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Descriptive analysis of vacinal coverage performed by the national immunization program between 2015 and 2019

Análisis descriptivo de la cobertura vacinal realizada por el programa nacional de inmunizaciones entre 2015 y 2019

Análise descritiva da cobertura vacinal executada pelo programa nacional de imunizações entre 2015 e 2019

ABSTRACT

Objective: To carry out a descriptive analysis of vaccination coverage performed by the national immunization program between 2015 and 2019. **Method:** A descriptive study was conducted, based on epidemiological information on vaccination coverage in Brazil. Variables such as National Coverage, Coverage by Region, Average Coverage rates between Regions and Average Coverage between States were used. **Results:** In 2015, the vaccination coverage rate reached 95.7%, higher than the ideal value. Subsequent years showed a sharp decrease in this rate with 50.44% in 2016, 69.04% in 2017 and 71.99% in 2018. 2019 showed only 45.65%. The South Region had the highest average (72.20%), while the North Region (61.28%), with the lowest rate. **Conclusion:** The scenario is compromising with regard to the control of vaccine-preventable diseases, reflects the need to improve communication between professionals and the population, in order to unify and promote correct and safe information about the vaccine.

DESCRIPTORS: Immunization Programs, Vaccination Coverage; Health Policy.

RESUMEN

Objetivo: Realizar un análisis descriptivo de las coberturas de vacunación realizado por el programa nacional de inmunización entre 2015 y 2019. **Método:** Se realizó un estudio descriptivo, con base en información epidemiológica sobre coberturas de vacunación en Brasil. Se utilizaron variables como Cobertura Nacional, Cobertura por Región, Tasas de Cobertura Media entre Regiones y Cobertura Media entre Estados. **Resultados:** En 2015, la tasa de cobertura de vacunación alcanzó el 95,7%, superior al valor ideal. Los años posteriores mostraron una fuerte disminución en esta tasa con 50,44% en 2016, 69,04% en 2017 y 71,99% en 2018. 2019 mostró solo 45,65%. La Región Sur tuvo el promedio más alto (72,20%), mientras que la Región Norte (61,28%), con la tasa más baja. **Conclusión:** El escenario es comprometedor en cuanto al control de enfermedades prevenibles por vacunación, refleja la necesidad de mejorar la comunicación entre profesionales y población, con el fin de unificar y promover información correcta y segura sobre la vacuna.

DESCRIPTORES: Programas de Inmunización; Cobertura de Vacunación; Política de Salud.

RESUMO

Objetivo: Realizar uma análise descritiva da cobertura vacinal executada pelo programa nacional de imunizações entre 2015 e 2019. **Método:** Foi realizado um estudo descritivo, com base nas informações epidemiológicas das coberturas vacinais do Brasil. Foram utilizadas variáveis como Cobertura Nacional, Cobertura por Região, Média das taxas de Cobertura entre Regiões e Média de Cobertura entre Estados. **Resultados:** Em 2015 a taxa de cobertura vacinal alcançou 95,7%, valor superior ao ideal. Os anos subsequentes apresentaram brusco rebaixamento dessa taxa com 50,44% em 2016, 69,04%, em 2017 e 71,99% em 2018. 2019 manifestou apenas 45,65%. A Região Sul, obteve a maior média (72,20%), enquanto a Região Norte (61,28%), com a menor taxa. **Conclusão:** O cenário é comprometedor no tocante ao controle das doenças imunopreveníveis, reflète a necessidade de aprimorar a comunicação entre profissionais e a população, a fim de unificar e promover informações corretas e seguras sobre a vacina.

DESCRIPTORES: Programas de Imunização; Cobertura Vacinal; Políticas de Saúde.

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INTRODUCTION

The term vaccine is defined as “a product that produces immunity and therefore protects the body against disease”, by the Centers for Disease Control and Prevention (CDC), and represents an extremely safe biological substance, being responsible for great public health benefits. In this way, two terms are used in an equivalent way: vaccination and immunization, in which vaccination is the administration of infectious microorganisms or parts of them, killed or attenuated, in order to prevent diseases due to the formation of antibodies, and immunization it is the process by which the individual becomes protected against a particular disease.⁽¹⁾

Bearing in mind that immunization is the goal of vaccination, that is, providing the vaccinated individual with immunity against a certain disease, through the administration of the immunobiological that will provide protection, that is, vaccination is the act of vaccination and immunization is the acquisition of immunological protection against a disease, usually infectious. Immunization, in turn, can be active and passive, in which the active occurs when the individual's own immune system, upon contact with a substance foreign to the organism (antigen), responds by producing antibodies, which can be acquired through contamination by an infectious disease or through vaccination, unlike passive immunization, which is induced by the administration of antibodies against a specific infection.⁽²⁾

Vaccination is highlighted as one of the greatest public health achievements of the 20th century, being considered one of the three supreme public health milestones for the promotion, prevention and control of vaccine-preventable diseases, making it one of the most effective and efficient prevention measures for health systems. The relevance that vaccines have

in promoting health and preventing vaccine-preventable diseases, especially throughout childhood, is indisputable. Given this perspective, health authorities around the world have instituted immunization programs, as well as specific vaccine schedules according to each age group.^(3,4)

These characteristics make the vaccine a legendary means of intervention,



The term vaccine is defined as “a product that produces immunity and therefore protects the body against disease”, by the Centers for Disease Control and Prevention (CDC).

with the aim of reducing the morbidity of infectious diseases through collective protection, where immune-vaccinated individuals indirectly protect the non-vaccinated, making it difficult for the pathogen to circulate. The vaccine was able to change the health scenario between the centuries, especially the 1930s, where 45,7% of deaths were due to infectious diseases, rising to just 4,35% in 2006.⁽⁵⁾

In Brazil, the Ministry of Health has established a comprehensive routine immunization program and periodically promotes campaigns to control and eradicate diseases through massive vaccination of children. Having declared the eradication of smallpox in 1973, a new stage in history began with the institution of the National Immunization Program (Programa Nacional de Imunização) - PNI, formalized in 1975 by law No. 6.259 and decree No. 78.23/76, as well as the National Epidemiological Surveillance System and Immunizations enabling the consolidation of the PNI. Still in the seventies, it obtained the first basic vaccination schedule, with vaccines against tuberculosis, polio, measles, diphtheria, tetanus and whooping cough, being mandatory for children under one year old.⁽⁶⁾

Surveillance of vaccination coverage is an essential tool for the evaluation of the PNI, and suggests that it has enabled population surveys that propose to optimize vaccination coverage in Brazil. PNI is one of the largest immunization programs in the world, offering up to 45 different immunobiologicals for the entire population, of all ages.⁽⁴⁾

The advances of the PNI with the decentralization of vaccines to the municipalities, being integrated to the Family Health Strategies (Estratégias de Saúde da Família) - ESE, and the Creation of the Global Alliance for Vaccine and Immunization - GAVI, the national vaccine calendars becoming broader, composed of immunobiologicals and the performance

of a qualified and active vaccination team, reflected in the high percentages of immunization coverage across the country.⁽⁵⁾

The program that has become a world reference in immunization, after decades with rates of good popular adherence, has been declining in the vaccination percentages. From February 2018 to January 21 this year, 10.302 measles cases were confirmed in Brazil. Of the 5.570 municipalities in the country, 2.751 (49%) did not reach the goal of measles vaccination coverage, far from the expected 95% of coverage. The state of Pará stands out, with 83,3% of the municipalities outside this target; Roraima with 73,3% and Amazonas, with only 50% vaccination coverage.⁽⁷⁾ After two years of winning the measles-free country certificate, Brazil identifies new cases of the disease in 2019, and loses the certificate in March, with 48 cases of the disease. In September, there were already 2.753 cases, an increase of 18% in cases.⁽⁸⁾

In view of this scenario, the public health problem puts at risk the population that is not yet old enough to receive the immunobiological or belongs to the group that is not able to be immunized. Therefore, this research aimed to perform a descriptive analysis of vaccination coverage performed by the national immunization program between 2015 and 2019.

METHOD

A descriptive study was conducted, based on epidemiological information on vaccination coverage in Brazil. As inclusion criteria, all national vaccination coverage data from each Region and States of the federation were used in isolation between the years 2015 and 2019, which were openly available on the SI-PNI, PNI and Department of Informatics website. SUS - DATASUS. The exclusion criteria comprised the data referring to the National Immunization Campaigns between the period proposed for the study. Data were collected on July 13th, 2020.

Data were collected that allowed the analysis of the following variables: National Coverage Rate, Coverage Rate by

Region, Average coverage rates between the North, Northeast, South, Southeast and Midwest Regions, and Average Coverage among the 26 States the Brazilian territory, with emphasis on the states with the highest and lowest coverage rates by Region, both between the years 2015 and 2019.

After obtaining the data, they were treated using simple average calculations and converted into a national coverage rate. From the treated data, graphs were made for a better understanding of the data obtained. All data were processed using the Excel for Windows 2010 program. It was not necessary to submit the study for approval by the Research Ethics Committee, considering that the data used are in the public domain and without identification of participants.

RESULTS

National Coverage

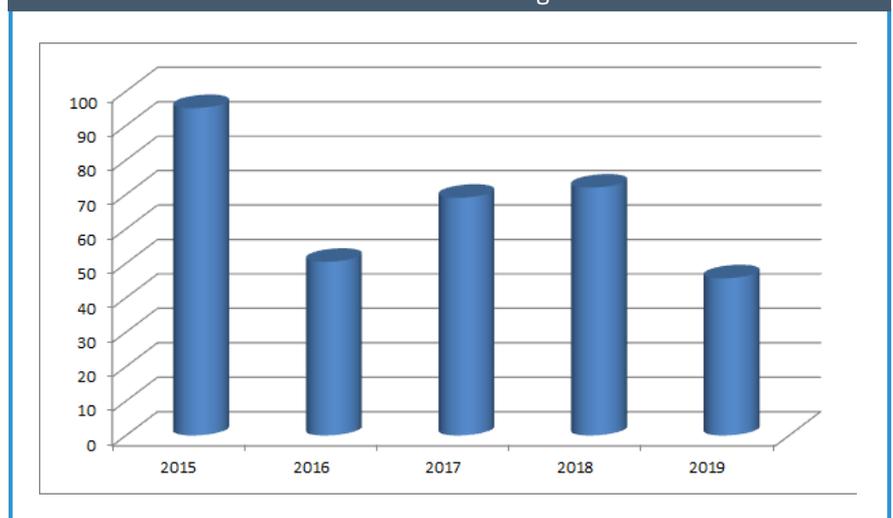
In 2015, the vaccination coverage rate in the entire Brazilian territory presented a rate of 95,7%, higher than the rate of 95% considered ideal for maintaining immunization of the general population. The following year, 2016, showed a sharp drop in immunization, with only 50,44% coverage, approaching the value considered half the ideal rate. 2017 expresses the

value of 69,04% of the coverage rate, similar to that observed in 2018, with 71,99% of the vaccinated population. With two years of increasing coverage, despite a timid expression between 2017 and 2018, there was no positive sequence to return to that already presented in 2015. The year of 2019 surpassed the low coverage achieved in 2016, showing only 45,65%, demonstrating a value half of the ideal vaccination rate (FIGURE 1).

Regional Coverage

With the territory of continental dimensions possessed by Brazil, its regions have different results of vaccine coverage, which do not always corroborate the scenario presented nationally. In 2015, all regions of the country concomitantly obtained the best coverage rate for the five years. The worst rates, in turn, were observed in 2019, in most regions, being different only in the South region, which has the worst rate in 2016 (FIGURE 2). The average coverage of the regions during the years 2015 and 2019 represents: 61,28% in the North Region, with the lowest rate among the regions; Northeast Region having 63,95%; Southeast Region with 66,79%; South Region, with the highest average (72,20%), and Central-West Region, obtaining 70,71%.

FIGURE 1: Evolution of National Vaccine Coverage between 2015 and 2019



Source: DATASUS, 2020.

State Coverage

With 26 member states of the Brazilian federation, the state of Santa Catarina leads the ranking of vaccination coverage among the states of the country and the South Region, with an average of 60,59%, with Rio Grande do Sul having the lowest average (51,65%) in the Region. While Rio de Janeiro has the lowest average of the states and the Southeast Region, with a rate of 25,99%, and Minas Gerais with the

highest average of the Region (53,43%), between the years 2015 to 2019.

The State of Tocantins with 57,59% expressed the highest average vaccination rate in the North Region, while Amapá with 44,02% has the lowest, being below all in the Region. Rio Grande do Norte (38,1%) and Ceará (47,53%) have the lowest and highest average in the Greater Northeast Region. In the Midwest Region, the highest average was obtained in

the state of Mato Grosso do Sul (52,21%), and in Goiás (47,04%) the lowest average (FIGURE 3).

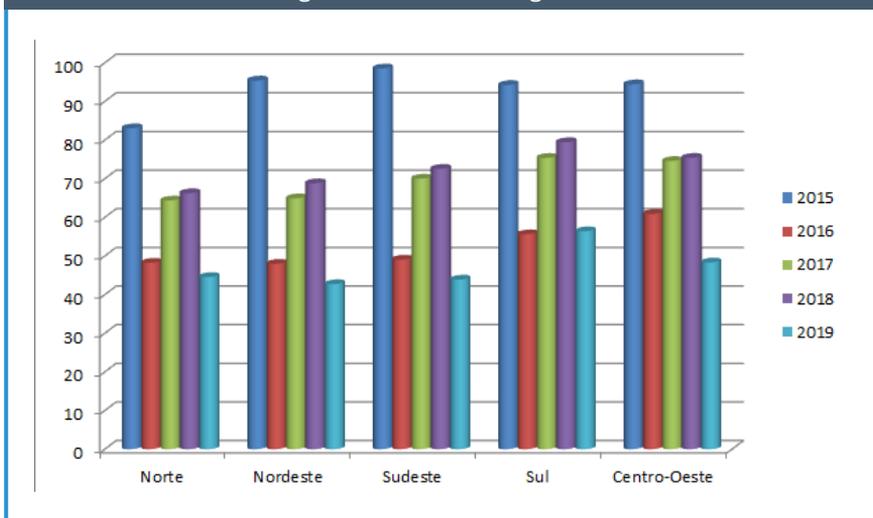
Immunobiological Coverage

Although the national vaccine calendar is updated annually, over the past five years, twenty immunobiologicals are common among the calendars analyzed, making it possible to reach the averages for immunobiologicals between 2015 and 2019. During this period, the BCG vaccine offered at birth, ideally in the first twenty-four hours of life, had the highest coverage average among immunobiologicals, with 89,68%. Hepatitis B is another vaccine that should be offered at birth, and had an average of 78,58% (rate of application within 30 days of life). Other vaccines make up the children's calendar and expressed their respective averages, such as Human Rotavirus (82,24%), Hepatitis A (77,19%), Yellow Fever (47,13%) which in 2020 started to participate in the usual calendar of 1,101 municipalities in the Northeast states that were not yet part of the vaccination recommendation area, and having a booster dose at 4 years of age, in addition to the first dose applied at 9 months. ⁽⁸⁻⁹⁾

Vaccines with integrated schemes of more than one dose, such as Triple Viral, with an average of 86,28% in the first dose, and the second dose 71,59%, and reinforcement with Tetra Viral (49,63), showed a decline between the first dose and reinforcement, such as Meningococcus C, with 1st dose (83,61%) and 2nd dose (79,74%), Pneumococcal initially with average 85,73%, and 2nd dose 76,52%, Poliomyelitis (1st dose 81,34%; Reinforcement 70,94%), and the Penta scheme (81,23%), DTP (81,52%) and reinforcement with Triple Bacterial (66,10%), also followed in decline in the reinforcement doses.

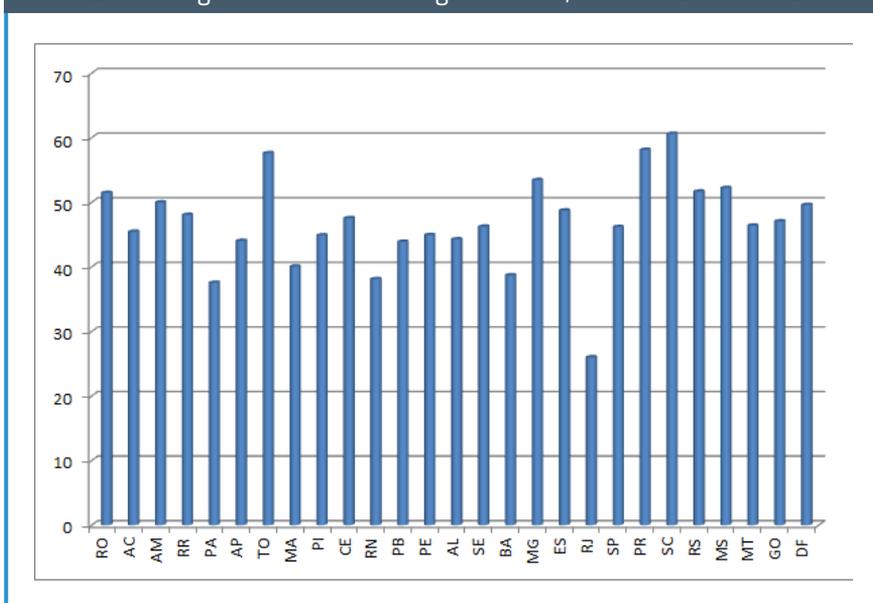
The immunobiological component of the vaccine schedule for adults and pregnant women, which prevents Hepatitis B (87,61%) obtained the second highest average of vaccination coverage, different from dTpa, a specific vaccine for pregnant

FIGURE 2: Vaccine Coverage of the Brazilian Regions between 2015 and 2019



Source: DATASUS, 2020.

FIGURE 3: Average Vaccination Coverage of States, between 2015 and 2019



Source: DATASUS, 2020.

women, which showed only 45,23 average. The immunobiological Double Adult, had the lowest coverage among all vaccines, with an average of only 37,88% coverage (FIGURE 4).

DISCUSSION

The results reveal that the national vaccination coverage provided by the PNI since 2015 has been varied, exposing low non-linear results, sometimes reactive, but soon decreasing, keeping away from the vaccination coverage rate recommended for national public health security. The observed in the national scenario referring to immunization during the years 2015 to 2019, corroborates with that obtained in the analyzes made in each region of the country, where the highest average reached among the regions during the last five years, does not reach 75%, being 66,43% the average achieved by the country, similar to the highest average achieved among the states (60,59%).

The immunization policy conquered and consolidated by Brazil is a reference worldwide for its coverage, as it is a populous and territorially extensive country, in addition to containing diversified geographical and socioeconomic scenarios. However, the panorama identified in the survey is not exclusive to Brazil, much less to the Americas. An analysis of the routine

global vaccination coverage carried out in 2018, based on analyzes carried out after the Global Vaccine Action Plan 2011-2020 - GVAP identified that less than two thirds of all countries globally reached the target of $\geq 90\%$ of national coverage the rates of first doses of several vaccines (which have more than one dose in their regimen) contained in common in several countries have increased, but the other doses remain at low levels of coverage, 60% of children who did not receive the 3rd DTP dose, or no dose (54% to 97%) in 2018, were from 10 countries, including Brazil.⁽¹⁰⁾

An ecological study carried out with information on the number of children up to one year of age immunized with BCG, polio and triple viral vaccines, between 2006 and 2016, in Brazilian municipalities, observed a reduction in the number of biased immunizations in Brazil, showing decreases of 0,9%, 1,3% and 2,7% per year for these vaccines, respectively, also showing the temporary reductions in vaccination coverage between the five regions of Brazil, converging to the results obtained between the years 2015 and 2019. The same study highlights a heterogeneity in the reduction in vaccination coverage among municipalities in recent years, noting the plurality of scenarios among them, thus indicating the need for planning and execution of care based on the local needs of each munic-

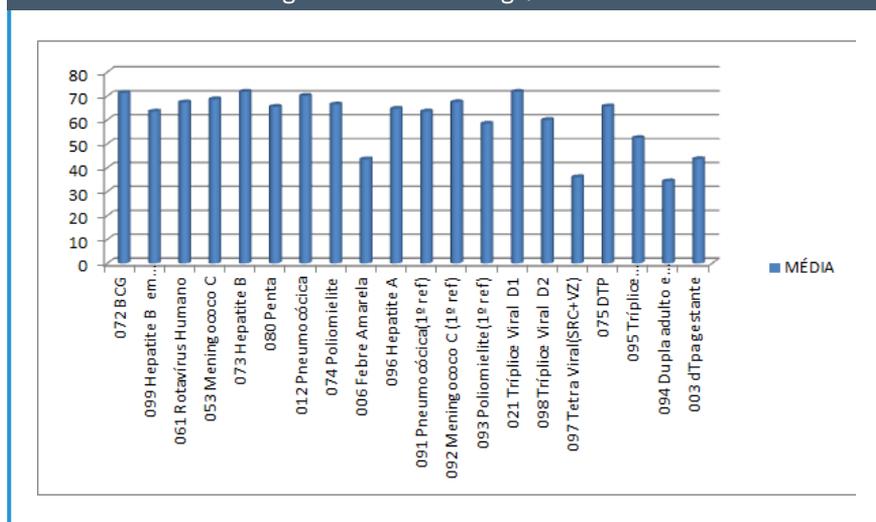
pality, promoting the adequate vaccination coverage, as well as the control of disease reappearance in Brazil.⁽¹¹⁾

A study carried out in the Municipality of Araraquara, in the interior of the State of São Paulo, using information from vaccines of children up to 24 months of age, vaccinated in the municipality between 1998 and 2013, analyzed that the timely vaccination coverage, that is, when the vaccine is administered within the term recommended by the child's age, it showed a minimum of 53,33% in the year 2000 and a maximum of 74,04% in 2006, in children up to 12 months old, showing a similar percentage in children up to 24 months old, with minimum of 36,78% in 2011 and maximum of 53,83% in 2006. Evidence of congruence in the results obtained in the media manifested between the Regions and States of Brazil in the years 2015 to 2019.⁽¹²⁾

The reasons why they justify this panel have already been discussed in Brazil. Here, the success of the program may be one of the causes of the drop in coverage, due to the fact that people up to 50 years of age did not witness the consequences left on victims infected by the diseases already eradicated by the effective action of the PNI. Another issue that is mentioned is the real lack of knowledge of the public health benefits associated with immunization and the availability of vaccines in SUS, as well as the strict process of validation and quality control in which immunobiologicals suffer from regulatory agencies and the PNI itself. Factor which leaves the vulnerable population to be convinced by the anti-vaccination movement that disseminates fake news, without any true scientific basis.⁽¹³⁾

This disservice and disorientation provided to the population in relation to immunization or vaccination, are increasingly common in so-called social networks, corroborating the anti-vaccine movement. Research already points to a priority action in closed groups in Facebook and WhatsApp applications, arousing the need to direct new studies that focus on these other media spaces. Thus, it is evident that science and health agencies, as well as government institutions, need to invest in initiatives in this area to ex-

FIGURE 4: Immunobiological Vaccine Coverage, between 2015 and 2019



Source: DATASUS, 2020.

pand interaction with the population, considering that they have an important role in this dialogue between science and society.⁽¹⁴⁾

CONCLUSION

The study carried out a descriptive analysis of the vaccination coverage performed by the PNI between the years 2015 and 2019, iden-

tifying the low coverage prevalent in all states among the different regions in the country, reflecting a major public health problem, capable of compromising the control of diseases, and put the consolidated and exemplary Brazilian vaccination system in insecurity.

The scenario described and evaluated in the study points to the need to improve communication between professionals

and the population, especially with young people, not only in health units, but also in educational institutions, large companies and civil society meetings, captured by Community Health Agents, in order to unify and promote correct and safe information, sown by the ESF team, in addition to encouraging the habit of attending Basic Family Health Units - UBSF. ■

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