Original Article
Santos DF, Oliveira JO, Vieira ACS, Santos RCS, Silva AMOA, Costa CRB
Factors associated with the permission for child vaccination in the context of the COVID-19 pandemic
Rev Gaúcha Enferm. 2023;44:e20220362
doi: https://doi.org/10.1590/1983-1447.2023.20220362.en

Factors associated with the permission for child vaccination in the context of the COVID-19 pandemic

Fatores associados à permissão da vacinação infantil no contexto da pandemia da COVID-19

Factores asociados al permiso de vacunación infantil en el contexto de la pandemia del COVID-19

Diane Fernandes dos Santos[a] https://orcid.org/0000-0002-5472-4122
Jayane Omena de Oliveira[b] https://orcid.org/0000-0003-2830-9379
Ana Carolina Santana Vieira[b] https://orcid.org/0000-0002-7273-1414
Regina Célia Sales Santos[b] https://orcid.org/0000-0002-2447-0707
Alanna Michella Oliveira de Albuquerque da Silva[c] https://orcid.org/0000-0002-7318-941X
Christefany Régia Braz Costa[b] https://orcid.org/0000-0001-6124-8243

[a]Universidade Federal de Alagoas (Ufal). Faculdade de Nutrição. Programa de Pós-Graduação em Nutrição. Maceió, Alagoas, Brasil.
[b]Universidade Federal de Alagoas (Ufal). Escola de Enfermagem. Maceió, Alagoas, Brasil.
[c]Universidade Federal de Alagoas (Ufal). Instituto de Ciências Biológicas e da Saúde. Programa de Pós-Graduação em Ciências da Saúde. Maceió, Alagoas, Brasil.

How to cite this article:
Santos DF, Oliveira JO, Vieira ACS, Santos RCS, Silva AMOA, Costa CRB. Factors associated with the permission for child vaccination in the context of the COVID-19 pandemic. Rev Gaúcha Enferm. 2023;44:e20220362. doi: https://doi.org/10.1590/1983-1447.2023.20220362.en

ABSTRACT

Objective: To identify factors associated with permission for child vaccination in the context of the COVID-19 pandemic.

Method: Cross-sectional study, with parents/guardians of children aged up to 1 year, 11 months and 29 days, aged 18 years or older, with internet access and residents of the state of Alagoas. The collection was conducted between June 2021 and April 2022, using a structured instrument via Google forms®. Fisher's Exact and Pearson's chi-square statistical tests were used.

Results: A total of 94 parents/guardians participated. There was an association between permission for child vaccination during the COVID-19 pandemic and higher education level of parents/guardians, with the lack of an educational bond with the child, and between parents/guardians who would allow the application of the COVID-19 vaccine.

Conclusion: Permission for child vaccination in the context of the COVID-19 pandemic was associated with higher education level of parents/guardians and the absence of educational bond of the child.
Descriptors: Child. Vaccines. Pandemics. COVID-19.

RESUMO
Objetivo: Identificar os fatores associados à permissão da vacinação infantil no contexto da pandemia da COVID-19.
Método: Estudo transversal, com pais/responsáveis de crianças com até 1 ano 11 meses e 29 dias, idade maior ou igual a 18 anos, acesso à internet e residentes no estado de Alagoas. A coleta foi realizada entre junho de 2021 e abril de 2022, por instrumento estruturado via Google Forms®. Utilizou-se os testes estatísticos Exato de Fisher e o Qui-quadrado de Pearson.
Resultados: Participaram 94 pais/responsáveis. Houve associação da permissão da vacinação infantil durante a pandemia da COVID-19 com uma maior escolaridade dos pais/responsáveis, com a ausência de vínculo educacional da criança e entre os pais/responsáveis que permitiriam a aplicação da vacina da COVID-19, caso estivesse disponível.
Conclusão: A permissão da vacinação infantil no contexto da pandemia da COVID-19 foi associada a maior escolaridade dos pais/responsáveis e a ausência de vinculação educacional da criança.
Descritores: Criança. Vacinas. Pandemias. COVID-19.

RESUMEN
Objetivo: Identificar los factores asociados a permitir la vacunación infantil en el contexto de la pandemia de COVID-19.
Método: Estudio transversal, con padres/tutores de niños de hasta 1 año, 11 meses y 29 días, con edad igual o superior a 18 años, con acceso a internet y residentes en el estado de Alagoas. La recolección se realizó entre junio de 2021 y abril de 2022, utilizando un instrumento estructurado a través de Google Forms®. Se utilizaron las pruebas estadísticas Exacto de Fisher y chi-cuadrado de Pearson.
Resultados: Participaron 94 padres/tutores. Hubo asociación entre el permiso para la vacunación infantil durante la pandemia de COVID-19 y la escolaridad superior de los padres/tutores, con la falta de vínculo educativo con el niño, y entre los padres/tutores que permitirían la aplicación de la vacuna contra el COVID-19, si disponible.
Conclusión: El permiso para la vacunación infantil en el contexto de la pandemia de COVID-19 se asoció con la educación superior de los padres/tutores y la falta de vínculos educativos para el niño.
Descriptores: Niño. Vacunas. Pandemias. COVID-19.

INTRODUCTION

Vaccination aims to protect people through the prevention, control, and eradication of vaccine-preventable diseases. The wide vaccination coverage and its adherence in Brazilhad led to the elimination of certain diseases, such as poliomyelitis and smallpox, which mostly affected children, thus becoming a milestone in the country's history[1].

In Brazil, a percentage of proper vaccination coverage is recommended for cities and the Federal District, which varies from 80% to 95% among child vaccines, in order to

maintain high coverage[1]. However, it is possible to observe that, over the years, there has been instability in the vaccination coverage by regions of Brazil. The year 2016 had one of the lowest vaccination rates, with a decreasing trend in subsequent years[2]. The Northeast region had less than 74% vaccination coverage in all child vaccines in 2021 and, until December 20, 2022, less than 80% among vaccines for children[3]. The decrease in vaccination coverage has allowed previously controlled diseases to resurge and spread within the country[2,4].

In addition to factors associated with non-adherence to immunization, already evidenced in the literature, such as lack of knowledge, fear of contracting a disease and religious issues[5,6], an important event changed the socioeconomic and global health organization, directly affecting the daily lives of the population, impacting several areas of social life, including vaccination practices: the COVID-19 pandemic.

In December 2019, a new coronavirus was discovered in patients from China, called SARS-CoV-2, responsible for causing COVID-19 (coronavirus disease), which is a respiratory infection[7]. Transmitted through contact with droplets from the speech, cough or sneeze of infected individuals, the disease quickly spread across continents, forcing public health authorities to declare a state of pandemic[8].

The social measures imposed by the health authorities ended up directly affecting the population routine and vaccination practices. It is worth mentioning that vaccines are means of protection against infectious and contagious diseases, being one of the most effective and safe strategies, especially in childhood, when the immune system is developing, being a period of vulnerability and for this reason, most of the vaccines are administered in early childhood[9].

The fact that parents/guardians do not allow vaccination makes the child more vulnerable to diseases, puts their growth and development at risk, and consequently affects their learning, skills, social interaction, motor, cognitive and sensory development. Therefore, the information investigated may support the formulation of strategies for pandemic contexts and/or situations that hinder parents/guardians to allow child vaccination, contributing to greater vaccination coverage and reducing child deaths from preventable diseases.

Given the above, this study aimed to answer the following guiding question: What are the factors associated with permission for child vaccination in the context of the COVID-19 pandemic? With the objective of identifying the factors associated with the permission for child vaccination in the context of the COVID-19 pandemic.

METHOD

This is a cross-sectional study conducted online with parents/guardians of children in the state of Alagoas, in the northeast region of Brazil, between June 2021 and April 2022.

The study included parents/guardians of one or more children aged up to 1 year, 11 months and 29 days, over 18 years old, living in Alagoas and who had internet access. Participants with duplicate responses and those who responded the questionnaire inconsistently were excluded.

An online calculator was used to obtain the sample size considering a confidence interval of a proportion[10]. Data from a study identified the prevalence of delayed immunization during the COVID-19 pandemic in the region of Qassim, Saudi Arabia[11] was considered as reference for the sample calculation.The study found a prevalence of 23.4% of parent reports about a delay of more than one month in the child's immunization. The sample size was 108 participants, considering an estimated population proportion of 23.4%, a 95% confidence level, and an 8% beta error.

As for sampling, it was non-probabilistic for convenience. Data collection was conducted online using a structured instrument on the Google forms® platform, built by the researchers for the study.

The instrument was divided into four stages: 1) Guardian's Profile; 2) Vaccine Information; 2.1) Positive Vaccine Information; 2.2) Negative Vaccine Information; 3) Child's Profile; 3.1) Did not receive vaccines during the COVID-19 pandemic; 3.2) Vaccination in the context of the COVID-19 pandemic; 4) Additional information.

To disseminate the research, a page was created on Instagram® and a partnership was established with several academic leagues in the State that focused on topics related to children. Additionally, seven researchers disseminated the research through the WhatsApp® application. Thus, interested participants, after clicking on the research dissemination link, were directed to the Google forms® platform. The Respondent-Driven Sampling (RDS) method adapted to the virtual environment was used. In this method, participants are encouraged to recruit other people from the same category as theirs, through social networks. Another resource used was dissemination among schools/daycare centers in the municipal/state network that served children under two years old, via e-mail.

Regarding the analysis, for the dependent variable, permission (the act of accepting and authorizing vaccination) was considered ayes answer to the question: "Was the child under your care vaccinated during the COVID-19 pandemic?".

The independent variables used were the parents/guardians' sociodemographic profile; child profile and access to vaccination; information about vaccines and the means of disseminating this information.

Sociodemographic variables of parents/guardians: Age (mean in years, minimum and maximum value); Color/Race (white, brown, black, yellow, indigenous), Education level (illiterate, incomplete elementary education, complete elementary education, incomplete high school, complete high school, incomplete higher education, complete higher education, graduate); Income (less than 1 (one) minimum wage, 1 (one) minimum wage, 2 (two) minimum wages, 3 (three) minimum wages, 4 (four) minimum wages, 5 (five) minimum wages or more); Number of children under responsibility (1 child, 2 children, 3 children, more than 3 children); Relationship to the child (mother, father, aunt/uncle).

For the sociodemographic variables, color/race and education level, the definitions of the Brazilian Institute of Geography and Statistics (*Instituto de Brasileiro de Geografia e Estatística* - IBGE)[12] were used.Regarding income, for better understanding, it was opted to classify it by the number of minimum wages.

Child profile and access to vaccination: Age (0 months – 12 months, 13 months – 1 year 11 months and 29 days); Education - daycare/school (yes, no); Updated vaccine card (yes, no); Responsible for taking/accompanying to vaccinate in the context of the pandemic (mother, father, aunt, grandmother/grandfather); Nature of the service where received the vaccines in the context of the pandemic (public network, private network, public and private network).

Vaccine information: Most vaccine information was (positive, negative); The positive information was (prevent diseases; eradicate diseases, control diseases, reduce hospitalization costs, reduce the number of fatalities, reduce disease transmission in a community, reduce the chance of severe form of a disease, bring benefits for the health and development to the child, others); Negative information was (does not work, causes diseases, causes disabilities, causes many reactions, can cause death, others); the possibility of the COVID-19 vaccine being available for children (would vaccinate, would not vaccinate, might vaccinate). It should be noted that knowledge regarding vaccination was assessed by asking what the guardian heard/seen most about vaccination.

The means of disseminating positive and negative information about vaccines: Television (TV); Whatsapp; Instagram; Facebook; Twitter; Tiktok; Youtube; Internet (websites, blogs, etc); Friends/neighbors/relatives (in person); Radio; Scientific articles; School/Educational Institutions; Healthcare professional; Others.

For data analysis, the statistical program SPSS® (Statistical Package of Social Sciences) version 21.0 was used. Descriptive statistics were used in the analysis, absolute and relative frequency, mean and standard deviation (SD) were calculated. To verify the normal distribution of numerical and continuous variables, the Kolmogorov-Smirnov test was used. To evaluate the association, Fisher's exact test and Pearson's chi-square were used. A 95% confidence interval and a significance level of 5% ($p \leq 0.05$) were adopted.

The project was approved by the Research Ethics Committee (REC) of the *Universidade Federal de Alagoas* (UFAL) under number 44600921,6,0000,5013, respecting the ethical principles and guidelines established in Resolutions 466/12 and 510/16 of the National Research Council in Health involving human beings. All participants received and electronically signed the Informed Consent Form (ICF).

RESULTS

Initially, 96 individuals agreed to participate in the research. However, two exclusions were made due to duplicate questionnaires and inconsistent responses; and six exclusions after analyzing the age variable, whose parents/guardians made a mistake when placing the child's age in the item "age of parents/guardians", resulting in 94 participants.

The parents/guardians in the study had a mean age of 29.36 years (±sd = 5.99). There was a predominance of brown color/race, with 48.9% (n = 46), 83% (n = 78) with more than nine years of study, 28.7% (n = 27) with a postgraduate degree and total family income of 5 minimum wages or more with 34% (n = 32). Added to this, 95.7% (n = 90) of the parents/guardians who answered the questionnaire had only one child under two years old under their responsibility, of which 87.2% (n = 82) were mothers (Table 1).

Table 1 - Sociodemographic profile of parents/guardians of children under two years of age. Alagoas, Brazil, 2021-2022

Variables	**n**	**%**
Color/Race		
White	38	40.4%
Brown	46	48.9%
Black	07	7.5%
Yellow	03	3.2%
Indigenous	00	0%
Total	94	100%
Education level (years of study)		
Illiterate	00	0%
Incomplete elementary School	02	2.1%
Incomplete high school	02	2.1%

Complete high school	10	10.7%
Incomplete higher education	25	26.6%
Complete higher education	26	27.7%
Graduate	27	28.7%
Total	94	100%
Total family income		
Less than 1 (one) minimum wage	05	5.3%
1 (one) minimum wage	17	18.1%
2 (two) minimum wages	14	14.9%
3 (three) minimum wages	17	18.1%
4 (four) minimum wages	09	9.6%
5 (five) minimum wages or more	32	34.0%
Total	94	100%
Number of children under responsibility up to 1 year 11 months and 29 days		
1 child	90	95.7%
2 children	03	3.2%
3 children	01	1.1%
More than 3 children	00	0%
Total	94	100%
Relationship		
Mother	82	87.2%
Father	07	7.5%
Aunt/Uncle	05	5.3%
Total	94	100%

Source: Research database.

Looking at the data from Table 2, the age group of children between 0 and 12 months stands out, with 53.2% (n = 50). The children in the study had a minimum age of 0 months and a maximum age of 24 months, with an average of 12.93 months (± sd = 7.10). Regarding education, 19.1% (n = 18) of the children were enrolled in a daycare/school and 96.8% (n = 91) had an up-to-date vaccination card, according to their parents/guardians. In the context of the COVID-19 pandemic, 87.2% (n = 82) of the children took the vaccines for their age, and the person responsible for taking/accompanying them was the mother, with 97.6% (n = 80). The predominant nature of the service was the public healthcare system with 74.4% (n = 61).

Table 2 - Characterization of children under two years of age regarding vaccination in the context of the COVID-19 pandemic. Alagoas, Brazil, 2021-2022

Variables	n	%
Age		
0month - 12 months	50	53.2%
13 months - 1 year 11 months e 29 days	44	46.8%
Total	94	100%
Education (daycare/school)		
Yes	18	19.1%
No	76	80.9%
Total	94	100%
Updated vaccination card		
Yes	91	96.8%
No	03	3.2%
Total	94	100%
Vaccination in the context of the pandemic		
Yes	82	87.2%
No	12	12.8%
Total	94	100%
Responsible for taking/accompanying to vaccinate in the context of the pandemic[¥§]		
Mother	80	97.6%
Father	34	41.2%
Aunt	03	3.6%
Grandmother/Grandfather	09	11.0%
Nature of the service where vaccines were administered in the context of the pandemic		
Public healthcare system	61	74.4%
Private healthcare system	07	8.5%
Public and private healthcare system	14	17.1%
Total	82	100%

Source: Research database.
Note: [¥]Question with multiple responses (more than one option); [§]82 people responded.

Table 3 shows the association of sociodemographic variables with permission for vaccination in the context of the COVID-19 pandemic. There was an association between permission for vaccination in the context of the pandemic with higher education of parents/guardians ($p = 0.018$) and with the lack of educational ties between the child and day care/school ($p = 0.010$).

Table 3 -Association of color/race, education level, total family income, number of children under responsibility, guardian's relationship with the child, educational relationship of the child and updated vaccination card regarding permission for vaccination in the context of the COVID pandemic-19. Alagoas, Brazil, 2021-2022

Variables	Permission for vaccination		P-value
	Yes n (%)	No n (%)	
Color/Race			
White	36 (94.7)	02 (5.3)	
Brown	37 (80.4)	09 (19.6)	
Black	07 (100)	00 (0.0)	0.096*
Yellow	02 (66.7)	01 (33.3)	
Indigenous	-	-	-
Education level			
Illiterate	-	-	-
Incomplete elementary School	02 (100)	00 (0.0)	
Complete elementary School	00 (0.0)	02 (100)	
Incomplete high school	02 (100)	00 (0.0)	
Complete high school	07 (70)	03 (30)	0.018*
Incomplete higher education	21 (84)	04 (16)	
Complete higher education	24 (92.3)	02 (7.7)	
Graduate	26 (96.3)	01 (3.7)	
Total family income			
Up to 1 (one) minimum wage	03 (60)	02 (40)	
1 (one) minimum wage	13 (76.5)	04 (23.5)	
2 (two) minimum wages	12 (85.7)	02 (14.3)	
3 (three) minimum wages	16 (94.1)	01 (5.9)	0.174*
4 (four) minimum wages	08 (88.9)	01 (11.1)	
5 (five) minimum wages or more	30 (93.8)	02 (6.3)	
Number of children under responsibility up to 1 year 11 months and 29 days			
Up to 1 (one) child	79 (87.8)	11 (12.2)	
2 (two) children	02 (66.7)	01 (33.3)	0.426*
3 (three) children	01 (100)	00 (0.0)	
More than 3 children	-	-	-
Relationship of the person with the child			
Mother	70 (85.4)	12 (14.6)	
Father	07 (100)	00 (0.0)	
Aunt	04 (100)	00 (0.0)	0.795*
Uncle	01 (100)	00 (0.0)	
Educational bond of the child (daycare/school)			
Yes	12 (66.7)	06 (33.3)	0.010*
No	70 (92.1)	06 (7.9)	
Took the vaccines for age (child)			
Yes	80 (87.9)	11 (12.1)	0.339*
No	02 (66.7)	01 (33.3)	

Source: Research database.

Note: (1) *Fisher's Exact Test. Statistical significance was considered when $p < 0.05$.

When associating the information heard/seen about vaccines, according to parents/guardians with permission for vaccination, there was many responses indicating positive information, without significant differences. Permission to apply the COVID-19 vaccine to the child, if available, was associated with parents/guardians who allowed vaccination in the context of the pandemic with vaccines from the National Childhood Vaccination Schedule (p = 0.034) (Table 4).

Table 4 – Association of information on vaccines with permission for vaccination in the context of the COVID-19 pandemic. Alagoas, Brazil, 2021-2022

Variables	Permission for vaccination		P-value
	Yes n(%)	No n(%)	
Most information about vaccines has been			
Positive	74 (87.1)	11 (12.9)	
Negative	08 (88.9)	01 (11.1)	1.000*
The positive information was¥‡			
Prevent diseases	61 (87.1)	09 (12.9)	1.000*
Eradicate diseases	11 (84.6)	02 (15.4)	0.673*
Control diseases	47 (87)	07 (13)	1.000*
Reduce hospitalization costs	34 (91.9)	03 (8.1)	0.335*
Reduce the number of fatalities	55 (88.7)	07 (11.3)	0.479*
Reduce disease transmission in a community	50 (86.2)	08 (13.8)	1.000*
Reduce the chance of severe form of a disease	58 (87.9)	08 (12.1)	0.703*
Bring benefits for the health and development to the child	39 (86.7)	06 (13.3)	1.000§
Others	08 (80)	02 (20)	0.611*
Negative information was¥†			
Does not work	03 (75)	01 (25)	0.444*
Causes diseases	04 (80)	01 (20)	1.000*
Causes disabilities	04 (100)	00 (0.0)	1.000*
Causes many reactions	08 (88.9)	01 (11.1)	-
Can cause death	03 (75)	01 (25)	0.444*
Others	01 (100)	00 (0.0)	1.000*
Regarding the possibility of the COVID-19 vaccine being available for children			
would vaccinate	68 (90.7)	07 (9.3)	
would not vaccinate	05 (100)	00 (0.0)	0.034*
might vaccinate	09 (64.3)	05 (35.7)	

Source: Research database.

Note: (1) ¥ Question with multiple responses (more than one option); ‡85 people responded; †9people responded.

(2) *Fisher's Exact Test. Statistical significance was considered when $p < 0.05$.

(3) §Pearson's chi-square. Statistical significance was considered when $p < 0.05$.

In table 5, the means of disseminating positive and negative information about vaccines with the permission of parents/guardians for vaccination were analyzed, and there were no significant differences.

Table 5 -Association of means of disseminating positive and negative information about vaccines according to parents/guardians of children under two years of age regarding permission for vaccination in the context of the COVID-19 pandemic.Alagoas, Brazil, 2021-2022

Means of dissemination	Permission for vaccination		P-value
	Yes n (%)	No n (%)	
Positive information			
Television	52 (86.7)	08 (13.3)	1.000*
WhatsApp	31 (91.2)	03 (8.8)	0.513*
Instagram	37 (86)	06 (14)	1.000§
Facebook	13 (92.9)	01 (7.1)	0.682*
Twitter	06 (100)	00 (0.0)	1.000*
Tiktok	02 (66.7)	01 (33.3)	0.344*
Youtube	17 (89.5)	02 (10.5)	1.000*
Internet (websites, blogs, etc)	31 (86.1)	05 (13.9)	1.000*
Friends/Neighbors/Family (in person)	41 (93.2)	03 (6.8)	0.110§
Radio	09 (90)	01 (10)	1.000*
Scientific articles	36 (90)	04 (10)	0.529§
School/Educational Institutions	33 (91.7)	03 (8.3)	0.342*
Healthcare professional	60 (89.6)	7 (10.4)	0.235*
Others	11 (100)	00 (0.0)	0.345*
Negative information			
Television	03 (100)	00 (0.0)	1.000*
WhatsApp	05 (100)	00 (0.0)	0.444*
Instagram	03 (100)	00 (0.0)	1.000*
Facebook	01 (100)	00 (0.0)	1.000*
Twitter	-	-	-
Tiktok	01 (100)		0.889*
Youtube	-	-	-
Internet (websites, blogs, etc)	05 (100)	00 (0.0)	0.444*
Friends/Neighbors/Family (in person)	07 (87.5)	01 (12.5)	1.000*
Radio	-	-	-
Scientific articles	01 (100)	00 (0.0)	1.000*
School/Educational Institutions	-	-	-
Healthcare professional	01 (100)	00 (0.0)	1.000*
Others	02 (100)	00 (0.0)	1.000*

Source: Research database.
(1)*Ficher Exact Test. Statistical significance was considered when $p < 0.05$.
(2)§Pearson's chi-square. Statistical significance was considered when $p < 0.05$.

DISCUSSION

The main findings of this study characterize those responsible for the children as brown, young adults, mostly mothers, with high education level, high family income and with responsibility for only one child under 2 years old. Most of the children did not have an educational bond and the mothers who took them to take the recommended vaccines for their age, even before and during the pandemic, through the Unified Health System (*Sistema Único de Saúde* - SUS).

Most of the information heard/viewed was positive and the negative information was mainly disseminated by friends/neighbors/relatives (in person). Most parents/guardians stated that they would vaccinate their children with the COVID-19 vaccine for children, and there was an association between them and those who allowed child vaccination during the COVID-19 pandemic. There was also an association between permission for vaccination with the education of parents/guardians and the children's education.

The state of Alagoas has the majority of the population of brown color/race[12], which justifies the percentage presented by parents/guardians in this study. Regarding education, corroborating the results of the association, the higher the education level of parents contributes to a high vaccination coverage, since they have more information and knowledge about preventable pathologies and forms of prevention, such as vaccination[13].

On the other hand, people with lower education level and low income are associated with a lack of knowledge[14]. In this regard, economically disadvantaged population has difficulty accessing goods and services, which consequently results in low adherence to vaccination[13]. However, there are studies that indicate that parents who are more hesitant and less concerned about vaccinating their children are those with higher socioeconomic status[15].

In Brazil, people with different social levels have unequal treatment regarding vaccination. For a family with higher economic power, there are no barriers to accessing some services, such as the requirement of a complete and up-to-date vaccination record for their children in schools. Families who need to enroll their children in public day care centers and who need assistance from the *Bolsa Família* social program are required to provide this proof[4]. Therefore, the requirement for vaccination should be universal, considering the collective impact on the control of vaccine-preventable diseases.

As for those main responsible for taking children for vaccination, there is a greater presence of mothers. Culturally, the mother is seen as an innate and instinctive caregiver, being primarily responsible for daily activities and their children health. There is a stereotype that a woman was born to be a mother and it is her duty to fully dedicate herself to the child,

with the father only as secondary support, when the mother for some reason is not available[16]. Thus, the results ratify the cultural thought that caring is a female function.

Regarding the number of children and vaccination, this study showed that most parents/guardians had only one child, which is in line with some studies that report that families with only one child are more likely to complete the children's vaccination schedule, as they only have one child to focus on and to dedicate[13]. Unlike families with many children, in which preventive activities may not be considered a priority[14], as they demand more time, financial resources and family logistics, which often implies an incomplete vaccination schedule[17].

Regarding the age of vaccinated children in the context of the COVID-19 pandemic in Alagoas, the age group that stood out in this study was 0 to 12 months. According to the vaccination schedule of the Ministry of Health, more than 20 types of vaccine and 48 immunobiologicals are available in the SUS through the PNI, with most vaccines administered in childhood[18], more specifically, 10 vaccines in the same period of age presented in this research.

Some studies mention that during pregnancy, the mother transfers some antibodies to the baby through the placenta, and at birth, through breastfeeding. However, the amount is not enough, as circulating maternal antibodies reduce over the months, requiring the child's body to produce its own antibodies. Thus, in the first six months of life, this function is established and matures over the years, and consequently, it is essential that children receive the vaccines indicated for their age, as they are more vulnerable[19].

In view of this, children who attend day care centers are more susceptible to preventable diseases. Although this environment provides growth, development, education and socialization, it is important to remember that children do not have a mature immune system, and because it is a collective place with a high flow of people, it has a quick and easy transmission of pathologies, causing negative consequences for children's health[19].

In this study, there was an association with the educational bond. It is noteworthy that most children had no education, which can be explained by the age of the children, with most of them being under 12 months old; the benefits of home office in some institutions; and the right to maternity leave used by mothers, allowing them to spend more time with their child at home. Furthermore, another factor that can influence this choice is that the parents/guardians participating in the research had the babysitting service, given their higher socioeconomic status and resources[20]. In this sense, even without the risk of exposing the child at

daycare/school, parents were aware of the importance of vaccination and took their children for vaccinations during the COVID-19 pandemic.

Another important point to mention is the predominance of the use of public healthcare service in Alagoas for the vaccination of children, referring to the trust of parents/guardians in the SUS. The SUS offers the service free of charge, where the immunobiologicals produced and distributed go through about seven stages to reach the final consumer[21]. For this process to be performed with quality, safety and efficacy, it is also necessary to adopt guidelines and procedures before, during and after the immunization administration[9].

In this context, it is important to emphasize that the vaccination room is the responsibility of the Nursing team, and these professionals are responsible for the organization, conservation, handling, preparation, administration, registration, and correct disposal of immunobiologicals. Therefore, it is necessary that the team is trained and qualified, and it is up to the nurse to provide permanent education for nursing technicians[9]. When considering that nurses are responsible for managing the vaccination room, they are also responsible for providing guidance and health education for parents and guardians[22].

In view of this, the actions of healthcare professionals may favor vaccination, helping those who are hesitant to change their minds about vaccinating their children[23]. This evidence corroborates the result of this study, as most parents/guardians heard positive information about vaccines from healthcare professionals. Thus, it is perceived that the population has the Nursing team as an accessible and reliable reference, which contributes for their understanding that vaccines are beneficial and essential for health[22].

It is important to highlight that children do not have the autonomy or knowledge to make their own decisions, and it is the responsibility of parents/guardians to contribute to their health[5]. However, some of the participants in this research heard negative information about vaccination, which may have unfavorably influenced the immunization of their children. There are several reasons for not vaccinating, however, the statement that vaccines cause many reactions stood out.

According to the Ministry of Health, vaccines may present Events Supposedly Attributable to Vaccination or Immunization (ESAVI)[24], being a natural and temporary process[9], usually causing only discomfort such as pain and malaise. It is worth remembering that reactions do not occur in all children, and that the benefits of immunization outweigh the risks and protect children from serious illness that can lead to death[6].

Therefore, the main means in which the participants in this study obtained negative information were in person through friends/neighbors/relatives, followed by virtual means, through WhatsApp® and the internet (websites/blogs). Another investigation points out that sharing false content through several means, without validating the information, causes harmful behaviors to the health of their children in the population, strengthens vaccine hesitancy and the anti-vaccine movement[6].

It is noteworthy that the hesitation of vaccination not only leads to the occurrence of vaccine-preventable diseases in adults but also results in more severe consequences and complications compared to those acquired in childhood, besides influencing the spread of preventable and eradicated pathologies in the country[4]. Measles is an example of such a disease. It was declared eliminated in Brazil in 2016, however, between 2018 and 2021, more than 40,000 cases emerged[25].

Another important aspect is that with the advent of COVID-19 and its epidemiological scenario, it is possible that people have become apprehensive and insecure, mainly due to its high mortality rate. As a result, the world stopped to develop the vaccine, and after tests, it began to be administered to risk groups and, later, to the overall population[26]. The emergence of the vaccine against COVID-19 for children provided divergent opinions, however, the perception and knowledge of parents about the risks and benefits of vaccination were associated with the decision to vaccinate. This perception has often been considered a determining factor in the attitude of hesitation[27].

The COVID-19 pandemic brought changes to the immunization routine for children not only in Brazil, but also in other countries. A study conducted in Saudi Arabia showed that the pandemic directly affected child vaccination, contributing to the delay in scheduled doses[11]. Likewise in Canada, where three months after the COVID-19 emergency was declared, the chances of delay in child vaccination were 4 times higher when compared to the pre-pandemic period[28]. Among the main reasons cited for the delay in this vaccination in the pandemic context were the fear of being infected with COVID-19, followed by the lack of time, lack of immunobiologicals or closed clinics[11,28].

At the time of preparing the questionnaire for this study, the COVID-19 vaccine for children was not yet available. However, when asked the parents/guardians who participated in the research, the majority stated that if the vaccine were available for children, they would take it to vaccinate, showing statistical significance. Data similar to a study conducted in Italy, in which 82.1% of respondents were willing to vaccinate their children[28]. This association strengthens the importance of information disseminated by healthcare

professionals, which increases the possibility of acceptance by parents. Clarification about the risks and benefits favors the establishment of bonds, trust and a respectful relationship between parents and professionals.

It is important to point out that the state of Alagoas started vaccinating children against COVID-19, from 6 months to 2 years of age, with and without comorbidities, from December 5, 2022[29].

The fact that the research was conducted online and in the context of the COVID-19 pandemic offered some limitations, such as: availability only of people with internet access; literate people who understood the questions described, with higher income; not viewing the child's vaccination card, considering all the information filled in to be true; the high number of online surveys during the pandemic, which made it difficult to participate and even disseminate the research, limiting the sample size. Thus, further studies on vaccination in the context of COVID-19 are suggested to be developed in person, in public and private vaccination units, with information confirmation through registration in the child's booklets/vaccination card and a larger sample size.

Finally, this study is a pioneering effort in the state of Alagoas on the subject and strengthens the contribution of research conducted by Nursing to public health. Thus, considering that the Nursing team is responsible for the vaccination rooms, it plays a crucial role in the dissemination of truthful information about immunobiologicals, as they are references and influence the decision-making of parents/guardians.

Furthermore, the results may contribute to expanding knowledge about the factors that affect child vaccination in pandemic contexts.

CONCLUSION

The study indicates that the factors associated with the permission for vaccination in the context of the COVID-19 pandemic in the State of Alagoas for vaccines in the National Child Vaccination Schedule are the higher education level of parents/guardians and the lack of educational bond for the child in daycare center or school. Another relevant factor is the association between permitting vaccination during the pandemic with the availability of the COVID-19 vaccine, in which parents/guardians also allowed its application. These factors reiterate the importance of increasing and strengthening strategies to promote health equity and access to vaccination across all regions of the country.

REFERENCES

1. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde. PNI. Programa Nacional de Imunizações. Coberturas vacinais no Brasil. Período: 2010-2014 [Internet]. Brasília, DF: Ministério da Saúde; 2018 [cited 2022 Nov 13]. Available from: https://siteal.iiep.unesco.org/sites/default/files/sit_accion_files/br_5113.pdf

2. Pestana JTS, Souza CEA, Filho CAB, Silva GO, Nascimento GA, Silva GA, et al. Baixa cobertura vacinal e seus possíveis impactos para a saúde da população brasileira. Braz J Dev. 2022;8(1):3968-81. doi: https://doi.org/10.34117/bjdv8n1-261

3. Ministério da Saúde (BR), Departamento de Informática do SUS. DATASUS. Ministério da Saúde; 2022 [cited 2022 Dec 20]. Available from: https://datasus.saude.gov.br

4. Leite FPA, Lopes CB, Oliveira FBMPGB. O impacto negativo das 'fakenews' nos serviços públicos de saúde: redução da vacinação e da erradicação de doenças no Brasil. Rev Direito Bras. 2020 [cited 2022 Jun 03];25(10):142-61. Available from: https://www.indexlaw.org/index.php/rdb/article/view/5310/5069

5. Nunes AP. Vacinação obrigatória. RJLB. 2022 [cited 2022 Sep 21];8(1):221-58. Available from: https://www.cidp.pt/revistas/rjlb/2022/1/2022_01_0221_0258.pdf

6. Nascimento JAC. Vacinação obrigatória. VI curso pós-graduado em bioética. RJLB. 2022 [cited 2022 Sep 21];8(2):1153-208. Available from: https://www.cidp.pt/revistas/rjlb/2022/2/2022_02_1153_1208.pdf

7. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel coronavirus from patients with pneumonia in China, 2019. N Eng J Med. 2020;382(8):727-33. doi: https://doi.org/10.1056/NEJMoa2001017

8. Bedford J, Enria D, Giesecke J, Heymann DL, Ihekweazu C, Kobinger G, et al. COVID-19: towards controlling of a pandemic. Lancet. 2020;395(10229):1015-8. doi: https://doi.org/10.1016/S0140-6736(20)30673-5

9. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Manual de normas e procedimento para vacinação [Internet]. Brasília, DF: Ministério da Saúde; 2014 [cited 2022 Sep 03]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/manual_procedimentos_vacinacao.pdf

10. Lauris JRP. Cálculo amostral [Internet]. São Paulo: USP; 2023 [cited 2023 Apr 27]. Available from: http://estatistica.bauru.usp.br/calculoamostral/ta_ic_proporcao.php

11. Alsuhaibani M, Alaqeel A. Impact of the COVID-19 pandemic on routine childhood immunization in Saudi Arabia. Vaccines (Basel). 2020;8(4):581. doi: https://doi.org/10.3390/vaccines8040581

12. Instituto Brasileiro de Geografia e Estatística [Internet]. Pesquisa Nacional por Amostra de Domicílios Contínua 2019. Brasília, DF: IBGE; 2010 [cited 2022 Sep 13]. Available from: https://www.ibge.gov.br/estatisticas/sociais/trabalho/9171-pesquisa-nacional-por-amostra-de-domicilios-continua-mensal.html?=&t=destaques

13. Efendi F, Pradiptasiwi DR, Krisnana I, Kusumaningrum T, Kurniati A, Sampurna MTA, et al. Factors associated with complete immunizations coverage among Indonesian children aged 12–23 months. Child Youth Serv Rev. 2020;108:104651. doi: https://doi.org/10.1016/j.childyouth.2019.104651

14. Etana B, Deressa W. Factors associated with complete immunization coverage in children aged 12-23 months in Ambo Woreda, Central Ethiopia. BMC Public Health. 2012;12:566. doi: https://doi.org/10.1186/1471-2458-12-566

15. Kaliner E, Moran-Gilad J, Grotto I, Somekh E, Kopel E, Gdalevich M, et al. Silent reintroduction of wild-type poliovirus to Israel, 2013 - risk communication challenges in an argumentative atmosphere. Euro Surveill. 2014;19(7):20703. doi: https://doi.org/10.2807/1560-7917.es2014.19.7.20703

16. Estrela JM, Machado MS, Castro A. O "ser mãe": representações sociais do papel materno de gestantes e puérperas. Id onLineRevMult Psic. 2018 [cited 2022 Jun 03];12(42):569-78. Available from: https://idonline.emnuvens.com.br/id/article/view/1450/2122

17. Kiely M, Boulianne N, Talbot D, Ouakki M, Guay M, Landry M, et al. Impact of vaccine delays at the 2, 4, 6 and 12 month visits on incomplete vaccination status by 24 months of age in Quebec, Canada. BMC Public Health. 2018;18:1364. doi: https://doi.org/10.1186/s12889-018-6235-6

18. Ministério da Saúde (BR) [Internet]. Calendário nacional de vacinação. Brasília, DF: Ministério da Saúde; 2022 [cited 2022 Oct 07]. Available from: https://www.gov.br/saude/pt-br/assuntos/saude-de-a-a-z/c/calendario-nacional-de-vacinacao#:~:text=S%C3%A3o%20mais%20de%2020%20vacinas,%2C%20gestantes%2C%20idosos%20e%20ind%C3%ADgenas

19. Condino-Neto A. Susceptibilidade a infecções: imaturidade imunológica ou imunodeficiência? Rev Med. 2014 [cited 2022 Oct 07];93(2):78-82. Available from: https://www.revistas.usp.br/revistadc/article/view/97325/96337

20. Vieira NS, Almeida TMC. O trabalho doméstico e as babás: lutas históricas e ameaças atuais. Soc Cult. 2019 [cited 2022 Oct 07];22(1):135-56. Available from: https://revistas.ufg.br/fcs/article/view/57899/32880

21. Homma A, Martins RM, Jessouroum E, Oliva O. Desenvolvimento tecnológico: elo deficiente na inovação tecnológica de vacinas no Brasil. HistCiencSaude Manguinhos. 2003 [cited 2022 Oct 07];10(2):671-96. Available from: https://www.scielo.br/j/hcsm/a/QdG3LKNqsg4mMFrpVVLxPYH/?format=pdf&lang=pt

22. Fernandes PKL, Cruz EA, Oliveira ACC. A supervisão do enfermeiro em sala de vacina. Fac Sant'AnaRev. 2020 [cited 2022 Sep 18];4:65-73. Available from: https://www.iessa.edu.br/revista/index.php/fsr/article/view/1618/729

23. Gust DA, Darling N, Kennedy A, Schwartz B. Parents With doubts about vaccines: which vaccines and reasons why. Pediatrics. 2008;122(4):718-25. doi: https://doi.org/10.1542/peds.2007-0538

24. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Nota Técnica Nº 255/2022-CGPNI/DEIDTS/SVS/MS. Da atualização da terminologia de "Eventos Adversos Pós-Vacinação (EAPV)" para "Eventos Supostamente Atribuíveis à Vacinação ou Imunização (ESAVI)". Brasília, DF: Ministério da Saúde; 2022.

25. Peres GP, Ferraz JG, Matos AFM, Zöllner MSA. Cobertura vacinal e o retorno do sarampo no Brasil: uma análise comparativa. Braz J Infec Dis. 2022;26(Supp 2):102441. doi: https://doi.org/10.1016/j.bjid.2022.102504

26. Balieira MMFG, Silva L, Wysocki AD, Maia EBS, Kusahara DM, organizadores. Sociedade Brasileira de Enfermeiros Pediatrais. Nota Técnica da SOBEP sobre vacinação infantil contra a Covid-19 [Internet]. SOBEP; 2022 [cited 2022 Oct 13]. Available from: https://sobep.org.br/wp-content/uploads/2022/03/Nota-t%C3%A9cnica-SOBEP.pdf

27. Bianco A, Polla GD, Angelillo S, Pelullo CP, Licata F, Angelillo IF. Parental COVID-19 vaccine hesitancy: a cross-sectional survey in Italy. Expert Rev Vaccines. 2022;21:(4):541-7. doi: https://doi.org/10.1080/14760584.2022.2023013

28. Lee DID, Vanderhout S, AglipayM, Birken CS, Morris SK, Piché-Renaud PP, et al. Delay in childhood vaccinations during the COVID-19 pandemic. Can J Public Health. 2022;113,126-34. doi: https://doi.org/10.17269/s41997-021-00601-9

29. Campos LAM, Santana CML, Silva CM, Moraes FX, Domingos LF, Pereira DBA, et al. Hesitação à Vacina de COVID-19 para Crianças no Brasil. Cad Psicol. 2022;2(2)1-13. doi: https://doi.org/10.9788/CP2022.2-15

Acknowledgments:
We thank for the contribution and participation during data collection to the researchers: Thaynara Maria Pontes Bulhões, Caroline Magna de Oliveira Costaand Carlos Rodrigo dos Santos.

Authorship contribution:
Project administration: Diane Fernandes dos Santos, Christefany Régia Braz Costa.
Formal analysis: Diane Fernandes dos Santos, Regina Célia Sales Santos, Christefany Régia Braz Costa.
Conceptualization: Diane Fernandes dos Santos, JayaneOmena de Oliveira, Christefany Régia Braz Costa.
Data curation: Diane Fernandes dos Santos, Christefany Régia Braz Costa.
Writing-original draft: Diane Fernandes dos Santos, Christefany Régia Braz Costa.
Writing-review & editing: Diane Fernandes dos Santos, JayaneOmena de Oliveira, Ana Carolina Santana Vieira, Regina Célia Sales Santos, AlannaMichella Oliveira de Albuquerque da Silva, Christefany Régia Braz Costa.
Investigation: Diane Fernandes dos Santos, JayaneOmena de Oliveira, Christefany Régia Braz Costa.
Methodology: Diane Fernandes dos Santos, Regina Célia Sales Santos, Christefany Régia Braz Costa.
Software: Diane Fernandes dos Santos, Regina Célia Sales Santos.
Supervision: Christefany Régia Braz Costa.

Visualization: Diane Fernandes dos Santos, Christefany Régia Braz Costa.

The authors declare that there is no conflict of interest.

Corresponding author:
Diane Fernandes dos Santos
E-mail: dianefernandes@outlook.com.br

Received: 12.30.2022
Approved: 05.31.2023

Associate editor:
Jéssica Teles Schlemmer

Editor-in-chief:
João Lucas Campos de Oliveira