

## NATIONAL SUS IMMUNIZATION PROGRAM AND ITS IMPACT ON SOCIETY

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**Abstract:** Over the past 50 years, the vaccine has saved more lives on a global scale than any other medical product or procedure. Vaccination is widely recognized as one of the most effective public health treatments in the world. Since 1976, the National Immunization Program (PNI) has played a crucial role in Brazil's success in controlling vaccine-preventable diseases. This work is an integrative review study, with an exploratory descriptive character, with a qualitative approach, whose main objective is to analyze the recent dynamics associated with the supply of vaccines in Brazil according to the vaccine schedule, identifying its reflexes and the challenges imposed on access universal access to health in the country. The study highlighted the need to develop new strategies in the National Vaccination Plan to overcome the challenges faced by the country.

**Keywords:** Vaccines, Immunization, SUS (Unified Health System), Brazil.

## INTRODUCTION

The development of vaccines and the establishment of global immunization strategies against highly infectious diseases were decisive for significant changes in the pattern of diseases that affect the population (ANDERSON, 2016).

The modern origin of vaccine development dates back to the work of Edward Jenner, a French-English naturalist and physician who pioneered the concept of vaccines, including the invention of the smallpox vaccine in 1796 (BARON, 2014). Since then, there have been significant advances in terms of improvement and technological efficiency, from simple vaccines produced with attenuated viruses to the development of multivalent vaccines that use antigenic strains of the circulating pathogen, such as pneumonia and human papillomavirus (HPV) (GADELHA et al., 2020).

Over the past 50 years, vaccination has saved more lives on a global scale than any other medical product or procedure. Consequently, vaccination is recognized as one of the most successful public health interventions in the world. Even with movements in society that contest the benefits of these immunological agents, vaccination is enshrined as an essential component of the right to health, an individual, community, social and governmental responsibility (GADELHA et al., 2020).

For the successful control of vaccine-preventable diseases in Brazil, the National Immunization Program (PNI) was instituted in 1973, even before the creation of the Unified Health System (SUS), in 1988. Based on the performance of the program, until today Currently, significant improvements are observed in the health of the Brazilian population (TEMPORÃO, 2003; DI SANTO et al., 2022).

Since the creation of the program, contributions such as the eradication of smallpox, the elimination of poliomyelitis, urban yellow fever, measles and rubella virus circulation have been observed in society, as well as a reduction in the incidence of diphtheria, whooping cough, tetanus, tuberculosis in children under 15 years of age, and, more recently, meningitis and pneumonia (SILVA JUNIOR, 2013; DOMINGUES et al., 2019).

In addition, these benefits provided a reduction in the incidence and mortality due to vaccine-preventable diseases, especially in the first years of the individual's life, in addition to notable reflections in the increase in life expectancy and in the reduction of hospitalizations (ALVES et al., 2019).

The catalog of vaccines offered by SUS has been increased over time and currently 20 vaccines are available for more than 20 diseases (MINISTÉRIO DA SAÚDE, 2022). Similar to

civilized nations, the National Vaccination Calendar covers not only children, but also adolescents, adults, pregnant women, the elderly, indigenous peoples and vaccines for special groups. However, the success of the PNI and its growing complexity have become an obstacle to maintaining adequate vaccination coverage (DOMINGUES et al., 2019).

Due to the reduction in morbidity and mortality rates generated by the population's adherence to vaccines, people were no longer aware of the threat that these vaccine-preventable diseases pose to their personal health, the health of their families and the health of the community (DOMINGUES et al, 2019).

Reemerging diseases indicate a change in the epidemiological behavior of already known diseases, which had been controlled, but which again presented a threat to human health (MORAES et al., 2020).

In December 2019, an outbreak of pneumonia of unknown origin was reported in Wuhan, China. Subsequently, the SARS-CoV-2 respiratory virus was isolated from the inoculation of respiratory samples into human airway epithelial cells. The global spread of SARS-CoV-2 and the thousands of deaths caused by the coronavirus disease (COVID-19) led the World Health Organization to declare a pandemic on March 12, 2020. And since then, the world has paid a heavy price for this pandemic in terms of human lives lost, economic repercussions and increased poverty (CIOTTI et al., 2020).

Although the vaccination schedule in Brazil against COVID-19 began in February 2021, the slow immunization of the population maintained a scenario of hope and, at the same time, fear of unfavorable health outcomes, corroborating the dissemination of Fake News about the immunobiological advantages of vaccines and their low adherence numbers

(SACRAMENTO & PAIVA, 2020).

Anti-vaccination movements, coming from a wide range of vaccine critics, were strengthened during this fragile period of humanity and are increasingly frequent and persuasive, disseminating information without scientific basis about the risks of vaccines (BELTRÃO et al., 2020).

Since the 1990s, childhood immunization rates have been above 95%, which shows that the general public has followed vaccine recommendations well. These coverages, however, decreased by about 10 to 20 percentage points from 2016 onwards. As a result, the infant and maternal mortality rate also increased (SATO, 2018).

There are countless variables that contribute to this decline, including the weakened state of the Unified Health System (SUS), technological advances such as the installation of the new information system on immunization, in addition to social and cultural elements that influence the acceptability of vaccination (SATO, 2018).

Brazil has been successful in building a productive base that is essential to guarantee equitable access to vaccination in the country, but innovation and information efforts have still proved to be insufficient. It is noted that to achieve innovation capacity, the main challenge is to go beyond the strategies that connect the local productive base and the national public demand (CONDE & ARAÚJO-JORGE, 2003).

Aiming to contribute to overcoming the national dilemma of directing science, technology and innovation efforts in health towards social needs on sustainable and less asymmetric bases, this study was based on the following guiding question: What impact does the national immunization program have on SUS in society?

Considering that aspects inherent to the process of innovation and globalization are

central elements for thinking about national strategies in the vaccine segment, the present work aims to analyze the recent dynamics associated with the supply of vaccines in Brazil according to the vaccine schedule, identifying its consequences and the challenges imposed on universal access to health in the country.

## **MATERIAL AND METHOD**

This is an integrative review study, with an exploratory descriptive character, with a qualitative approach researched in articles published from 2017 to 2022. The bibliographic survey was carried out through the Scientific Electronic Library Online (SciELO), National Library databases of Medicine (PUBMED) and Virtual Health Library (VHL). In the advanced search of each database, the following descriptors were used in English and Portuguese: Vaccines, immunization, SUS and Brazilian population.

In the selection process (Figure 1), articles written in Portuguese and English, published in less than 5 years, were chosen.

Based on the inclusion and exclusion criteria, the number of articles found and included in the study was defined, with the data shown in Table 1, in which publications with non-pertinent titles and repeated in more than one informational resource were also excluded of the count.

The search focused on works that presented a perspective on the current Brazilian vaccination program, with an analysis of its efficiencies and contributions to the population. This study also advocated contributing to the formulation of hypotheses and serving as a basis for other studies with the same theme.

## **RESULTS AND DISCUSSION**

The survey results show that currently 20 vaccines are provided nationally for children, adolescents, adults, elderly and pregnant women based on the National Vaccination Calendar. Of these, 18 are vaccines only for children and adolescents.

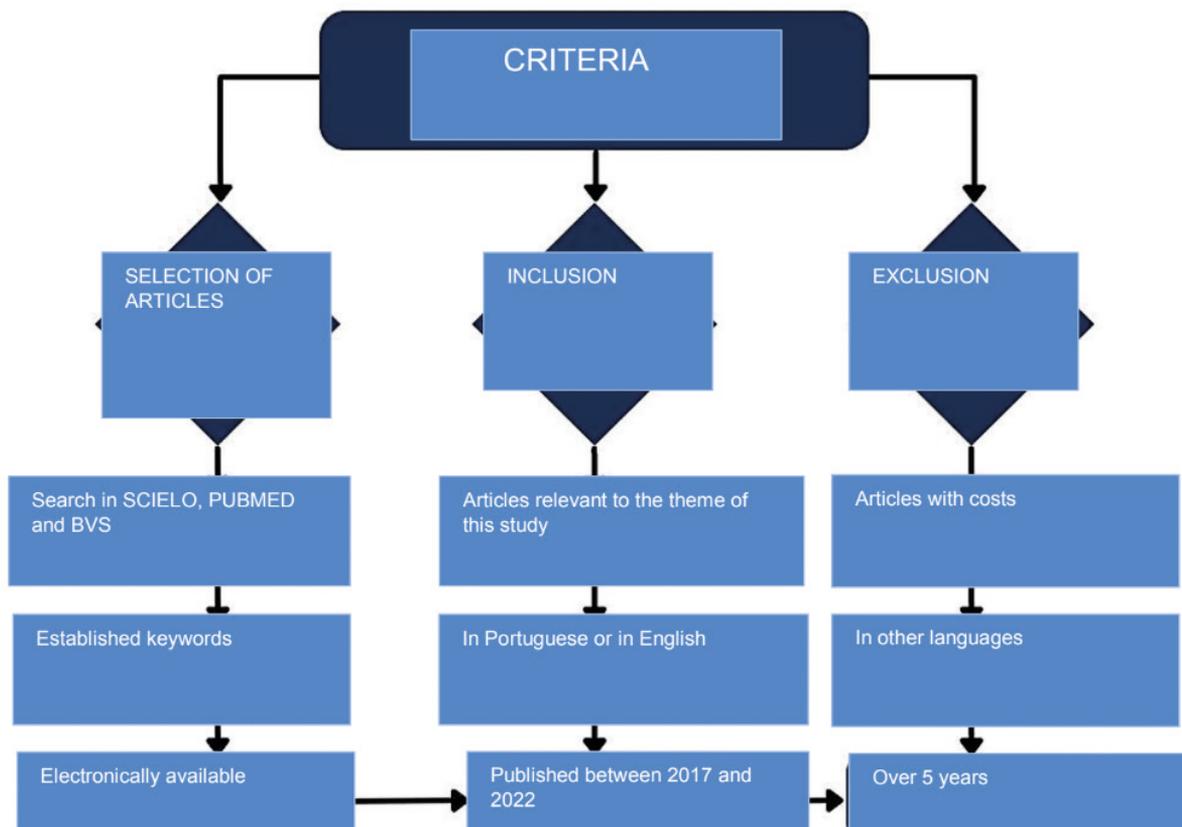
According to the Ministry of Health (2022), there are more than 38,000 vaccination rooms spread across the Basic Health Units (UBS) in the country, where the entire population has the right to receive free vaccines with the vaccination card.

The agency also informs that occasionally, the individual may suffer from side effects such as fever and local pain after administration of a vaccine, but the advantages of immunization outweigh the risks of these temporary reactions since all licensed vaccines are evaluated and approved by institutes. very strict regulators that carry out several stages of tests, from the initial development processes to production and the final phase that is the application, thus guaranteeing its safety and effectiveness (DA SILVA & DOS SANTOS, 2022).

In addition, to maintain continuous monitoring of product safety, the National Immunization Program, in collaboration with the National Health Surveillance Agency (Anvisa), tracks post-vaccination adverse events of all vaccines provided by the program (DE JESUS et al. al., 2021).

With regard to the dissemination of the PNI, during the search, the need for more vaccination campaigns was noted, since annually, the health departments of the states, municipalities and the Federal District, together with the Ministry of Health, promote only the vaccination campaign flu and the measles vaccination campaign for children under five years of age (SOUZA et al., 2021; SANTOS et al., 2021).

To analyze the vaccine supply process in Brazil according to the vaccine calendar, 25



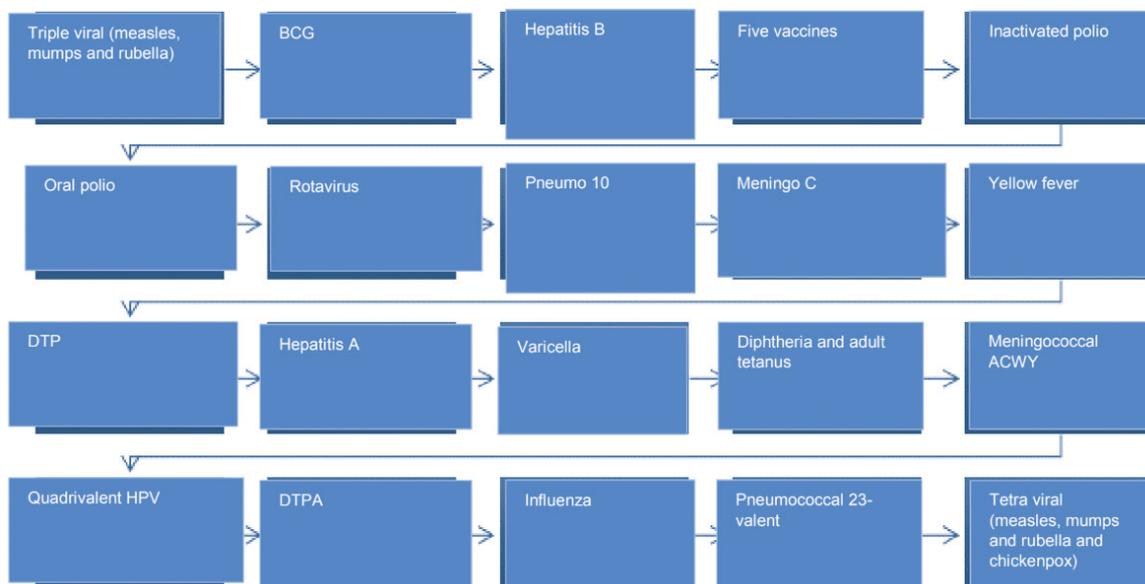
**Figure 1-** Article selection flowchart.

**Source:** The author, 2022.

INFORMATIONAL RESOURCE	INTERFACE	ARTICLES FOUND	ARTICLES INCLUDED
BVS	Biblioteca Virtual em Saúde	7	2
SciELO	Scientific Electronic Library Online	10	6
PubMed	National Library of Medicine	8	5
<b>Total items used</b>		25	13

**Table 1-** Number of publications found in informational resources and included in the study.

**Source:** The author, 2022.



**Figure 2-** Vaccines offered according to the National Vaccination Calendar.

**Source:** Ministry of health (2022).

TITLE OF THE ARTICLE	AUTHORS	YEAR	MAGAZINE
Evaluation of the National Immunization Program Surveillance System - Vaccinated Registration Module, Brazil, 2017	SILVA et al.	2021	Epidemiologia e Serviços de Saúde
The historical context of the implementation of the National Immunization Program (PNI) and its importance for the Unified Health System (SUS)	LIMA & DOS SANTOS PINTO	2017	Scire Salutis
National Immunization Program: the challenge of universal access in the 21st Century	GADELHA	2020	Ciência & Saúde Coletiva
Vaccination coverage: a comparative analysis between the states of the North Region of Brazil	DA SILVA OLIVEIRA et al.	2020	Revista de Patologia do Tocantins
Vacinal coverage of the national immunization program (PNI)	NÓVOA et al.	2020	Brazilian Journal of Health Review
Clinical research for the National Immunization Program	MAIA et al.	2020	Cadernos de Saúde Pública
46 years of the National Immunization Program: a history full of achievements and challenges to be overcome	DOMINGUES et al.	2020	Cadernos de Saúde Pública
The vaccination campaign against SARS-CoV-2 in Brazil and the invisibility of scientific evidence	MACIEL et al.	2022	Ciência & Saúde Coletiva
Evaluation of vaccination coverage of children in a medium-sized city (Brazil) using a computerized immunization record	FERREIRAS et al.	2018	Cadernos de saúde pública
Vaccines for neglected and emerging diseases in Brazil by 2030: the “valley of death” and opportunities for RD&I in Vaccinology 4.0	HOMMA; FREIRE & POSSAS	2020	Cadernos de Saúde Pública
Regulatory evolution and challenges from the perspective of public laboratories producing vaccines in Brazil	STÁVALE, LEAL; FREIRE	2020	Cadernos de Saúde Pública
The panorama of post-vaccination adverse event surveillance at the end of the 2010s: importance, tools and challenges	OLIVEIRA et al.	2020	Cadernos de Saúde Pública
National vaccination plan against COVID-19: use of spatial artificial intelligence to overcome challenges	ROCHA et al.	2021	Ciência & Saúde Coletiva

**Table 2-** Characterization of publications found in scientific databases and included in the study.

**Source:** The author, 2022.

(twenty-five) articles were found, of which 13 (thirteen) were part of the results (Table 2), adding the total of 3 (three) informational resources used in this review to identify the effects of the PNI and its challenges imposed on universal access to health in the country.

Lima and Dos Santos Pinto (2017) discuss the importance of the PNI for maintaining public health and disease prevention. In the authors' investigation, it was possible to verify the advances of the PNI, which included a broad vision of health and the remarkable success of immunization actions in the practice of health services. This way, the PNI is crucial in promoting health, raising the standard of living of a large portion of the Brazilian population, reducing infant mortality and increasing life expectancy.

The evaluation of the Immunization Surveillance System was also carried out by Silva et al. (2021). In the study, the system was considered complex in its description, flexible to changes in the vaccination schedule, of low data quality for DTP and rotavirus vaccines, with high sensitivity for the BCG vaccine, inappropriate for the hepatitis B vaccine and useful for the purposes of the National Immunization Program. It is noteworthy that the findings of quality, acceptability and timeliness of the data did not meet expectations, requiring improvements in the information system.

For Oliveira et al. (2020), identifying diseases, especially rare ones, is a challenge, due to underreporting of cases in Brazil and other nations. Thus, the authors show that the establishment of an effective monitoring system in Brazil has become essential as the number of vaccinations included in the basic schedule and the population's access to them increase. Constant provision of up-to-date data on the benefit/risk of vaccines allows immunization programs to react quickly and accurately to reports of new pathologies.

This maintains the reliability of the system, even more so in the face of the growing anti-vaccination movement and the increasing influence of social media on public opinion.

The authors of Nóvoa et al. (2020), performed observational coverage of the National Immunization Program (PNI) in Brazil in a descriptive, longitudinal and retrospective analysis of data from the DataSus platform corresponding to vaccination coverage in the period from 1994 to 2019 and differences in coverage between states and regions. The study indicated a very satisfactory level of coverage, with a focus on the BCG vaccine. However, there was a diversified access to the intraregional context, as well as the comparison of Brazilian regions. Studies like this one make it possible to understand the needs of the population and the causes of low coverage, guiding future health actions.

Still regarding vaccination coverage, in the study by Da Silva Oliveira et al. (2020), the North Region was appointed with the lowest vaccination coverage among the five regions of Brazil. The need to understand the context and peculiarities of the different national areas is evident in order to develop more specific and effective health policies to increase vaccination coverage rates.

According to Ferreiras et al. (2018), with regard to delays and outdated vaccination records, the event is accentuated according to the recommended age in doses from six months and seems to be more related to age than to the number of doses in the scheme. Despite the increase in the number of doses in the vaccination schedule, little updated coverage was achieved in the national and international literature, but more efforts are needed to increase the opportunity.

As for Domingues et al. (2020), it is necessary to understand the various reasons that are causing the decrease in adherence to immunizations in the vaccine schedule,

favoring an increased risk of reappearance of serious, controlled or completely eradicated diseases in the population.

The research by Maciel et al. (2022), reveals another aspect related to the PNI, the vaccination campaign. According to the authors, the PNI lost its role in conducting the vaccination campaign, mainly against COVID-19. Despite being a vaccination campaign with a lot of potential and one of the most accepted by the population among countries in the world, it presented many problems and left several gaps in the Brazilian scenario. In this sense, it is fundamental that the quality scientific evidence produced during this period can guide a constant remodeling of the vaccination strategy. The following four points must be emphasized: intervals between doses, interchangeability of vaccines, immunization of adolescents and the need for more conclusive data to determine vaccination strategies in certain groups and age groups.

Maia et al. (2020), show clinical research in SUS units as a strategic tool for the PNI, generating scientific knowledge about the vaccines offered and, with this, maintaining the confidence of the population and health professionals in the Program. In addition, as all research must be carried out in line with Good Clinical Practices, carrying out a clinical study in a basic health unit has the potential to improve work procedures. The opportunity to carry out clinical research for the PNI emerges as an instrument for strengthening SUS health policies, as in addition to demonstrating the efficacy and safety of new vaccines of epidemiological interest, it promotes the increase and availability of products that meet the demands of the Ministry of Health.

In Homma, Freire and Possas (2020), the strategy presented above is supported according to the authors' recommendations for the elaboration of new government plans

that support Brazilian manufacturers of public vaccines in international collaborations for the national plan for sustainable development and production of vaccines by 2030.

Stávale, Leal and Freire (2020), emphasize that the responsibility of regulators and manufacturers in guaranteeing the quality, safety and efficacy of vaccines becomes even more critical, since these substances are used, for the most part, in children and patients healthy. Faced with this scenario, manufacturers need to create strategies to keep their products and facilities adequate and an up-to-date and operational quality system. On the other hand, regulatory agencies have the role of ensuring that the products that are in use meet the established criteria, without compromising the supply of medicines to the population.

Based on the study by Gadelha (2020) and Rocha et al. (2021), the vaccine against the coronavirus has become vital for survival in the current scenario and new obstacles arise for the continuity and dialectical triumph of this story. The ability to learn and innovate are crucial elements for the SUS of future opportunities. Never has knowledge and science been so crucial and important to ensuring that everyone in our population has access. It is necessary to rethink the approaches to public health issues that were so brilliantly addressed in the PNI. The greatest task of the 21st century is to reconcile sovereignty, science and health, as in the original PNI tradition, in a democratic scenario governed by the right to knowledge, development and life. Once again, the PNI must constitute a transforming seed for an equitable future that is in a hurry.

## FINAL CONSIDERATIONS

In conclusion, given what was presented, there is a need to recover the values of the importance of vaccination for the population, which were the basis for building this success story and this way, maintain all the

achievements achieved until the days of today. For this, it will be necessary to face the challenge of finding a balance between the application of coercive measures and persuasive strategies.

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