

**VACCINE COVERAGE
FOR CHILDREN FROM
ZERO TO TWELVE
MONTHS OF AGE IN
BASIC HEALTH UNITS IN
THE MUNICIPALITY OF
RIBEIRÃO PRETO**

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Abstract: The Brazilian National Immunization Program makes several vaccines available to children, seeking to increase vaccination coverage and reach the target of 95%. Failure in collective immunization can lead to outbreaks, often of diseases that were under control in the country. The objective of the present study is to evaluate the vaccination coverage of children from zero to twelve months of age followed up at Basic Health Units (BHU) in the northern district of Ribeirão Preto. The electronic or physical medical records of children from zero to twelve months of age who attended the UBS in the northern district of Ribeirão Preto were checked, and the vaccines registered according to the National Vaccination Calendar were evaluated. The analyzed vaccines were classified as “confirmed” or “unconfirmed”. Vaccination records of 502 children under one year of age were evaluated. The BCG vaccine achieved vaccination coverage of 97.20%; Hepatitis B 96.60%; Pentavalente reached 92.31%, 73.47% and 50.83%, in the first, second and third doses, respectively; VIP 94.58%, 89.88% and 77.70% in the first, second and third doses respectively; Rotavirus 92.97% and 88.56% in the first and second doses respectively; 10-valent pneumococcal 93.45% and 89.92% in the first and second doses, respectively; Meningococcal C 92.25% and 86.94% in the first and second doses respectively; Yellow Fever reached 63.36%; Triple Viral 78.81%. It was concluded that only the BCG, Hepatitis B, VIP (1st dose), Human Rotavirus (1st dose) and Pneumococcal 10 (1st dose) vaccines met the established coverage.

Keywords: Vaccination coverage, Immunization programs, Child health.

INTRODUCTION

The most effective way to prevent some vaccine-preventable diseases in children and

adults is through the vaccine. However, the difficulties in accessing health services, and the lack of confidence in their effectiveness, generated by misinformation propagated by various means, can undermine the success of vaccination coverage in public health services. It is essential, therefore, that the doses are administered in the period planned by the health services, especially in children in their first year of life (PERSON; PUGA; ATALLAH, 2019; SOUZA et al., 2018).

In Brazil, the National Immunization Program (PNI) is a policy that has achieved important results, through universal vaccination, such as the certification of an area free from the circulation of wild poliovirus (FIOCRUZ, 2021). However, some people choose not to be vaccinated, just as parents/guardians prefer not to vaccinate their children, due to factors such as beliefs, superstitions, fear, myths and the difficulty of accessing health services (QUEIROZ et al., 2013). In addition, more recently, social media has allowed the dissemination of arguments from anti-vaccine movements (SUCCI, 2018).

This fact is often responsible for the failure of collective immunity, as a result, outbreaks and epidemics arise, sometimes of diseases already considered controlled in the country, as is the case of measles, which was reported in the Brazilian area in 2018, mainly in the United States. states of Amazonas and Roraima, due to the importation of the D8 genotype of the Morbillivirusmeasles virus from Venezuela (BRASIL, 2018a).

Vaccination coverage is designated as a set of eight indicators that assess vaccination in individuals under one year of age for nine diseases, namely: 1 dose of hepatitis B, 1 dose of MRS (measles, rubella, mumps), 3 doses of pentavalent (diphtheria, tetanus, whooping cough, pneumonia caused by Haemophilus influenzae and hepatitis B) and 3 doses of VIP (polio) (BRASIL, 2007).

The vaccination coverage indicator is a fundamental tool for determining actions in the different spheres of management, since adequate coverage is necessary to achieve the control or even the eradication of vaccine-preventable diseases (BRASIL, 2017).

The vaccination coverage target is 95%, but the national rate is 76%. The state of São Paulo has a vaccination coverage rate of 75.20% for poliomyelitis, and 74.40% for measles. In relation to the entire Brazilian territory, the percentages of 76.09% and 76.14%, respectively, are observed for polio and measles (BRASIL, 2018b).

Given this scenario, the low vaccination coverage, studies that investigate local vaccination situations are relevant, to support the development of strategies that improve these indicators.

OBJECTIVES

To evaluate the vaccination coverage in children from zero to twelve months of age in Primary Care units in the city of Ribeirão Preto-SP, identifying the vaccines with the lowest proportion of vaccination coverage and the differences in vaccination coverage between the Basic Health Units (BHU).

MATERIAL AND METHODS

This is a descriptive study, carried out in four BHU located in the North Zone of Ribeirão Preto, SP, covering the population of 4,393 users at the Family Health Unit (FHU) Valentina Figueiredo (CITY HALL OF RIBEIRÃO PRETO, 2010a), 5.677 at FHU Station of Alto (CITY HALL OF RIBEIRÃO PRETO, 2010b), 7.529 at FHU garden Heitor Rigon (CITY HALL OF RIBEIRÃO PRETO, 2010c) e 16.103 at FHU garden Aeroporto (CITY HALL OF RIBEIRÃO PRETO, 2010d).

The electronic medical records of children aged 0 to 12 months attended at the UBS were analyzed and, if they did not have an

electronic record, the physical record was also checked. Subsequently, the following vaccines were categorized into two groups (confirmed and unconfirmed): BCG (Bacillus Calmette-Guérin), Hepatitis B, Pentavalent (Diphtheria, Pertussis, Tetanus, Hepatitis B and Haemophilus influenzae type b), VIP (Inactivated Poliomyelitis Vaccine), Human Rotavirus, Pneumococcal 10-valent, Meningococcal C, Yellow Fever, MRS or MMR (Measles, Mumps and Rubella). The vaccine was considered “confirmed” when it met the appropriate dose and time conditions according to the recommendations of the National Vaccination Calendar (BRASIL, 2018c).

Based on this categorization of vaccines (confirmed and unconfirmed), the Z correlation test was applied, based on the proportion of children with a complete basic regimen at the target age for a given type of vaccine in relation to the number of children at the target age, with 5% significance level.

The inclusion criteria used in the selection were: children between zero and twelve months; children residing in the city of Ribeirão Preto; children registered in the evaluated health units; children registered with correct dates of birth and vaccinations. Exclusion criteria were: children outside the established age; death confirmed before reaching 12 months of age or without a date of death; moving to another municipality without recording the migration date; residents in other municipalities; uncertain records such as duplicates, children registered in dates before birth and dates of vaccine applications before the date of birth.

The project obtained a favorable opinion from the Ethics Committee in Research with Human Beings of the Centro Universitário Barão de Mauá (number 3,691,975, 11/07/2019).

RESULTS

Vaccination records of 502 children aged between 0 and 12 months, with a mean age of 7 months, were evaluated, 265 (52.8%) were girls and 237 (47.2%) were boys.

For the BCG vaccine, which must be administered in a single dose at birth, the expected coverage is 90% (BRASIL, 2017). The coverage found for this vaccine for the researched population significantly exceeded the expected coverage, reaching 97.20% of the target population (Table 1).

Regarding vaccines with recommended coverage of 95%, Hepatitis B met the expected coverage, covering 96.60% of children in this age group; the Pentavalent vaccine achieved lower than expected vaccine coverage, with 92.31% of the population vaccinated with the first dose, 73.47% with the second dose and 50.83% with the third dose; the VIP vaccine met the coverage established for the first dose, reaching 94.58% of children, while the second and third doses were lower than expected, covering 89.88% and 77.70% of children with indication; for the Rotavirus vaccine, the dose administered at 2 months met the established coverage, with 92.97% of children vaccinated, while the dose administered at 4 months was lower than the established coverage, with only 88.56% of the target audience vaccinated; the first dose of the 10-valent pneumococcal vaccine met the established coverage, with 93.45% of the vaccinated individuals, while the second dose was lower than the established coverage, with 89.92% of the vaccinated individuals; both doses of Meningococcal C had lower coverage, with 92.25% of the population vaccinated with the first dose and 86.94% with the second dose; for the MMR vaccine, coverage was 78.81% of children older than 6 months, lower than the established target (Table 1).

The target coverage of the yellow fever vaccine is 100%. It is administered at 9

months of age (BRASIL, 2017), and presented coverage of 63.36% (Table 1).

The vaccines that reached the expected coverage were BCG, Hepatitis B, first dose of VIP, Rotavirus and Pneumococcal 10 valent. On the other hand, the vaccination coverage of the other vaccines was significantly lower than that recommended by the Ministry of Health of Brasil.

Among the vaccines evaluated, BCG and Hepatitis B were the ones with the highest coverage, and the USF Estação do Alto and USF Valentina Figueiredo reached 100% application of both vaccines. UBS Jardim Aeroporto had the lowest percentage (96.15%).

Observing vaccination coverage in the city of Ribeirão Preto - SP and in the state of São Paulo, according to DataSUS, in 2019 (Table 2), with the results of the present study, the percentage rates of vaccination coverage in the units surveyed were higher for all immunobiologicals present in the Vaccination Calendar of children from zero to twelve months.

The individual evaluation of the BHU allowed us to verify that the FHU Station of Alto has the highest rate of vaccination coverage among all the units evaluated, considering that the BCG and Hepatitis B vaccines had 100% adherence this year (Table 3). On the other hand, BHU Garden Aeroporto, as it covers a larger population, has lower rates of vaccination coverage. In comparison with the FHU Station of Alto, the BCG vaccine, in garden Aeroporto, had a coverage of 96.15%, while Hepatitis B had a coverage of 96.56%. In this unit, the yellow fever vaccine was the one with the lowest vaccination coverage of the target population. (60,81%).

In general, it was found that the larger the population covered, the lower the vaccination coverage. Comparing the FHU Garden Heitor Rigon and Valentina Figueiredo with the average vaccination coverage of all units

Vaccine	observed	Expected	N	p
BCG	0,9720	0,90	500	<0,001
HEPATITIS B	0,9660	0,95	500	0,1010
PENTAVALENTE 1st dose	0,9231	0,95	442	0,0094
PENTAVALENTE 2nd dose	0,7347	0,95	377	<0,001
PENTAVALENTE 3rd dose	0,5083	0,95	303	<0,001
VIP 1st dose	0,9458	0,95	443	0,6892
VIP 2nd dose	0,8988	0,95	405	<0,001
VIP 3rd dose	0,7770	0,95	305	<0,001
ROTAVIRUS 1st dose	0,9297	0,95	441	0,0500
ROTAVIRUS 2nd dose	0,8856	0,95	376	<0,001
Pneumococcal 10 1st dose	0,9345	0,95	443	0,1362
Pneumococcal 10 2nd dose	0,8992	0,95	377	<0,001
Meningococcal C 1st dose	0,9225	0,95	413	0,0104
Meningococcal C 2nd dose	0,8694	0,95	337	<0,001
YELLOW FEVER	0,6336	0,999	131	<0,001
VIRAL TRIPLE	0,7881	0,95	302	<0,001

Table 1 - Vaccination coverage in children (N = 502). Municipality of Ribeirão Preto, Brasil, 2019.

Source: own authorship.

Vaccine	Municipality of Ribeirão Preto (%)	Municipalities in the state of São Paulo (%)
BCG	43,55	50,70
Hepatitis B	4,14	47,15
Pentavalent	36,93	49,04
VIP	37,25	52,48
rotavirus	34,87	53,12
Pneumococcal 10	35,52	54,44
meningococcal	36,31	54,07
Yellow fever	40,26	45,08
Triple Viral	43,30	60,19

Table 2- Coverage by Immunobiological according to the Municipality of Ribeirão Preto and Municipalities of the State of São Paulo, in the year 2019

Source: DataSUS (2019) adapted.

Vaccine	Vaccination coverage			
	FHU Station of Alto	BHU Garden Aeroporto	FHU Valentina Figueiredo	FHU Heitor Rigon
BCG	100%	96,15%	100%	98,85%
Hepatitis B	100%	96,45%	100%	98,85%
pentavalent	91,43%	90,39%	100%	95,40%
VIP	91,43%	93,59%	97,22%	97,70%
rotavirus	85,71%	91,46%	100%	97,70%
Pneumococcal 10	91,43%	93,24%	100%	97,70%
meningococcal	88,24%	91,05%	97,22%	95,18%
Yellow fever	73,33%	60,81%	61,54%	66,67%
Triple Viral	75,00%	80,00%	88,89%	72,31%

Table 3- Vaccination coverage at FHU Station do Alto, BHU Garden Aeroporto, USF Valentina Figueiredo and FHU Heitor Rigon in 2019.

Source: own authorship.

analyzed, the same proportion of vaccination coverage is obtained (Table 4).

Comparing the average vaccination coverage of the FHU (Station of Alto, Garden Heitor Rigon and Valentina Figueiredo) and the BHU Garden Aeroporto, there is a higher vaccination coverage of the HUF in all nine vaccines analyzed (Table 5).

On the other hand, when comparing the FHU alone with the BHU Jardim Aeroporto, the FHU Estação do Alto presented lower coverage for the VIP, Rotavirus, Pneumococcal 10 and Meningococcal vaccines (Table 6).

DISCUSSION

By comparing the units individually, it is possible to identify that the larger the population served by the unit, the lower the vaccination coverage. There are several alternatives for improving the non-adherence of guardians to childhood vaccination, among them, increasing awareness campaigns on the importance of each vaccine, and improving the level of education of parents or guardians. Regarding health services, strategies such as improving the organization of the vaccination department of the units with availability of work equipment and adequate supply of

immunobiologicals, reduction of waiting time, creation of a personalized vaccination calendar and reminders through phone calls are also can contribute to increasing vaccination coverage (CAVALCANTI; NASCIMENTO, 2015).

The low coverage found for some vaccines can be explained by some factors, such as vaccine hesitancy, lack of parental commitment, often resulting from fake news, or even the replacement of isopathic vaccines (MORAIS; QUINTILIO, 2021; SATO, 2021; SATO, 2018; REPA; SILVA, 2018; QUEIROZ et al., 2013) and the concern about possible adverse events associated with the high amount of immunizing agents present in a dose. Thus, vaccines that are administered in the same period have different coverage, which indicates that children are taken to health units, but there is no simultaneous vaccination according to the Vaccination Calendar.

According to a monitoring carried out in Brazilian municipalities, the main reasons that explain the low vaccination rate would be the parents' misunderstanding that several diseases have been eradicated, the lack of knowledge of the vaccines that make up the

Vaccine	Average vaccination coverage	Vaccination coverage at BHU
BHU Jardim Aeroporto		
BCG	97,59%	96,15%
Hepatitis B	97,38%	96,45%
pentavalent	92,26%	90,39%
VIP	94,53%	93,59%
rotavirus	92,94%	91,46%
Pneumococcal 10	94,53%	93,24%
meningococcal	92,20%	91,05%
Yellow fever	63,63%	60,81%
Triple Viral	78,66%	80,00%
FHU Heitor Rigon		
BCG	97,59%	98,85%
Hepatitis B	97,38%	98,85%
pentavalent	92,26%	95,40%
VIP	94,53%	97,70%
rotavirus	92,94%	97,70%
Pneumococcal 10	94,53%	97,70%
meningococcal	92,20%	95,18%
Yellow fever	63,63%	66,67%
Triple Viral	78,66%	72,31%
FHU Valentina Figueiredo		
BCG	97,59%	100%
Hepatitis B	97,38%	100%
pentavalent	92,26%	100%
VIP	94,53%	97,22%
rotavirus	92,94%	100%
Pneumococcal 10	94,53%	100%
meningococcal	92,20%	97,22%
Yellow fever	63,63%	61,54%
Triple Viral	78,66%	88,89%
BHU Estação do Alto		
BCG	97,59%	100%
Hepatitis B	97,38%	100%
pentavalent	92,26%	91,43%
VIP	94,53%	91,43%
rotavirus	92,94%	85,71%
Pneumococcal 10	94,53%	91,43%
meningococcal	92,20%	88,24%
Yellow fever	63,63%	73,33%
Triple Viral	78,66%	75,00%

Table 4- Vaccination coverage of the Health Units studied in relation to the average vaccination coverage of all Health Units in Ribeirão Preto, in the period of 2019.

Source: Own authorship.

Vaccine	Average of vaccine coverage in FHU	Vaccination coverage at BHU
BCG	99,61%	96,15%
Hepatitis B	99,61%	96,45%
Pentavalent	95,61%	90,39%
VIP	95,45%	93,59%
Rotavirus	94,47%	91,46%
Pneumococcal 10	96,37%	93,24%
Meningococcal	93,54%	91,05%
Yellow fever	67,18%	60,81%
Triple Viral	78,73%	80%

Table 5- Vaccination coverage at BHU Garden Aeroporto and average vaccination coverage at FHU Station of Alto, Valentina Figueiredo and Heitor Rigon, in 2019.

Source: Own authorship.

Vaccine	Vaccination coverage at FHU Station of do Alto	Vaccination coverage BHU Garden Aeroporto	FHU vaccination coverage Valentina Figueiredo	FHU vaccination coverage Heitor Rigon
BCG	100%	96,15%	100%	98,85%
Hepatitis B	100%	96,45%	100%	98,85%
Pentavalent	91,43%	90,39%	100%	95,40%
VIP	91,43%	93,59%	97,22%	97,70%
Rotavirus	85,71%	91,46%	100%	97,70%
Pneumococcal 10	91,43%	93,24%	100%	97,70%
Meningococcal	88,24%	91,05%	97,22%	95,18%
Yellow fever	73,33%	60,81%	61,54%	66,67%
Triple Viral	75,00%	80,00%	88,89%	72,31%

Table 6- Vaccination coverage of FHU Station of Alto, Valentina Figueiredo and Heitor Rigon and BHU Garden Aeroporto in the year of 2019.

Source: Own authorship.

vaccination schedule, the fear of dangerous adverse reactions for the body, high number of some doses at a certain age that would cause harm to the child and the short time available to attend the clinic during its opening hours (ZORZETTO, 2018).

Despite the expansion of Primary Care in Brasil, vaccination coverage rates have been decreasing. However, the Family Health Units analyzed showed better results, corroborating Oliveira, Oliveira and Sanchez (2021), who showed similar results for the Influenza vaccine. Municipalities with greater coverage of Primary Care, primarily with the Family Health Strategy model and with a greater proportion of community workers per inhabitant, carry out more active searches for children with vaccination delays.

Adherence to vaccines has been decreasing year after year, since 2013, leading to the reappearance of controlled diseases. (SANSON; CREMONESE, 2018). In the present study, coverage for all vaccines from the fourth month of life was below recommended, which confirms this trend.

Silva et al. (2019) found, in a health regional of Pernambuco, adequate vaccine coverage for Triple Viral, Pneumococcal, Poliomyelitis and Pentavalent, and the Rotavirus and Meningococcal C vaccines had averages below the target recommended by the regional. The four units evaluated in Ribeirão Preto reached the goal established for the first dose of Poliomyelitis, Pneumococcal 10-valent and Rotavirus.

The state of Sergipe had 88.5% vaccination coverage, with some health regions below 80% (JESUS; SANTOS, 2019). In the sample of BHU in Ribeirão Preto, coverage for Hepatitis B was the second highest (86.6%), while Sergipe had the lowest rate. In 2017, the vaccine with the highest vaccine coverage was BCG in the northeastern state, also observed in the present study.

In Araraquara (TAUIL, 2017) and Ribeirão Preto, the highest vaccine coverage found was for Hepatitis B and BCG. However, in Araraquara, the lowest coverage was for the Triple Viral and Meningococcal C vaccines. It was observed that the BCG, Hepatitis B, Rotavirus, Pneumococcal, Poliomyelitis vaccines, applied up to 12 months, reached vaccination coverage above 95%, while in Ribeirão Preto, only the first two were also above the established target.

In a study on vaccine coverage for MMR in the regions of Brasil, from 2013 to 2019, it was observed that, from 2017 onwards, there was a decrease in vaccine coverage, which had already been happening since 2015 in the North region. Since then, Brasil has been facing a return of measles (CHAVES et al., 2020). A drop in the number of vaccinations for the MMR was also observed, nationwide, in a study carried out between 2006 and 2016, in which the vaccine had the greatest reduction in the number of immunized, reaching a decrease of 2.7% each year. (ARROYO et al., 2020). The low vaccine coverage of the Triple Viral vaccine could also be observed in the present study.

CONCLUSION

Vaccination coverage observed in children aged 0 to 12 months reached the target for BCG, Hepatitis B, first dose of VIP, Rotavirus and Pneumococcal 10 valent.

The three doses of Pentavalente, the second and third doses of VIP, the second dose of Rotavirus Human and Pneumococcal 10, the first and second doses of Meningococcal C, Yellow Fever and Triple Viral were significantly lower than the coverage recommended by the Ministry of Health of Brazil.

A progressive decline in vaccination coverage was identified throughout the first year of life.

The results obtained reproduce the national vaccination scenario and make it possible to reflect on more comprehensive and effective health education and continuing education actions..

INTEREST CONFLICTS

The authors declare that there is no conflict of interest.

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