of measles in Latin American countries has varied in recent decades. The data presented show that there are success stories in the implementation of vaccination measures, but it is also necessary to advance in several aspects, including the political, economic, and seek to strengthen public policies that

prioritize the prevention of diseases through the supply of immunobiologicals to the population, and the intensification of immunization programs. whether local, as well as national.

Throughout these years, PAHO has played an important role in the management of the EPI, which has allowed important milestones in the Latin American region, thus directly contributing to the success and advancement of vaccination coverage rates in the countries that make up this region. The strengthening of alliances, investment in the purchase of immunobiologicals, improvement in the structure of care services, and the contraction of human resources is essential to promote the success of vaccination programs.

Measles still represents a latent threat that needs to be monitored and combated, and for this, it is necessary to unify the efforts of both countries in the development and implementation of policies, as well as in the adoption of strategies aimed at eliminating outbreaks in the region.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest with any institution or person related to this study.

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