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POLIO VACCINATION COVERAGE IN THE FIRST YEAR OF LIFE IN THE STATE OF AMAPÁ – BRAZIL

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Abstract: Goal: to analyze the polio vaccination rate (VIP) in children up to 1 year of age in Amapá, between 2016 and 2022. **Methods:** This is a descriptive study of a quantitative nature, comprising vaccination coverage (VC) in children up to one-year residents in Amapá, covering its sixteen municipalities, between 2016 and 2022. The CV rate, the homogeneity rate and the average CV in the municipalities were calculated. **Results:** The average CV per year had the highest percentage in 2018, with 73.01%, and the lowest in 2020, with 42.68%. The average CV per municipality highlights that four municipalities reached up to 50% of CV, nine reached between 51% and 90% and three reached above 91%. In no year was the target homogeneity rate (70%) achieved. **Conclusion:** The drop-in polio CV is a worrying issue that carries the risk of reintroducing the pathology.

Keywords: Immunization; Primary Prevention; Vaccination coverage; Polio.

INTRODUCTION

Poliomyelitis, an infectious and contagious viral disease with an acute nature, is marked by the presentation of flaccid paralysis with a sudden onset, lasting no longer than three days. It preferentially affects the lower limbs in an asymmetrical way, maintaining superficial sensitivity, accompanied by muscle flaccidity and decreased reflexes or areflexia. Its etiological agent is the single-stranded RNA poliovirus Enterovirus, which has three serotypes - PV1, PV2 and PV3. [1,2,3]

The infected individual can present four distinct forms: asymptomatic, abortive, aseptic and paralytic meningitis. The abortive (mild) form involves non-specific symptoms, such as fever, headache, cough, vomiting, abdominal pain and diarrhea lasting 1-3 days, occurring in 5% of cases [1,2,4]. The paralytic form, rare (1-1.6%), brings sudden onset motor deficiency and fever, with asymmetry of muscle groups, muscle flaccidity, reduction or abolition of deep reflexes in the paralyzed area, preserved sensitivity and persistence of residual paralysis [1,2,3, 5, 6.]

The first outbreak, in Brazil, occurred in 1911 and, in 1953, it became epidemic in the state of Rio de Janeiro [7]. The fight in the country aimed at its eradication, achieved in 1989[1,3,8]. With the creation, in 1973, of the National Immunization Program (PNI), there was an important historical milestone that made it possible to eradicate the disease. This occurred through the incorporation of mass vaccination with the oral polio vaccine (OPV), which reduced cases of the disease from 1,290 cases in 1980 to 35 cases in 1982.[1,9,10]

The PNI, to this day, aims to promote public health benefits, being an important milestone for the prevention and control of vaccine-preventable diseases. Over the years, after the implementation of the vaccination schedule, important advances were made in the health area. Among the main results are the eradication of polio, rubella and congenital rubella syndrome, as well as the reduction in cases of neonatal tetanus [11]. Furthermore, the program contributed to the effective control of diseases such as diphtheria, tetanus and whooping cough.

In this scenario, the importance of vaccination is indisputable to ensure the eradication of vaccine-preventable diseases, the reduction of mortality and complications from communicable diseases.[11] Vaccinations also help to reduce the risk of hospitalizations, therefore, for the benefits proposed by the vaccine to be effective, it is essential that the population adheres to the vaccination schedule. Given this, there is great concern regarding the low vaccination adherence rate, evidenced by the significant drops in national coverage in recent years. Therefore, there is a need to continue adherence to vaccination, especially following the recommended vaccination

schedule from the first months of life. [1,2,6,12]

This way, vaccines promote the formation of antibodies that effectively fight harmful microorganisms capable of causing irreversible damage to the body. Among the vaccines, the Oral Polio Vaccine (OPV) and the Inactivated Polio Vaccine (VIP) stand out, responsible for preventing infantile paralysis. In fact, the VOP will be gradually replaced by the inactivated VIP from 2024, according to a recent decision made by the Ministry of Health. Therefore, the epidemiological analysis of how vaccination in the first year of life against polio and infantile paralysis has been established shows necessary [13].

Among the vaccines in the basic child immunization schedule, VIP was selected for the study, administered intramuscularly, at 2, 4 and 6 months of age. It has 3 serotypes, which are cultivated in human diploid cells or Vero cells and inactivated in formaldehyde. Furthermore, it is highly immunogenic and protects against polio, an oral-fecal transmitted disease that affects children under five years of age and its proliferation at the intestinal level can invade the nervous system. The first dose of VIP promotes 95% seroconversion for each serotype, followed by 99% after the 2nd dose and between 99-100% after the 3rd dose. Thus promoting life long immunity [14].

In view of the above, the present study aims to analyze the polio vaccination rate (VIP) in children up to 1 year of age in the state of Amapá between 2016 and 2021.

METHODS

This is a descriptive study, with a quantitative approach, comprising vaccination coverage in children up to one year of age living in the federated unit of Amapá, covering the sixteen municipalities of Amapá, from 2016 to 2022. The research was sourced from data from the National Immunization Program Information System, organized by the General Coordination of the National Immunization Program and made available through a public domain database by the SUS Information Technology Department (DATASUS) – accessed via the website: <http:/ /sipni.datasus.gov.br/si-pni-web/faces/inicio.jsf>.

Vaccination data regarding immunobiologicals belonging to the vaccination schedule for children up to one year of age of the Inactivated Poliomyelitis Vaccine (VIP) applied at 2, 4 and 6 months of life, during the first year of life, were considered.

For each immunobiological, vaccination coverage was calculated by dividing the number of individuals in the target population with a complete vaccination schedule by the total number of individuals that make up the target population, multiplying the result by 100. The goal was considered achieved when CV from 95% for both immunizers.

The homogeneity rates were calculated considering, as a numerator, the number of municipalities with adequate coverage for a given vaccine and, as a denominator, the total number of municipalities in the State, multiplying the result by one hundred. The homogeneity rate was considered adequate when at least 70% of the municipalities reached the vaccination targets recommended by the Ministry of Health 15,16. Vaccination coverage and homogeneity rates were presented by type of vaccine and year.

The present study uses public domain data with unrestricted access, for which there is no identification of the individuals participating in the investigation, therefore, no assessment by the Research Ethics Committee is necessary.

RESULTS

The average vaccination coverage per municipality in the State of Amapá, considering the period between 2016 and 2022, is shown in Figure 1. It can be seen, in red, that 04 municipalities reached up to 50% of CV. In yellow, the 9 cities that completed between 51% and 90% of the CV are represented. In green, the 3 municipalities that achieved above 91% of CV stand out.
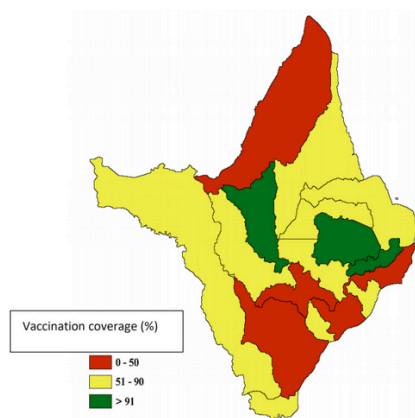

Figure 1: Average polio vaccination coverage by municipality in children up to one year of age in Amapá, from 2016 to 2022.

Source: own elaboration.

In Figure 2, the average CV per year in Amapá stands out. It is noteworthy that the highest percentage achieved corresponds to 2018, and the lowest to 2020, which totaled 42.68%.
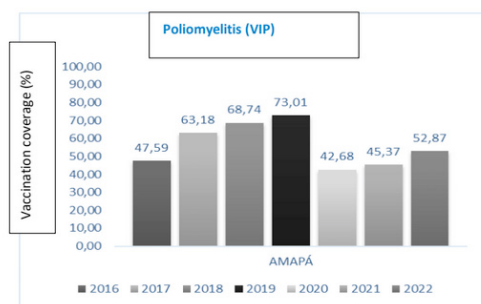

Figure 2: Polio vaccination coverage in children up to one year of age in the state of Amapá, Brazil, between 2016 and 2022.

Source: own elaboration.

Regarding the homogeneity rate, in no year was the target rate (70%) reached (Figure 3). The highest rate achieved refers to 2018, with 43.75%. And the lowest correspond to 2020 and 2021, both years with 6.25%.
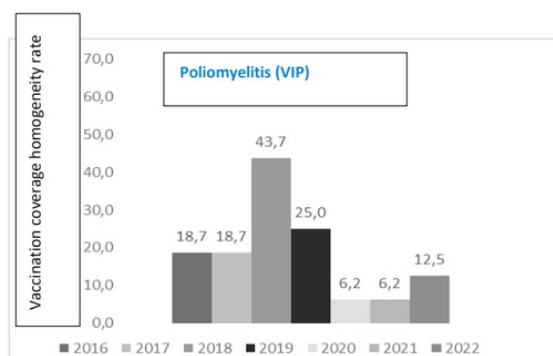

Figure 3: Homogeneity rate of polio vaccination coverage in children up to one year of age. Amapá-AP, Brazil, 2016 to 2022.

Source: own elaboration.

DISCUSSION

Despite much discussion regarding the impact of anti-vaccine movements and the politicization of issues involving public health, it is clear that the overall vaccination coverage rate in the State of Amapá remained stable in the period, with a decrease of 7.1% during the historical series. However, this data does not allow us to infer that the state is facing a favorable condition, mainly due to the heterogeneity that exists between municipalities and the changes in trends experienced year after year, which demonstrates the difficulty of establishing a permanent public policy.

By the way, in 2020, the State had the lowest vaccination coverage in relation to all States in the Federation [17]. The homogeneity rate, which reached 43.75% in 2018, fell to 6.25% in 2021, demonstrating the heterogeneous impacts that the pandemic caused in different locations across the state. In 2022, with the improvement in the COVID-19 pandemic indicators, there was an improvement in

relation to homogeneity, reaching 12.5%, an index still well below those achieved pre-pandemic.

The changes in vaccination coverage from 2016 to 2021 occurred disproportionately among the municipalities, considering that, although the majority had reduced their indicators, the municipalities of Laranjal do Jari, Macapá, Pracuúba, and Serra do Navio showed growth of 4.83%, 25.70%, 70.30% and 242.41%, respectively. These data demonstrate that different factors impact vaccination coverage and that specific measures need to be taken in relation to each city, focused on the realities specific to each region, in order to avoid the formation of pockets of unvaccinated people, facilitating the reintroduction of polio.[17].

Vaccination coverage was low in most municipalities during all years evaluated. Only Cutias do Araguari (2016-2018 and 2021), Serra do Navio (2017-2020) and Tartarugalzinho (2017-2020) managed to reach the Ministry of Health's target (95% coverage) for more than 2 consecutive years. The values achieved, which exceed 100% coverage, may present calculation errors, errors in recording doses applied, errors in population estimates of the target population, errors in birth records, extra doses applied and vaccines for target audiences above the expected age range [18].

The State of Amapá remained very far from the target, with 2019 being the year in which it came closest to it, reaching coverage of 73.01% of the target audience, still lacking a significant 21.99% of coverage to reach the target. With the release of the new Geographic Census in 2022 by the Brazilian Institute of Geography and Statistics, in which the State's population was found to be below estimates, assessments that take the new data into account will prove to be more reliable [19].

In the years analyzed, the municipality with the highest average coverage was Serra do Navio (108.58%) and the lowest was Mazagão (49.14%). From this observation, it is clear that the geographic factor is not the main influencer of the average vaccination coverage, considering that Mazagão is much closer geographically to the state capital, a reference municipality for the planning and distribution of immunization agents, which Serra do Navio.

In comparison to the national scenario, the State of Amapá was not directly influenced by the decrease in vaccination coverage. In Brazil, the year 2016 represented the milestone of the decline in population adherence to vaccination campaigns [8,20]. The immunization percentage fell to 91%, declining to 77% in 2017. The rate of decline, successively, continued at the level of 1.3% per year [21]. The State of Amapá, on the contrary, achieved increases of 32.76% in 2017, 8.80% in 2018 and 6.21% in 2019, having managed to go in another direction when observing the national trend.

Among the main hypotheses for the occurrence of a drop in vaccination are the wrong perception of its unnecessariness, lack of knowledge of the PNI, fear of adverse reactions, lack of time for caregivers, lack of confidence in the effectiveness of immunization agents, the smallest link between families and health services, lack of access to information, low perception of the risk of contracting infectious diseases, lack of link with vaccination actions and the success of anti-vaccine movements due to fake news [7,8,21,22,23,24,25].

The distance between residence and health services, difficulty in accessing public transport, opening hours of health units, deficiency in the continuing education of health professionals, excessive number of people in the geographic territory and poor distribution and low investments for vaccine production [21,23,26,27.] The State of Amapá, as it is geographically distant from other federal

entities, including without road connections, still has serious infrastructure deficiencies that make it difficult to achieve homogeneous vaccination in all its municipalities.

Obstacles include vaccine shortages [23], the COVID-19 pandemic[23,28], the loss of immunobiologicals due to technical and physical failures, the lack of community health agents (CHA) and the lack of material. Furthermore, in the North Region, municipal departments encounter barriers that hinder equal access to immunization agents [25].

Added to this is the COVID-19 pandemic, which disrupted the favorable scenario experienced in the State of Amapá until then, causing serious damage to the growth that had been achieved in the last few years preceding it. [19]. In 2020, there was a drop-in vaccination coverage of around 42.46%, a loss that will take many years to recover. Despite the vaccination campaigns established from 2021 onwards, there was a tiny 5.19% increase, far below what was lost due to the pathology. In 2022, there was a 7.5% increase, which brings hope of better scenarios in the years to come.

In 2020 and 2021, at the height of the pandemic, only the municipalities of Serra do Navio and Cutias do Araguari reached the stipulated target, with percentages of 153.33% (2020) and 100% (2021), respectively. On the other hand, Macapá, the State capital and most populous city, had coverage of 36.31% and 37.96%, respectively, making up, together with Santana, the second largest city in the State, the places with the lowest vaccination coverage. These municipalities are among the 84% of Brazilian municipalities that were classified as "high risk" or "very high risk" for polio [29]. The State of Amapá was considered "very high risk"[30].

The data, provided by the State Department of Health (SESA), is biased by underreporting, the lack of computerization in vaccination rooms and the delay in including data in computerized systems, which can contribute to the worsening of the scenario. Among the main measures to combat the decrease in vaccination rates, it is imperative to identify regions in which vaccination coverage does not have adequate coverage, helping to identify populations with difficulty accessing or adhering to vaccination. [21]. Public awareness is a mandatory measure 8, which can be achieved through a collective health pact [22], with the promotion of lectures and periodic works by the Ministries of Health and Education [7].

Furthermore, the participation of health bodies and Higher Education Institutions in promoting popular health education is crucial [23]. It is opportune to develop electronic systems to combat fake news, strengthen the Unified Health System (SUS), promote improvements in primary health care and continuously evaluate the doses applied to allow the identification of barriers related to vaccination [23].

New decisions involving vaccination against polio were taken by the Ministry of Health. Among them, the gradual replacement of PWV by inactivated VIP, given the better technology [13] The State of Amapá needs to be careful so that changes do not reach the entity late, slowing down the process of recovering indicators.

The drop-in polio vaccination coverage brings the risk of reintroducing a highly disabling pathology. Furthermore, the heterogeneity experienced facilitates the formation of pockets of unimmunized people (susceptible to infection), which favors a possible scenario of resurgence of the disease in the State of Amapá.

The lowest vaccination coverage rates in the period occurred in the two largest cities in the State, Macapá and Santana, which, in theory, would have better conditions for meeting vaccination targets. Furthermore, the

impacts of the 2022 Geographic Census by I.B.G.E. (Brazilian Institute of Geography and Statistics) on state indicators are still uncertain, but there is likely to be an improvement in the coming years, given the fact that the real population is smaller than that previously estimated.

In 2022, more than 50% vaccination coverage was once again achieved, an important milestone in the state's recovery process. Surveillance must remain constant in order to maintain the achieved indicator.

Among the various factors that hinder the development of effective public policies to improve the region's epidemiological scenario are the population's lack of awareness regarding the importance of vaccination, the lack of assistance from municipalities to health professionals, the lack of division of competence between the state and municipal health departments, the lack of coordination in the immunobiological acquisition and distribution chain, the underreporting of vaccines, the geographical difficulty in reaching more isolated populations (riverside, indigenous and quilombola populations) and fake news.

By mapping areas with lower coverage and higher risk, carrying out situational diagnosis, carrying out active searches, developing logistics chains for vaccine distribution, creating health information centers and combating fake news and indication of commitment frameworks with society (social pacts), the aim is to maintain the homogeneity of vaccination coverage, in order to avoid pockets of susceptible people.

ASSOCIATED ACADEMIC WORK

Not applicable.

INTEREST CONFLICTS

The authors declared that they have no conflicts of interest.

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