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VACCINAL COVERAGE OF POLIOMYELITIS IN BRAZIL BETWEEN 2012 AND 2022: Ecological study

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ABSTRACT

To evaluate polio vaccination coverage in Brazil between 2012 and 2022. This is an ecological, quantitative, and cross-sectional study with a search carried out in April 2023. Data collection occurred through access to the National Immunization Program Information System (IS - NIP), available at the Department of Informatics of the Unified Health System (DATASUS-TABNET) of the Ministry of Health for each region according to the year and study variables between 2012 and 2022. The variables used in the study were: Vaccination coverage, year, and region. In the period between 2012 and 2022, polio vaccination coverage in Brazil was 79.17%. The North region had the lowest number when compared to the other five Brazilian regions, with a quantitative average of 68.06%. In relation to the year with the highest number of vaccination coverage, it was 2012, in which the Central-West region presented a percentage of 109%, standing out in relation to the other regions. When analyzing when this decline began in the country, it is observed that the numbers fell from 2016 onwards, intensifying in 2020 and solidifying in 2022. In view of the findings presented, the relevance of an ascending VC in the country is affirmed, since it reduces the chances of combated pathologies such as poliomyelitis being reintroduced into the Brazilian territory. In addition, it is important to highlight the heterogeneity in relation to the index in each Brazilian region, signaling how determinants and conditioning factors influence the health-disease process of individuals.

Keywords:
Vaccination Coverage, Epidemiology, Immunization, Poliomyelitis.

RESUMO

Avaliar a cobertura vacinal da poliomielite no Brasil entre os anos 2012 e 2022. Trata-se de um estudo ecológico, quantitativo e transversal com busca realizada em abril de 2023. A coleta ocorreu por meio do acesso ao Sistema de Informação do Programa Nacional de Imunização (SI – PNI), disponível no Departamento de Informática do Sistema Único de Saúde (DATASUS-TABNET) do Ministério da Saúde para cada região segundo o ano e variáveis de estudos entre 2012 e 2022. As variáveis utilizadas no estudo foram: cobertura vacinal, ano e região. No período entre 2012 e 2022, a cobertura vacinal da poliomielite no Brasil foi de 79,17%. A região Norte, apresentou o menor número quando comparada às outras cinco regiões brasileiras, contando com uma média quantitativa de 68,06%. Em relação ao ano com o maior quantitativo na cobertura vacinal, foi o de 2012 no qual a região Centro-Oeste apresentou uma porcentagem de 109% destacando-se em relação as demais regiões. Ao analisar quando se iniciou esse declínio no país, observa-se que os números sofreram uma queda a partir de 2016 intensificando-se em 2020 e solidificando-se em 2022. Diante dos achados expostos, afirma-se a relevância de uma CV ascendente no país, uma vez que diminui as chances de patologias combatidas como a poliomielite serem reintroduzidas no território brasileiro. Ademais, é importante destacar a heterogeneidade em relação ao índice em cada região brasileira, sinalizando como os determinantes e condicionantes influenciam no processo saúde-doença dos indivíduos.

Palavras-Chave:
Cobertura Vacinal, Epidemiologia, Imunização, Poliomielite.

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Introduction

Poliomyelitis is caused by Poliovirus classified as an RNA virus, of the Picornaviridae family and Enterovirus genus. The etiological agent of the disease has tropism through the digestive tract, transmission occurs through contact between people, through fecal-oral or contaminated food and droplets from the oropharyngeal secretion (Silveira *et al.*, 2019). The incubation of the microorganism varies from two to 30 days, and transmissibility can occur before the first clinical manifestations. After entering the body and making contact, the virus penetrates through the oropharyngeal mucosa and begins to proliferate, spreading and affecting cervical lymph nodes and organs such as the heart (Brasil, 2018).

The virus that causes polio has a high infection rate, but low pathogenicity, affecting mainly children. Approximately 90% to 95% of Poliovirus infections are asymptomatic or have mild symptoms, and can be confused with a flu-like syndrome. This is due to the stage of viremia that the disease causes, a situation that makes diagnosis difficult, soon after the initial phase in about five to 10% of patients the condition can evolve to neurological impairments (Brasil, 2019).

Poliomyelitis has no treatment and in cases of Acute Flaccid Paralysis (AFP) in Brazilian territory, the individual must be hospitalized and the case must be notified to the Municipal Health Department of the locality where the situation emerged. In addition, control measures can be guided and exercised, such as: Precautions in relation to contact with feces, immunization through vaccines with the maintenance of vaccination coverage (VC) and follow-up through epidemiological surveillance (Brasil, 2018; Greene *et al.*, 2019).

Vaccination consists of administering antigens to a person, with the primary objective of stimulating the immune system, triggering immunity, protecting the individual against the disease or making clinical signs “weaker”. The administered antigens activate the T and B lymphocytes responsible for the cellular and humoral response (Bertti & Souza, 2021).

The Brazilian polio vaccination schedule until 2011 consisted of four doses of the Oral Poliomyelitis Vaccine (OPV), however in 2012 the Ministry of Health (MS) added the Inactive Poliomyelitis Vaccine (IPV) replacing the first two doses of OPV. Finally, in 2016, the National Immunization Program (NIP) adopted the first three doses at two, four and six months of age, requiring the booster with OPV twice at 15 months and four years of age (Barros *et al.*, 2018).

An important pillar of the NIP is the equal access of Brazilians to vaccination in order to reduce regional inequalities related to access to health services and comply with the doctrinal principle, universality, proposed by the Federal Constitution in 1988. However, variations in VC levels are present, facilitating the scenario of resurgence of eradicated diseases such as polio (Nóvoa *et al.*, 2020).

According to the Ministry of Health, one in four Brazilian children is not fully protected from infection by the polio virus. This is because in 2016 there was a drop in the country's VC, intensified mainly in 2020 with the Sars-Cov-2 pandemic, making Brazil a high-risk nation in relation to the reintroduction of the disease (Verani, 2020).

The present study is justified by epidemiological data that point to a progressive drop in the number of vaccinations against poliomyelitis, which leads to a possible resurgence of the disease in Brazil. Therefore, the relevance of the article for students, professionals and lay people is affirmed, since the decline in the number of morbidities in a country depends on the joint work of society, professionals and managers. In this sense, the objective of this study was to evaluate polio vaccination coverage in Brazil between 2012 and 2022.

Methodology

This is an ecological, descriptive, and cross-sectional study, characterized by determining the frequency of events and their distribution according to the characteristics of the affected person, geographic areas, spatial and temporal location, or the highest prevalence of the disease (Hamann & Tauil, 2021).

The search took place in April 2023, through access to the National Immunization Program Information System (IS - NIP), which consists of a public domain database of the Department of Informatics of the Unified Health System (DATASUS-TABNET) of the Ministry of Health, for each region according to the year and study variables between 2012 and 2022.

Microsoft Excel 2019 was used to form the graphs, tables and tabulation of the data. The sample was collected and recorded from quantitative data representing the VC of Poliomyelitis, followed by the analysis of the following variables: Vaccination coverage, year and region.

Because it was an epidemiological survey that used data in the public domain, not directly involving human beings, it was not necessary for the study to be evaluated by a Research Ethics Committee (REC) on Human Beings. However, the ethical precepts permeated by resolution 466/2012 and resolution 510/2016, both of the National Health Council (NHC) were complied with (Brasil, 2012; Brasil, 2016).

Results and Discussions

In the period between 2012 and 2022, polio vaccination coverage in Brazil was 79.17%. The North region had the lowest number when compared to the other five Brazilian regions, with a quantitative average of 68.06%, as shown in Table 1.

Table 1.

Poliomyelitis Vaccination Coverage by year, according to region of Brazil

Year	North Region	Northeast Region	Southeast Region	South Region	Midwest Region	Total
2012	96%	95.63%	97.4%	94.82%	99.44%	96.55%
2013	96.47%	100.44%	100.18%	101.47%	109%	100.71%
2014	90.05%	96.5%	97.15%	97.18%	104.05%	96.76%
2015	88.16%	100.44%	100.52%	95.57%	97.88%	98.29%
2016	72.28%	81.55%	86.31%	87.5%	96.15%	84.43%
2017	57.35%	66.55%	80.31%	83.18%	76.97%	73.83%
2018	58.6%	69.99%	82.95%	86.37%	80.32%	76.69%
2019	66.47%	68.46%	80.24%	89.07%	81.02%	76.48%
2020	56.55%	62.74%	77.05%	88.36%	79.74%	72.28%
2021	54.26%	56.41%	64.7%	74.07%	67.12%	62.69%
2022	64.75%	70.32%	71.26%	81.45%	77.52%	72.19%
Total	68.06%	74.41%	82.14%	87.09%	84.1%	79.17%

Source: National Immunization Program Information System (IS-NIP/MS), 2023.

The decrease in poliomyelitis VC in the North region, when compared to other regions, may be associated with the difficulty of individuals living in the locality in accessing health services. A substantial portion of this population lives in places not covered by Family Health Units (FHU), which makes it difficult to guarantee health promotion and prevention actions, occasionally causing the region to become vulnerable to the occurrence of future reemerging cases of the disease, in addition to the precarious environmental conditions in sanitation in the region (Oliveira *et al.*, 2020).

Past experiences with services is a strong point that explains the decline in this coverage, but other factors are equally highlighted such as: Psychosocial in which research suggests that social support can interfere with adherence, religion in which the most hesitant according to studies carried out by the Brazilian Society of Immunization is evangelical due to the conception that vaccines are a "mark of the beast". In addition to the lack of Community Health Agents (CHA), the way information about vaccines is passed on to the population, the dissemination of Fake News and the factors associated with the structure of health establishments such as the lack of immunobiologicals (Oliveira *et al.*, 2020; Lins *et al.*, 2021).

In relation to the year with the highest number of poliomyelitis vaccination coverage, table 1 also shows that the corresponding year was 2012. In which the Central-West region presented a percentage of 109%, standing out in relation to the other regions of the country.

In 2012, the government regulated Constitutional Amendment 29, that is, it guaranteed the faithful execution of the existing amendment. In this regulation, it was defined that the Union should invest in health the amount of the previous year added to the nominal variation of the Gross Domestic Product (GDP), this situation caused an improvement in several care

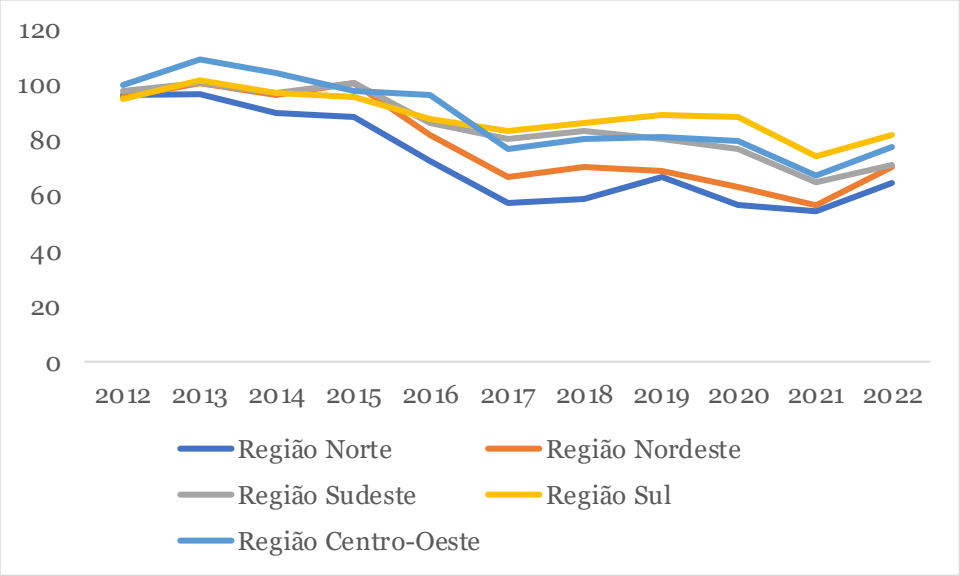
sectors, such as Primary Care, helping to increase the VC from greater investments in the PNI (Sousa & Shimizu, 2021).

According to studies, the central-south regions of Brazil, especially the Midwest, have a population with better socioeconomic and educational levels and with greater access to information, social determinants that can contribute to the adherence to vaccination by individuals in this region, as it provides a greater conception of the relevance of getting vaccinated (Franco *et al.*, 2020).

When analyzing when this decline began in the country, it is observed that the numbers fell from 2016 onwards, intensifying in 2020. Previously, there were oscillations between the quantity, however the decrease began in 2016 with a total of 84.43% as shown in the graph 1.

Graph 1.

Poliomyelitis Vaccination Coverage by year, according to region.



Source: National Immunization Program Information System (IS-NIP/MS), 2023.

In 2016, Brazil was going through a series of changes, because the country was in a period full of uncertainties about its future. With the economic crisis, the government approved a Constitutional Amendment Proposal No. 241/2016, later EC No. 95, which limited federal spending, the change affected several sectors of the country, including health. The limitation interfered with the reduction of several actions in health care, one of which was in the Brazilian NIP (Vieira & Benevides, 2016).

According to the data in Graph 1, it can be observed, as previously mentioned, that after the oscillation between decline and increase, in 2020 this drop in VC solidified until 2022, showing only decreases in all Brazilian regions.

Brazilian immunization was affected in 2020, when the World Health Organization (WHO) declared that the world was experiencing a Covid-19 pandemic. The declaration

generated changes in the world and in the country with isolation and social distancing, with the crisis that arose sequentially, once again Brazil started to have its health costs limited and a significant drop in its vaccination coverage (Carvalho *et al.*, 2021).

Social distancing drove the drop in face-to-face attendance at USFs for vaccination. According to a risk-benefit study conducted in African countries, vaccine-preventable deaths outweighed the risk of death from Covid-19 associated with attending the health service, which highlights the importance of increasing the number of VC (Sato, 2020).

The immunization of a country is a relevant pillar of occupational infection control programs, as it ensures the reduction of vaccine-preventable diseases and, consequently, the morbidity rate. Therefore, it is important for society, professionals and managers to mobilize efforts to expand vaccination coverage in order to prevent the recurrence of eradicated diseases and setbacks in the health model, rescuing the multicausal prevalent in the last century, in which pathologies arose only due to the epidemiological triad without considering the determinants addressed and others that help in this emergence (Araújo *et al.*, 2019).

Conclusions

In view of the findings presented, the relevance of an ascending VC in the country is affirmed, since it reduces the chances of combated pathologies such as poliomyelitis being reintroduced into the Brazilian territory. In addition, it is important to highlight the heterogeneity in relation to the index in each Brazilian region, signaling how determinants and conditioning factors influence the health-disease process of individuals.

Therefore, the need for public policies that provide access to the practice of health services is reinforced, as well as actions that demystify the vaccination process and encourage the act with the help of media and media artists. In addition to health education with the population and continuing education with professionals, based on principles such as welcoming and qualified listening, thus ensuring the permanence of the user in immunization services. Studies like this reveal the importance of knowing epidemiological data applied in the formation and improvement of public policies of the Unified Health System (*Sistema Único de Saúde* - SUS).

However, some factors such as underreported vaccination rates make the immunization process unfeasible. The limitations of the study were: The absence of variables such as age, gender, and the number of doses that were administered in the topic of vaccination coverage present in the DATASUS search. Thus, a gap is opened for new studies that foster and deepen the theme of poliomyelitis.

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