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VACCINATION COVERAGE AGAINST POLIOMYELITIS IN BRAZIL DURING THE COVID-19 PANDEMIC

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Abstract: Introduction: The vaccination process in Brazil has historical roots since the 19th century, through the National Immunization Program. However, given the adherence to immunizers, several pathologies were scarce, such as Poliomyelitis. Thus, in 1994, Brazil was certified by the World Health Organization as free of poliomyelitis. Poliomyelitis is caused by a virus that affects the gastrointestinal tract, and can take severe forms that affect the central nervous system, with risks of evolution with irreversible plegia. However, despite such achievements, with the advent of the COVID-19 pandemic, they were able to reflect on the current scenario of national immunizations. **Objective**: Therefore, the objective of the following work is to analyze and evaluate the vaccination coverage in Brazil against Poliomyelitis in children under 4 years old, between 2019-2021. Methods: The study was carried out in a descriptive ecological format, aiming to observe the vaccination scenario, specifically related to Poliomyelitis, according to the schedule of the National Immunization Program of Brazil, during the pandemic of the new coronavirus. **Results**: During the SARS-CoV-2 pandemic, there was a reduction in vaccination coverage in Brazil. **Conclusion**: Thus, taking into account that vaccination is the only form of prevention, it is essential that health education is put into practice, so that the stigmas about vaccination are extinguished and that this movement against vaccination is abolished.

Keywords: Vaccination Coverage, SARS-CoV-2, Pandemic, Poliomyelitis.

INTRODUCTION

The vaccination process in Brazil has historical roots since the 19th century, however, it was only in October 1975 that it was regulated through the National Immunization Program (PNI), which aimed to coordinate and plan vaccination schedules. From this, several pathologies were exiguous and even eradicated from the country, as an example, Poliomyelitis, which was extinct in the 80s and, in 1989, had its last documented case (DOMINGUES et al., 2020).

Paradoxically to the success of the immunization process, multiple aspects can guide the possibility of intermittency of this success (MUHAMMAD, 2022). Among these factors, the emergence of vaccine hesitancy in a social environment, defined as "a delay in accepting or refusing vaccination despite the availability of immunizing services" (SILVEIRA et al., 2020). The advent of the COVID-19 pandemic is relevant, which reflected on social behavior and, consequently, on the immunization process, especially among children (ALVES; FIGUEIROA; URQUIA, 2021)

Poliomyelitis is a pathology originally caused by an RNA virus, whose transmission mainly involves the oral-fecal route, through contaminated water. Some patients may develop severe forms with neurological damage and neuronal destruction in the spinal cord. Flaccid paralysis of the lower extremities occurs irreversibly in 1 in every 200 infected people, mostly unimmunized children. (SORIANO, et al., 2022)

In parallel with this context, the detection of poliovirus type 2 derived from the 'circulating' vaccine (cVDPV2) from environmental samples in the United Kingdom of Great Britain and Northern Ireland and in the United States of America is alerted. Vaccine-derived poliovirus (VDPV) is a well-documented type of poliovirus that has mutated from the strain originally contained in the oral polio vaccine (OPV) and has been affecting different areas of the world, particularly as the population is less immunized (WORLD HEALTH ORGANIZATION, 2022).

Given the above, it is necessary to take a closer look at the vaccination scenario in Brazil,

given that, given the current circumstances, the eradication of Poliomyelitis at the national level is possibly at risk.

Therefore, the objective of the following work is to analyze and evaluate the vaccination coverage in Brazil against Poliomyelitis in children under 4 years of age, between 2019-2021.

METHODOLOGY

TYPE OF RESEARCH (STUDY DESIGN)

This is a descriptive ecological study to evaluate the vaccination coverage for Poliomyelitis by the SUS system in Brazil after the emergence of COVID-19. The analysis focused on the delivery of Polio vaccine according to the PNI schedule.

DATA SOURCES

Publicly available data on vaccination coverage for Poliomyelitis, Poliomyelitis 4 years, Poliomyelitis (1st booster) tabulated by state and region during the years 2019 to 2021 were obtained from the federal database of open access health services in Brazil, DataSUS. DataSUS is a publicly accessible database maintained by the Department of Strategic and Participatory Management of the Ministry of Health that publishes monthly reports of disaggregated data at the municipal level for a wide range of diagnoses and procedures. All available data for the years 2019 to 2021 were retrieved following the norms of Resolution nº 466/12 on Research Ethics of the National Health Council, Brazil.

Polio vaccination coverage followed the vaccination schedule according to the PNI, which since 2016 consists of three doses of the VIP vaccine, administered at 2, 4 and 6 months of age, plus two booster doses with OPV, at 15 months and at 4 years old. For the purposes of our study, immunization coverage refers to the population-adjusted rate of individual vaccine doses delivered for vaccines covered by Brazil's standard immunization program, PNI.

DATA ANALYSIS

Descriptive statistics were performed. The Vaccination Coverage (CV) indicator for Poliomyelitis is calculated by the Ministry of Health team, based on the number of applied doses of the immunobiological agent for poliomyelitis recorded in the Information System of the National Immunization Program (SI-PNI), divided by the population under one year of the Live Births System (SINASC) database multiplied by 100. The 95% target, recommended by the WHO and adopted by the PNI, was used to consider low coverage (< 95%) or high (≥95%).

The percentages of decrease in the polio vaccine coverage rate were also compared between states and regions, which are calculated based on the mathematical formula for percentage variation, subtracting the final value from the initial value, dividing by the initial value and multiplying by 100.

The potential confounding factor of the data on vaccination coverage against Poliomyelitis is found in data collection in DATASUS, which makes available the following options for selection: Poliomyelitis, Poliomyelitis 4 years and Poliomyelitis (1st booster). To minimize this potential confounder, the 3 vaccine coverage options were selected.

ETHIC

Ethical approval was not required as the accessed database contains aggregated, de-identified and open access data.

RESULTS

Vaccination coverage for poliomyelitis during the years 2019 to 2020 has been falling on average for the entire Brazilian national territory, showing a reduction of 6.04% from

2019 to 2020 and 13.06% from 2020 to 2021.

The best vaccination coverage can be seen, respectively, in the South (81.57%), Midwest (74.53%), Southeast (72.65%), Northeast (62.8%) and North (59.17 %) in the period from 2019 to 2021. In addition, the units with the lowest coverage in 2019, 2020 and 2021 respectively stand out: Pará (56.78%), Amapá (36.79%) and Amapá (39.18%). Those with the highest coverage in 2019, 2020 and 2021 were respectively: Mato Grosso do Sul (93.97%), Santa Catarina (90.31%) and Santa Catarina (79.49%).

From this perspective, according to the total amount of doses applied in the period comprising 2019 to 2021, including Inactivated Poliomyelitis (VIP) and Oral Poliomyelitis (OPV) Immunizers, the Southeast region was able to apply the largest amount, resulting in 13,125,269 doses applied, with the Northeast region in second place with 9,117,590 doses and the South with 4,960,636, the North with 3,549,305 and the Midwest with 2,923,893 doses, with the lowest amounts of vaccines applied against the virus of Polio.

Furthermore, according to the doses applied annually by region, all showed a decrease in the number of doses applied during the period from 2019 to 2021.

DISCUSSION

> "As of 2016, there has been a drop in vaccination coverage rates (ICV), with levels below the vaccination targets recommended for the vaccines included in the national calendar (95% coverage for most vaccines for children, with the exception of of BCG and rotavirus vaccines that the goal is 90%)." (DOMINGUES et al., 2020, p. 6)

In line with this study and as can be seen in Table 1, vaccination coverage for poliomyelitis during the years 2019 to 2020 has been decreasing on average for the entire Brazilian national territory, showing a reduction of 6.04% from 2019 to 2020. 2020 and 13.06% from 2020 to 2021. As can be seen in Table 1, no Federation Unit reached the recommended target. In addition, the units with the lowest coverage in 2019, 2020 and 2021 respectively stand out: Pará (56.78%), Amapá (36.79%) and Amapá (39.18%). Those with the highest coverage in 2019, 2020 and 2021 were respectively: Mato Grosso do Sul (93.97%), Santa Catarina (90.31%) and Santa Catarina (79.49%).

Federation unit	2019	2020	2021	Total
Total	75,85	71,27	61,96	69,70
Rondônia	79,36	78,14	66,05	74,51
Acre	67,89	55,48	46,82	56,71
Amazonas	78,73	60,87	61,20	66,91
Roraima	72,50	64,71	48,99	61,12
Pará	56,78	48,87	46,73	50,83
Amapá	57,59	36,79	39,18	44,46
Tocantins	76,64	78,90	71,27	75,62
Maranhão	59,03	48,75	48,55	52,15
Piauí	67,02	67,54	63,06	65,90
Ceará	79,43	79,41	63,15	73,94
Rio Grande do Norte	68,87	65,49	58,61	64,39
Paraíba	78,05	66,03	58,59	67,60
Pernambuco	71,50	63,95	54,59	63,41
Alagoas	75,58	63,99	60,96	66,92
Sergipe	72,56	62,56	61,35	65,52
Bahia	63,84	59,00	49,70	57,64
Minas Gerais	82,21	82,92	68,65	77,94
Espírito Santo	81,49	77,57	67,12	75,30
Rio de Janeiro	62,86	51,60	46,99	53,84
São Paulo	82,71	79,75	68,39	76,93
Paraná	85,76	82,96	72,26	80,29
Santa Catarina	91,98	90,31	79,49	87,13
Rio Grande do Sul	83,66	85,53	68,24	79,18
Mato Grosso do Sul	93,97	81,38	67,77	80,93
Mato Grosso	78,38	78,21	68,26	74,82

Goias	74,40	74,93	63,17	70,75
Federal District	80,47	79,40	68,77	76,26

Table 1- Vaccination coverage for Poliomyelitis, Poliomyelitis 4 years, Poliomyelitis (1st booster) from 2019 to 2021 According to Federation Unit

Source: National Immunization Program Information System (SI-PNI/CGPNI/DEIDT/SVS/MS) (2022).

> "At the end of 2019, a new coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in Hubei Province, China. It spread rapidly, leading the World Health Organization (WHO) to declare a public health emergency in late January 2020 and characterize it as a pandemic in March 2020." (PALMORE, 2021, p.1)

In addition to the great impact on the economy to the detriment of social isolation measures to face the COVID-19 infection, there was an important effect on the entire health network (ALVES; FIGUEIROA; URQUIA, 2021). Thus, it is possible to observe an under-vaccination before and during the pandemic, but the rate of drop in vaccination coverage was much more expressive between the years 2020 to 2021, after the start of the pandemic, representing little more than double the previous period (2019 -2020), when the new coronavirus had not yet taken on a global dimension.

It is known that there were several measures to contain the spread of the virus, among them, social isolation, where many people had to stay in their homes, causing an impact on reducing the demand for vaccine updates, given that the greater need for this hospital search occurred in view of the need for care related to respiratory symptoms of the new coronavirus, relatively neglecting the search for health prevention in general (LOPES JÚNIOR et al., 2021).

A reduction in the number of vaccine doses administered was observed as the cases of COVID-19 grew (BATISTA FILHO et al., 2022; MOURA et al., 2022). In 2019, general immunization coverage registered a rate of 77.12% among Brazilian children under 10 years old, reducing to 68% in 2020 (MOURA et al., 2022).

In addition, heterogeneity was identified among the vaccination coverage among the states of the Brazilian Southeast, in which doses of doses predominated respectively in the states of São Paulo, Minas Gerais and Rio de Janeiro, a fact possibly explained by the higher population concentration in these local, in addition to being configured as an investment hub from the national point of view, which, consequently, enabled the promotion of greater access to health services. (BATISTA FILHO et al., 2022)

Analyzing specifically the rate of immunizations for Polio by region in figure 1, in fact, it is observed that the Brazilian Southeast is among the 3 regions with the best rates of vaccination coverage. However, the South and Midwest of the country precede the Southeast region, having respectively the highest rates of vaccination against Poliomyelitis during the period of the beginning of the Covid-19 pandemic. The Northeast and North of the country, compared to the other regions, prevailed, respectively, with the lowest immunization rates during the start of the Sars-Cov 2 pandemic.

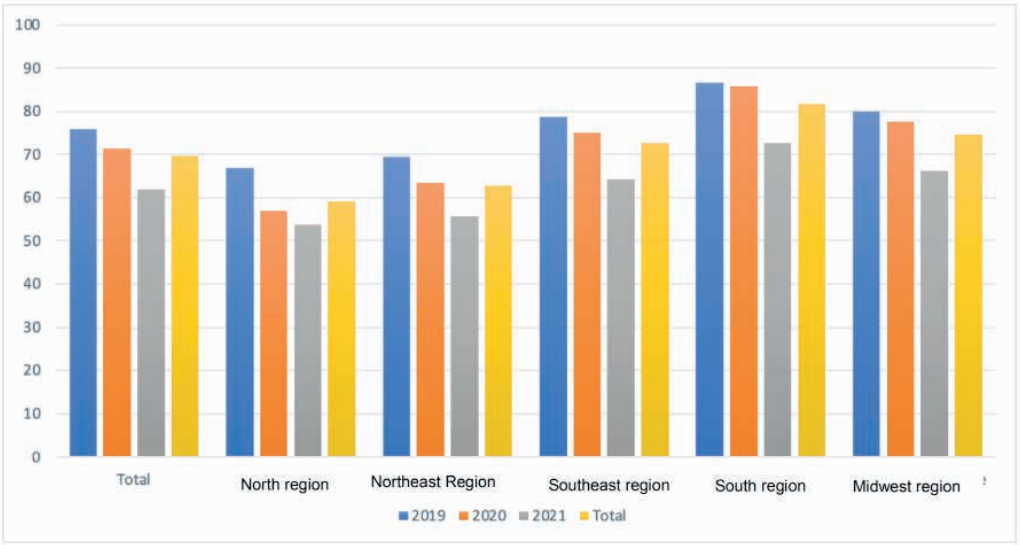

Figure 1 – Vaccine Coverage against Poliomyelitis by Year by Region

Source: Author (2022).

The socioeconomic heterogeneity existing in the country, where there is a concentration of people in situations of vulnerability due to their living conditions, the trend is that there is less access to health services and, consequently, reduced immunization rates. (GOMES, et al., 2022)

Despite the drop in vaccination against generalized poliomyelitis during the beginning of the pandemic, it is worth noting that, from a percentage point of view, the North region of the country showed a less significant reduction in vaccination coverage compared to other regions in the period from 2020 to 2021, registering a decline of only 5.96%, while the other locations still had drop percentages greater than 12% in the same period. (Figure 2)

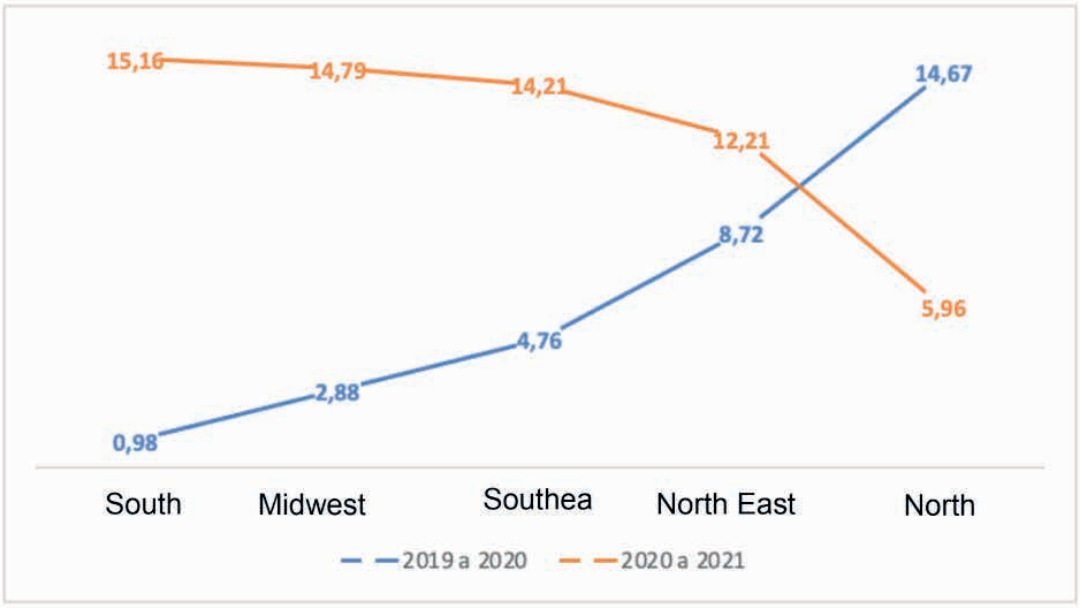

Figure 2 - Percentage of Polio Immunization Coverage Rate Decrease by Region (in %)

Source: Author (2022).

In addition, given the scenario of application of doses during the period from 2019 to 2021, which include inactivated poliomyelitis and oral poliomyelitis immunizations, it was possible to observe that two Brazilian regions presented the highest amount of immunizers use, being the Southeast and Northeast, responsible for more than half of the applications.

In fact, in the table below (Figure 3), an annual decline can also be seen between 2019 and 2021 in the application of these immunobiologicals, however, the North region, specifically, showed a smaller reduction in the percentage of drop in these vaccinations, of which, between 2019 to 2020, the amount of immunizations decreased by 11.83% and between 2020 to 2021, the reduction was only 6.57%.

Also in this sense, it was possible to verify that the other regions showed considerable growth related to the reduction in the application of immunizers, with the Southeast region having the highest percentage of decline in the application of doses, measuring about 14.52% between 2020 and 2021, however, between 2019 and 2020, the South region had the lowest percentage of reduction in the application of these vaccinations, measuring around 1.19%.

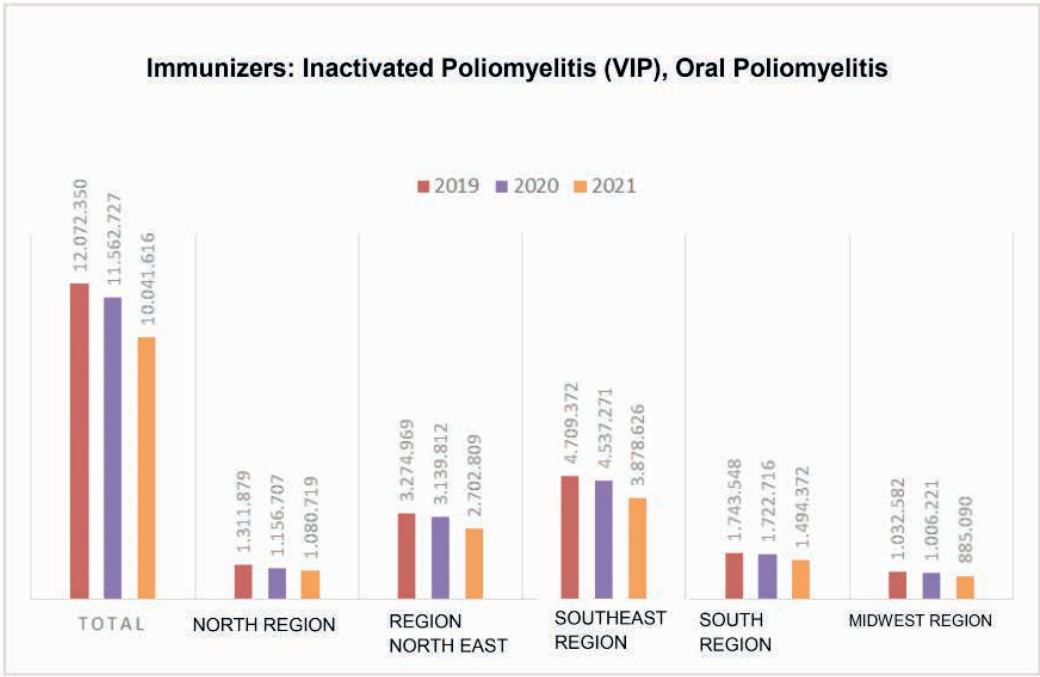

Figure 3 - Doses applied per year according to region of Brazil

SOURCE: AUTHOR (2023)

In addition to regional factors and socioeconomic characteristics among Brazilian states, it must be noted that the drop in vaccine adherence also involves other issues. It is speculated that such reductions are due to the increased popularity of the anti-vaccine movement in Brazil, false statements about the safety of immunizers and the growing installation of vaccine hesitancy, that is, an indecision about what to do, say, think about the immunization process, especially among parents with children who are still young. (SILVEIRA et al., 2020)

Currently, Pakistan and Afghanistan are

considered endemic countries, due to the circulation of the Poliomyelitis virus among the population.

In Afghanistan, 26 cases of wild poliovirus type 1 (WPV1) were reported in 2019 and 21 cases in 2018. In Pakistan, 117 cases of WPV1 were reported in 2019 and 12 cases in 2018. In 2019, 251 cases of circulating poliovirus derived from type 2 vaccine (cVDPV2) in 15 countries (Angola, Central African Republic, Benin, Chad, China, Democratic Republic of Congo, Ethiopia, Ghana, Niger, Nigeria, Pakistan, Philippines, Somalia, Togo and Zambia). In the same period, transmission of circulating vaccine-derived poliovirus type 1 (cVDPV1) was confirmed in three countries (Malaysia, Myanmar and the Philippines), totaling 8 cases. There are no records of circulating poliovirus derived from vaccine type 3 (cVDPV3) to date. (LIMA, 2021)

The main limitation of the present study is the precise delimitation of vaccination coverage, since vaccination rates in Brazil are reported at an aggregate level, and it is not possible to determine the number of patients who completed the complete vaccination schedule. Therefore, it is expected that this article can encourage further studies on vaccination coverage for other pathologies during the same period addressed and measures that enable the creation of vaccine intervention programs in primary health care.

CONCLUSION

Faced with a scenario where Brazil is in the process of eradicating some diseases, with polio being one of the main ones, however, there are countries that still have the virus circulating and, with the occurrence of the high number of travelers worldwide and a possible reduction in vaccination automatically generates an increase in the probability of spreading the virus.

In addition, in view of the analysis of the data interpreted during the study carried out through the vaccination coverage of Poliomyelitis in Brazil in children under four years of age, it was possible to infer that, during the period from 2019 to 2021, in the midst of a pandemic of the new coronavirus, there was a significant reduction in demand for vaccination against the Polio virus.

Thus, it is worth noting that vaccination is the only way to prevent the disease, and it is necessary to infer about the importance of implementing health education for the Brazilian population, above all, orienting the risk to which they are exposed due to a reduction in vaccination coverage., thus increasing the chance of spreading the disease.

Finally, more studies are needed to understand more clearly the associations of local social and environmental factors with the vaccination process, especially vaccination against poliomyelitis, with the aim of predicting situations that lead to a reduction in vaccination coverage and guide government measures to circumvent such a situation.

AREA OF CONCENTRATION

Science, Public health, Immunization, Information.

FINANCING

The authors declare that they did not receive funding for this article, since the data were taken from DATASUS, which is based on a free and online database provided by the government, through the TABNET platform.

CONFLICT OF INTERESTS

This article has no conflict of interest.

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