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Vaccine Situation of Children Registered in Family Health Teams

Situação Vacinal de Crianças Cadastradas em Equipes de Saúde da Família

Situación de Vacunas de Niños Matriculados en los Equipos de Salud Familiar

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ABSTRACT

Objective: to analyze the vaccination status of children under three years old, registered in Family Health Teams. **Method:** cross-sectional study carried out in Family Health Units in João Pessoa, Paraíba, Brazil, with 424 booklets for children under three years of age. Data were collected between May and November 2019, with the help of an instrument prepared according to the Child Handbook, and analyzed using descriptive and inferential statistics. **Results:** 295 (69,6%) booklets were updated according to the child's age, with a higher percentage of delay 58 (40%) in the booklets of children between 12 and 23 months. The most registered vaccines were BCG and Hepatitis B. Male children aged between 12 and 23 months showed a significant association with vaccination update. **Conclusion:** vaccination coverage is below what is recommended, and campaigns are needed to guide the population for better adherence to vaccines and an active search for children with delayed vaccinations.

DESCRIPTORS: Child health; Immunization; Primary health care; Health records, personal; Primary prevention.

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RESUMO

Objetivo: analisar a situação vacinal de crianças menores de três anos, cadastradas em Equipes de Saúde da Família. **Método:** estudo transversal, realizado em Unidades de Saúde da Família de João Pessoa, Paraíba, Brasil, com 424 cadernetas de crianças menores de três anos. Os dados foram coletados entre maio e novembro de 2019, com o auxílio de um instrumento elaborado conforme Caderneta da Criança, e analisados por estatística descritiva e inferencial. **Resultados:** 295 (69,6%) cadernetas estavam atualizadas conforme idade da criança, com maior porcentagem de atraso 58 (40%) nas cadernetas de crianças entre 12 e 23 meses. As vacinas mais registradas foram BCG e Hepatite B. Crianças do sexo masculino e entre 12 e 23 meses apresentaram associação significante com atualização vacinal. **Conclusão:** a cobertura vacinal está abaixo do recomendado, sendo necessárias campanhas de orientação a população para melhor adesão as vacinas e busca ativa de crianças com atraso vacinal.

DESCRITORES: Saúde da criança; Imunização; Atenção primária à saúde; Registros de saúde pessoal; Prevenção primária.

RESUMEN

Objetivo: analizar el estado de vacunación de los niños menores de tres años, registrados en los Equipos de Salud de la Familia**.** **Método:** estudio transversal realizado en Unidades de Salud de la Familia en João Pessoa, Paraíba, Brasil, con 424 folletos para niños menores de tres años. Los datos fueron recolectados entre mayo y noviembre de 2019, con la ayuda de un instrumento elaborado según el Manual del Niño, y analizados mediante estadística descriptiva e inferencial. **Resultados:** 295 (69,6%) cuadernillos se actualizaron según la edad del niño, con mayor porcentaje de atraso 58 (40%) en los cuadernillos de niños entre 12 y 23 meses. Las vacunas más registradas fueron BCG y Hepatitis B. Los niños varones de entre 12 y 23 meses mostraron una asociación significativa con la actualización de la vacunación. **Conclusión:** la cobertura de vacunación está por debajo de lo recomendado, y se necesitan campañas que orienten a la población para una mejor adherencia a las vacunas y una búsqueda activa de niños con vacunación tardía.

DESCRIPTORES: Salud del niño; Inmunización; Atención primaria de salud; Registros de salud personal; Prevención primaria.

INTRODUCTION

Vaccination is an effective strategy for prevention, control, and eradication of immunopreventable diseases, as well as for reducing morbidity and mortality; it is a highly cost-effective practice.[1–2]

The National Immunization Program (PNI), created in 1973 and periodically updated, provides vaccines for all age groups, including children. Every child has the right to receive free of charge the vaccines included in the National Vaccination Calendar, and it is also the duty of the child's guardian and professionals to provide access to these vaccines in public health services.[3]

Health professionals must refer children to the vaccination room, and the nursing team is responsible for administering and recording the vaccines received by the child, including the scheduling of the basic schedule and reinforcements in the Child's Health Book (CHB), in order to monitor the vaccination status.[1,4]

Although vaccination is an extremely important preventive resource for the entire population, especially for the most vulnerable groups, such as children, studies show that antivaccination movements are increasingly frequent and persuasive.[5–6] These movements use strategies such as distortion and dissemination of false information that question the efficacy and safety of various vaccines.[5] Therefore, this antivaccine movement and indecision and/or delay in the use of immunobiologicals lead to attitudes that put at risk not only the health of the individual, but of everyone around them.[6]

Furthermore, the literature highlights that the incomplete or delayed vaccination schedule, as well as gaps in the completion of children's report cards, is a pressing reality.[7–9] A survey conducted in Cuiabá, MT, showed that 39.7% of the report cards evaluated had incomplete vaccination status for the child's age10, according to the recommended basic schedule, while the recommended immunization goal is between 90 and 95% of the child population.[11]

Therefore, it is necessary to identify whether this is a problem existing in other locations in Brazil and which children are more vulnerable to incomplete vaccination. Therefore, this study aims to analyze the vaccination status of children under three years of age, registered in Family Health Teams (FHT). It is expected that this research can subsidize discussions and strategies to improve the monitoring and adequate immunization records in the Children's Health Booklet, aiming to promote and protect children's health, with special attention to early childhood and the most vulnerable populations.

METHODS

Cross-sectional study, conducted from May to November 2019 in Family Health Units (FHUs) of João Pessoa, Paraíba, Brazil. This municipality has 200 Family Health Teams, distributed in five Sanitary Districts (DS), responsible for the assistance of 170,444 registered families, of which 252,417 are children under five years old.[12]

Sampling was stratified according to the method of optimal allocation to strata of interest (Health Districts). The number of live births in the years 2016 to 2018 (14,850 children) was used as reference for the calculation, resulting in a sample of 354 children, plus an additional of eventual losses. Thus, the sample

was composed of 424 booklets of children seen in the USFs of the five DS of the municipality. To reach the sample, the five FHU with the highest number of registered children were selected in each SD, totaling 25 FHU for data collection.

The study participants met the following inclusion criteria: mothers/caregivers of children under three years old enrolled in the FHU, older than 18 years of age and carrying the CHB at the time of data collection.

Data were collected through systematic sampling in the waiting line for medical or nursing consultation, in the vaccination room and/or during home visits, through direct consultation in the booklets, with the help of an instrument developed based on the CHB. The mothers/caregivers were interviewed to fill out a socioeconomic questionnaire.

A value of 1 (one) was assigned to notebooks in which at least one dose of the vaccine was recorded in the vaccination schedule; 0 (zero), when no record was found according to the recommended age to receive the vaccine; and value 3 (not applicable) when the child was not old enough to receive a given vaccine. It was considered vaccine delay when there were no records of vaccines in the booklet, according to age.

The data were analyzed in open source statistical software, from descriptive statistics, calculating the absolute and relative frequency of the variables. For inferential analysis, the Chi Square test was performed, with a 95% significance level, and Poisson Regression with robust variance, whose entry criterion for the variables was set at $p<0.20$.

This study is linked to the universal project "Surveillance of Development and the Child Health Handbook: ways to promote child health", which was approved by the Research Ethics Committee, under opinion 3.156.449. The development of the research followed the national and international norms for studies involving human beings. The mothers and/or guardians of the children signed two copies of the Informed Consent Form.

RESULTS

We included 424 booklets of children under three years of age, whose mothers/caregivers were 357 (84.2%) or older, married or in a stable union 333 (78.5%), from home 312 (73.6%), with eight or more years of schooling 319 (75.2%), and with two or more children 267 (63%). Among the notebooks analyzed, 144 (34%) belonged to children younger than six months and 143 (33.7%) were aged between 12 and 23 months (Table 1).

Regarding vaccination updates, 295 (69.6%) booklets were up to date for the child's age. The bivariate analysis showed a significant association ($p<0.05$) between the child's age and vaccination update, with emphasis on greater delay in those aged 12 to 23 months (Table 2).

Table 3 shows the distribution of recommended vaccines according to the child's age, revealing the highest percentage of BCG and Hepatitis B vaccine records, 410 (96.7%) and 409 (96.5%), respectively. In contrast, the DTP, Tetra Viral, Triple Viral, and Hepatitis A vaccines had the lowest percentages of registration, 41 (9.7%), 37 (8.7%), 32 (7.6%), and 26 (6.1%), respectively.

Table 1 - Descrição das variáveis referentes às características sociodemográficas da mãe/responsáveis e das crianças com menos de três anos de idade e o seu calendário de vacinação. João Pessoa, PB, Brasil 2019

Variables	N	%
Mother/Caregiver Information		
Age		
< 20 years old	67	15,8
≥ 20 years old	357	84,2
Years of Study		
< 8 years	105	24,8
≥ 8 years	319	75,2
Marital Status		
Married/Stable Union	333	78,5
Single	91	21,5
Family income		
< 1 Minimum wage	101	23,8
> 1 Minimum wage	323	76,2
Number of children		
1 child	157	37
2 or more	267	63
Workplace		
Home	312	73,6
Outside the home	112	26,4
Child Data		
Age		
Under 6 monthss	144	34,0
7 to 11 months	83	19,6
12 to 23 months	143	33,7
24 to 36 months	54	12,7
Gender of the child		
Female	221	52,1
Male	203	47,9
Vaccine schedule		
Yes	401	94,6
No	23	5,4
Vaccination update according to age		
Yes	295	69,6
No	129	30,4

To evaluate the independent effect of variables, Poisson Regression with robust variance (Table 4) was performed between the variables: child's age and gender with vaccination update. The age from 12 to 23 months and male gender showed a statistically significant association with vaccine update. In this study, children aged 12 to 23 months had a prevalence of vaccine update 11% higher than those younger than six months (RP=1.11).

Table 2 - Update of the vaccination calendar according to the sociodemographic characteristics of the family and vaccination of children under three years of age. João Pessoa, PB, Brazil, 2019

Vaccination Update in the Children's Booklet					
Variables	Yes		No		p value†
	n	%	n	%	
Maternal Sociodemographic					
Age					0,29
< 20 years old	43	64,2	24	35,8	
≥ 20 years old	252	70,6	105	29,4	
Marital status					0,17
Married/Stable Union	237	71,2	96	28,8	
Single	58	63,7	33	36,3	
Number of children					0,13
1	116	73,9	41	26,1	
≥ 2	179	67,0	88	33,0	
Workplace				0,61	
Home	215	68,9	97	31,1	
Outside the home	80	71,4	32	28,6	
Years Studied					0,98
< 8 years	73	69,5	32	30,5	
≥ 8 years	222	69,6	97	30,4	
Family income					0,75
< 1 salary	69	68,3	32	31,7	
≥ 1 salary	226	70,0	97	30,0	
Children's characteristics					
Child's Age				0,01	
≤ 6 months	105	72,9	39	27,1	
7 to 11 months	62	74,7	21	25,3	
12 to 23 months	85	59,4	58	40,6	
24 to 36 months	43	79,6	11	20,4	
Gender of the child					0,06
Female	145	65,6	76	34,4	
Male	150	73,9	53	26,1	
Vaccine schedule					0,99
Yes	279	69,6	122	30,4	
No	16	69,6	7	30,4	

† Pearson's chi-square.

With respect to the delayed vaccination schedule, Figure 1 shows that in 43 (12.9%) of the HS, the Meningococcal C vaccine and in 40 (12%) the DTP had some dose delayed.

DISCUSSION

The data from the present study reveal a considerable number of children under three years old with delayed vaccination status and, therefore, at risk for morbidity and mortality from preventable diseases.

Vaccination is considered by the Ministry of Health (MH) a measure for disease prevention and health promotion, which should be effectively implemented in health facilities in order to achieve its main objective: to control and eradicate immuno-preventable diseases in childhood.[1] Therefore, this is an important means of protection for the child's health, and it should be an articulated care between the family, the health service, and the community, because the involvement and accountability of all can minimize missed opportunities and favor updating the vaccination status of children.[2–3]

Of the 424 booklets analyzed, only 12.7% were of children aged two years or older, which reinforces the greater demand for health services by children under two years of age. Another study of 452 CHB revealed that 94.1% of the booklets belonged to children under six months old.[13]

Regarding vaccine update by age of the child and sex, a statistically significant association was observed in the regression between these variables, finding that vaccine update is possibly associated with the age of 12 to 23 months of life. The age group younger than six months was not associated, although the frequency of childcare visits recommended by the MH is higher in this age group, at least five visits, out of a total of seven in the first year of life.[14]

Regarding the association with the child's gender, it is noteworthy that, according to the results, it seems that being a boy is a protective factor for vaccination updates. Corroborating this finding, a study conducted in São Luís, Maranhão, shows that the highest percentages of incomplete basic scheme were found in female children, inferring that there is greater protection by family members to male children.[15]

As for vaccine records for age, a higher percentage of BCG and Hepatitis B vaccines was observed; however, these immunobiologicals should be recorded in all notebooks, since they are administered preferably in the maternity ward, before hospital discharge.[16] On the other hand, the Meningococcal C, DTP, Viral Tetra, Viral Triple and Pentavalent vaccines showed a higher percentage of delay. It is worth noting that the MS changed the supplier of the Pentavalent vaccine, which resulted in the temporary unavailability of the product in July 2019, with its distribution only being normalized in November of the same year,[17] which may have caused a delay in the application of this vaccine.

The delay of Pentavalent, due to temporary unavailability in health services, may also have negatively influenced the delay of DTP (Diphtheria, Tetanus, and Pertusis), which is indicated as a reinforcement of the basic Pentavalent scheme. This situation deserves attention from managers and health professionals in order to avoid as much as possible the lack of vaccines, considering that the application at the correct time of the vaccines is essential for the proper compliance with the calendar, because the delay in the administration of any of them can result in the delay of subsequent doses or even the loss of the vaccination scheme.[11]

Tetra Viral vaccine is indicated for children 15 months and older, provided they have already received the first dose of the MMR vaccine. This also had an important delay evidenced in this

Table 3 - Distribution of vaccines for age and their records in the Children's Booklets. João Pessoa, PB, Brazil, 2019

Vaccines	Age									Vaccine Register					
										Yes		No		NA	
	At birth	2 m†	3 m	4 m	5 m	6 m	12 m	15 m	4 years	n	%	n	%	n	%
BCG	DU‡	–	–	–	–	–	–	–	–	410	96,7	14	3,3	0	0,0
Hepatitis B	D§	–	–	–	–	–	–	–	–	409	96,5	15	3,5	0	0,0
Pentavalent	–	1ª D§	–	2ª D§	–	3ª D§	–	–	–	392	92,4	10	2,4	22	5,2
VIP/VOP	–	1ª D§	–	2ª D§	–	3ª D§	–	1° R††	2° R††	395	93,1	7	1,7	22	5,2
Pneumococcal 10V	–	1ª D§	–	2ª D§	–	–	R††	–	–	393	92,5	9	2,3	22	5,2
Rotavirus Human	–	1ª D§	–	2ª D§	–	–	–	–	–	392	92,4	10	2,4	22	5,2
Meningococcal C (conjugated)	–	–	1ª D§	–	2ª D§	–	R††	–	–	354	83,5	19	4,5	51	12,0
Triple–Viral	–	–	–	–	–	–	1ª D§	–	–	165	38,9	32	7,6	227	53,5
Hepatitis A	–	–	–	–	–	–	–	DU‡	–	133	31,4	26	6,1	265	62,5
DTP	–	–	–	–	–	–	–	1° R††	2° R††	118	27,8	41	9,7	265	62,5
Viral Tetra	–	–	–	–	–	–	–	DU‡	–	122	28,8	37	8,7	265	62,5

m†: months; DU‡: single dose; D§: dose; R†††: booster

Table 4 - Poisson regression model with robust variance between the variables child's age and sex with vaccine update in the booklet of children under three years of age. João Pessoa, PB, Brazil, 2019

Variables	Vaccination Update in the Children's Booklet		
	Adjusted Ratio		
	RP†	IC‡	p-value§
Child's Age			
≤ 6 months	1	-	-
7 to 11 months	0,99	0,90-1,09	0,84
12 to 23 months	1,11	1,03-1,21	<0,01
24 to 36 months	0,95	0,86-1,06	0,36
Sex of the child			
Female	1	-	-
Male	0,93	0,87-1,00	0,04

†RP: prevalence ratio; IC‡: confidence interval; §Poisson regression with robust variance

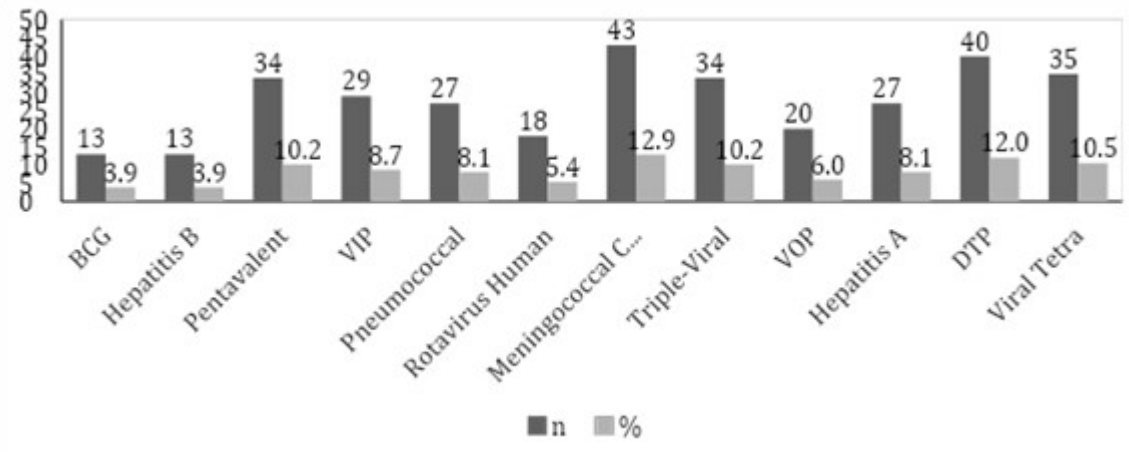

Figure 1 - Distribution of Children's Booklets with overdue vaccines. João Pessoa, Paraíba, Brazil, 2019.

study, a fact also revealed in research conducted in the state of Pernambuco, which highlighted the low coverage of this vaccine.[11]

According to the World Health Organization (WHO), in 2018, one in ten children, or about 20 million children, did not complete the vaccination scheme against measles, diphtheria, and tetanus. Also that year, approximately 350,000 cases of measles were reported worldwide, leading health authorities to associate this reality with low vaccination coverage, since to maintain the eradication of the disease it is necessary to vaccinate about 95% of the eligible population.[18]

In the period from November 2017 to October 2018,30 European Union (EU) member states notified 13,144 cases of Measles, showing higher rates in Greece and France (22.0%), Italy (19%), Romania (12%) and the United Kingdom (8%) and other 14 EU member states also showed relevant numbers of Rubella, notifying 602 cases of the disease.[19]

In Brazil, the number of Measles cases increased by 18% in 2019, leading to the loss of the certificate of eradication of the disease.[20] By March 2020, 909 measles cases were confirmed in the country and children under one year of age presented the incidence coefficient 13 times higher than that recorded in the general population.[21] Contrary to these negative results, Cuba improved its vaccination indicators with 100% measles and rubella coverage in the eligible population in the year 2019.[19]

According to the National Policy for Integral Attention to Child Health (PNAISC), immunization and qualified CHB completion are fundamental strategies for the promotion of child health. Such strategies, combined with breastfeeding and monitoring of child growth and development, especially in early childhood, have the power to reduce morbidity and mortality and, consequently, promote full child growth and development.[22]

Considering the potential impacts of immunization on children's lives, health actions aimed at this age group are a priority for mankind,[22] with a view to reducing child morbidity and mortality. Therefore, immunization strategies, such as ensuring high vaccination coverage, reducing dropout rates and, consequently, controlling and reducing the risk of disease transmission, are strongly associated with reaching this goal, seen as essential pillars for child growth and development.[23]

A limiting factor is the inclusion in the study of only children under three years of age registered in FHUs in a Brazilian capital, which does not allow us to draw a picture of what happens with the vaccination status of all Brazilian children.

CONCLUSION

This study showed that the booklets of children under three years of age have records of vaccination coverage below the recommended by WHO, considering the number of booklets that had some delay in the vaccination schedule, with a higher percentage of delay in children aged 12 to 23 months, especially in vaccines that require three doses to confer immunity.

To reverse this situation, it is essential to monitor the child in the childcare consultation, a crucial moment for monitoring the development, monitoring the vaccination schedule and identifying health problems in the child, in order to make early and assertive interventions. In addition, it is necessary that health professionals actively search for children with delayed vaccination, as well as health education, in order to raise family and community awareness about the importance of vaccines for disease prevention and promotion of proper child growth and development.

As contributions to practice, it is believed that the study, by identifying weaknesses in the vaccination status of children, reinforces the need for new strategic actions for better coverage of children, protecting them against immunopreventable diseases and reducing the number of preventable deaths in childhood.

It is hoped that this study will provide managers in the three spheres of government with reflections on the vulnerability of children in situations of vaccine delay, so that the immunization goals proposed in Brazil are achieved. It is also suggested that new studies be carried out in other regions of the country to provide evidence of the whole context involved in the vaccination coverage of Brazilian children.

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