Original article

Immunization of pregnant women in times of the COVID-19 pandemic*

Imunização da gestante em tempos de pandemia da COVID-19

Inmunización de mujeres embarazadas en tiempos de pandemia de COVID-19

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Abstract

Objective: analyze and compare the immunization of pregnant women during the COVID-19 pandemic in western Paraná. **Method:** this is an analytical, cross-sectional study carried out in the ninth and tenth regional health departments of Paraná. A total of 823 puerperal women took part, and data was collected using a survey and information from medical records between September and December 2021. Descriptive analysis and the chi-square test were used, with a significance level of 5%. **Results:** the ninth region performed better in immunization against Hepatitis-B, Influenza, Diphtheria, Tetanus and Pertussis compared to the tenth region. Vaccination against COVID-19 had low uptake in both regions, the reasons for which were: fear, own choice, medical advice and the wish to wait for the child to be born. **Conclusion:** new strategies and awareness campaigns are needed to increase the vaccination rate among pregnant women, especially for the COVID-19 vaccine, considering the complications for maternal and child health.
Descriptors: Pregnancy; Women's Health; Immunization; Vaccination Coverage; COVID-19

Resumo

Objetivo: analisar e comparar a imunização de gestantes no período da pandemia da COVID-19 no Oeste do Paraná. **Método:** pesquisa analítica e transversal, realizada na nona e décima regionais de

saúde do Paraná. Participaram 823 puérperas. A coleta de dados foi conduzida por inquérito e informações do prontuário entre setembro a dezembro de 2021. Utilizaram-se análise descritiva e teste de qui-quadrado com nível significância de 5%. **Resultados:** a nona regional apresentou melhor desempenho na imunização contra Hepatite-B, Influenza, Difteria, Tétano e Coqueluche em comparação à décima regional. A vacinação contra COVID-19 teve baixa adesão em ambas as regionais, cujos motivos foram: medo, opção própria, orientação médica e desejo de esperar o filho nascer. **Conclusão:** são necessárias novas estratégias e campanhas de sensibilização para aumentar o índice vacinal entre gestantes, sobretudo para a vacina contra COVID-19, considerando as complicações para a saúde materno-infantil.
Descritores: Gestação; Saúde da Mulher; Imunização; Cobertura Vacinal; COVID-19

Resumen

Objetivo: analizar y comparar la inmunización de mujeres embarazadas durante la pandemia de COVID-19 en el Oeste de Paraná. **Método:** investigación analítica y transversal, realizada en la novena y décima región sanitaria de Paraná. Participaron 823 puérperas. La recolección de datos se realizó mediante encuesta e información de historias clínicas entre septiembre y diciembre de 2021. Se utilizó análisis descriptivo y prueba de chi cuadrado con un nivel de significancia del 5%. **Resultados:** la novena región presentó mejor desempeño en inmunización contra Hepatitis B, Influenza, Difteria, Tétanos y Tos Ferina en comparación con la décima región. La vacunación contra la COVID-19 tuvo baja adherencia en ambas regiones y los motivos fueron: miedo, elección personal, consejo médico y deseo de esperar a que nazca el niño. **Conclusión:** son necesarias nuevas estrategias y campañas de sensibilización para aumentar la tasa de vacunación entre las mujeres embarazadas, especialmente de la vacuna contra la COVID-19, considerando las complicaciones para la salud materna e infantil.
Descriptores: Embarazo; Salud de la mujer; Inmunización; Cobertura de vacunación; COVID-19

Introduction

Prenatal care, given its importance in protecting women through screening for risk indicators, immunization, prophylaxis, obstetric therapeutic interventions, counseling, and health education, is essential for minimizing risks, especially during critical periods such as the COVID-19 pandemic,[1] since it directly influences the reduction of maternal and infant morbidity and mortality.[2-3]

Immunization of pregnant women, an important tool for promoting the health and well-being of the mother and fetus, has been hampered by COVID-19, as have other essential primary care actions.[4] COVID-19 is a disease caused by the SARS-CoV-2 virus and was declared a pandemic by the World Health Organization in 2020.[5-6]

It is known that due to the pandemic and to control the transmission of the virus, attendance at health services have been drastically reduced in many countries, especially for health promotion and disease prevention services, which include immunization.[7] During

pregnancy, the recommended immunizations are against Influenza, Hepatitis B, Tetanus and Diphtheria (dT) or Tetanus, Diphtheria and Pertussis (dTpa), which confer a protective factor against severe forms of these infections. In addition to these immunizers, pregnant women have been included as a priority group for vaccination against COVID-19 due to the increased risk of aggravation by this disease.[4]

The presence of infections during pregnancy is associated with complications such as fetal death, malformations, premature birth and neonatal infections. However, many of these infections are immune-preventable and the maternal vaccination strategy preserves the health of the newborn, as the antibodies cross the placental barrier and provide passive protection for approximately 12 months of life, since their own humoral response is still relatively inefficient.[4,8]

Pregnant women and their offspring are considered to be a group at greater risk of morbidity and mortality from vaccine-preventable diseases due to the physiological and immunological changes that occur in the pregnancy cycle.[9-10] Data corroborated by a study that analyzed 17 pregnant women diagnosed with severe influenza showed that 88% needed to be hospitalized, 53% used mechanical ventilation, 29% underwent emergency caesarean section and 24% died. Only 14% of these women had received the influenza vaccine during pregnancy.[11]

In this context, since vaccination status is influenced by intrinsic and extrinsic factors, the role of health professionals becomes essential in times of health crisis and can influence women in their decisions about immunization during pregnancy.[12]

The aim of this study is to analyze and compare the immunization of pregnant women during the COVID-19 pandemic in western Paraná.

Method

This is an analytical, cross-sectional study carried out in four maternity hospitals in the Western region of the state of Paraná, Brazil, located in the municipalities of Cascavel, Foz do Iguaçu, Medianeira and Matelândia. These were intentionally chosen because they provide care through the Unified Health System (*Sistema Único de Saúde*, SUS).

The maternity hospital in Cascavel, the headquarters of the tenth regional health

department, is a reference point for high-risk and normal-risk pregnancies, as well as neonatology for all the municipalities belonging to this regional department, providing exclusive SUS services.

The maternity hospital in Foz do Iguaçu, headquarters of the ninth region, is a reference point for high-risk pregnancies and neonatology for all nine municipalities that make up this regional health department, and provides care through the public and private systems. In addition to high-risk care, it is also responsible for regular and intermediate risk care in the municipality itself and Santa Terezinha de Itaipu. The maternity wards in Medianeira and Matelândia provide services through the public and private systems, and care for normal and intermediate risk pregnant women from Medianeira, Matelândia, Ramilândia and Serranópolis do Iguaçu, all of which belong to the ninth regional health department

For the sample calculation, the number of births that occurred in 2020 in the municipalities of interest to the study was taken into account, considering N size (number of elements) of the population; n size (number of elements) of the sample; n^o a first approximation for the sample size; E0 tolerable sampling error. The following formulas were used: n0 = 1 / (E0)2. 0,05 = 400 / n = N . n0 / N + n0

A margin of error of 5% and a 95% confidence level were considered. A safety margin of 10% was set, in view of losses during data collection.

A total of 823 puerperal women hospitalized in rooming-in were included, regardless of maternal age or gestational age. The exclusion criteria were puerperae with clinical and/or mental health problems, recorded in their medical records, which could prevent them from taking part in the study. However, none of the participants approached had any description in their medical records of decompensated clinical problems (such as hypertensive syndromes, hemorrhages, among others) or mental health problems (such as postpartum depression).

A structured instrument was used, designed by nurse-teachers with expertise in maternal and child health research. The instrument contained the following variables: Sociodemographic data: age, schooling, family income and government subsidy; Gestational data: number of pregnancies, prenatal consultations and comorbidities; Immunization data: complete or incomplete vaccination (anti-Hepatitis B; dTtpa;

Influenza; COVID-19) and reasons for incomplete or no immunization.

The data collection period was from September to December 2021, carried out using a survey, in the rooming-in, approximately 24 hours after the birth of the child, in the room itself, but without the presence of companions and health professionals. The participants were invited to take part in the study by first explaining the objectives of the study and, when they accepted, their signatures were collected on the Free and Informed Consent Form, in two copies: one was kept by the participant and the other by the researcher. The answers were marked on a printed questionnaire by the researchers themselves, and after each survey was finished, they were asked to agree to their answers, but none of them reported needing to be checked.

The surveys were carried out by female nursing students from a public institution, who had been previously trained by the researchers in charge, who have professional and academic experience in the field of maternal and child health. Pilot tests (not included in the data collection) were used to train the students and to adapt the research instrument, which was drawn up and validated by the researchers responsible. Data was also searched for in electronic medical records and the pregnant woman's health card.

The data was organized in Excel® spreadsheets by independent double entry. For data analysis, the variables studied were organized in double entry tables and absolute and relative frequencies were calculated. The analysis sought to establish a comparison between the two regional health departments studied, distributing the types of vaccines and relating them to sociodemographic factors and obstetric profile. The chi-square test with a significance level of 5% was used to verify this association and the XLStat2014® program was used.

The study was reported according to the criteria of the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) initiative. It was approved by the Human Research Ethics Committee of the State University of Western Paraná under Opinion No. 4.837.617 and complied with all the ethical precepts involving research with human beings. This research is part of a larger project entitled Coping with COVID-19 and Maternal and Child Care ("*Enfrentamento da COVID-19 e a Assistência Materno-Infantil*").

Results

The vaccination status of 405 pregnant women from Paraná's ninth regional health department and 418 from the tenth region was analyzed, for a total of 823 participants.

Table 1 illustrates the comparison of vaccination coverage between the two regions in relation to Anti-Hepatitis B, Influenza, dTpa and COVID-19 immunization, which showed statistical relevance ($p<0.05$). It was observed that the ninth region showed better performance in immunization rates compared to the tenth region, maintaining rates above 90% in immunobiologicals related to Influenza, Anti-Hepatitis B and dTpa. However, regarding vaccination against COVID-19, the tenth regional health department had better results, with 79% of pregnant women immunized, while the ninth region had just over 50%.

Table 1 - Vaccination coverage of pregnant women against Hepatitis B, Influenza, dTtpa and COVID-19. Western Paraná state, Brazil, 2023

Variables	9th Regional Health Department		10th Regional Health Department		p-value*
	n	%	n	%	
Anti-Hepatitis B	380	93.9	364	87.0	0.006
Influenza	386	95.3	370	88.5	0.005
dTpa	397	98.0	392	96.8	0.028
COVID-19	227	56.0	330	79.0	0.001

* Chi-square test for proportions

Regarding immunization against Hepatitis B (Table 2) and socio-economic aspects, when comparing the two regional health departments, there was statistical significance ($p<0.05$) for pregnant women in the tenth health regional department who were under 19 years old, had more schooling (12 years or more) and a higher income (one to three minimum wages), while in the ninth region, there was a lower income (one minimum wage or less) and less schooling (five to 11 years).

Regarding the obstetric profile and immunization against Hepatitis B, no statistical significance was observed when comparing the regional health departments (Table 2).

Table 2 - Socioeconomic characterization and obstetric profile related to Hepatitis B immunization of pregnant women. Western Paraná state, Brazil, 2023

Variables		9th Regional health department		10th Regional health department		p-value#
		n	%	n	%	
Socioeconomic characterization						#
Age		n=376		n=357		0.035
	<19 years old	15	4.0	37	10.4	
	19 - 34 years old	315	83.8	278	77.9	
	≥35 years old	46	12.2	42	11.8	
Schooling		n=370		n=362		0.001
	0 - 4 years	8	2.2	2	0.6	
	5 - 8 years	66	17.8	30	8.3	
	9 - 11 years	95	25.7	39	10.8	
	≥ 12 years	201	54.3	291	80.4	
Family income		n=346		n=352		0.001
	<1	70	20.2	25	7.1	
	1 - 3 wages	251	72.5	300	85.2	
	≥4 wages	25	7.2	27	7.7	
Government Subsidy		n=376		n=363		0.119
	Received	108	28.7	85	23.4	
	Did not receive	268	71.3	278	76.6	
Obstetric profile						
Number of pregnancies		n=374		n=361		0.081
	Primigravida	113	30.2	132	36.6	
	Multiparous	261	69.8	229	63.4	
Nº of appointments		n=356		n=352		0.3278
	<6	38	10.7	29	8.2	
	≥6	318	89.3	323	91.8	
Comorbidities		n=376		n=363		0.054
	Yes	96	25.5	117	32.2	
	No	280	74.5	246	67.8	

*Minimum wage (2022): R$1.212,00.
Chi-square test

Table 3 - Socioeconomic characterization and obstetric profile related to influenza immunization of pregnant women. Western Paraná state, Brazil, 2023

Variables		9th Regional Health Department		10th Regional Health Department		p-value#
		n	%	n	%	
Socioeconomic characterization						#
Age		n=381		n=360		0.015
	<19 years old	18	4.7	37	10.3	
	19 - 34 years old	317	83.2	284	78.9	
	≥35 years old	46	12.1	39	10.8	
Schooling		n=375		n=368		0.001
	0 - 4 years	8	2.1	3	0.8	
	5 - 8 years	65	17.3	32	8.7	
	9 - 11 years	100	26.7	40	10.9	
	≥12 years	202	53.9	293	79.6	
Family income		n=349		n=357		0.001
	<1	70	20.1	28	7.8	
	1 - 3 wages	254	72.8	300	84.0	
	≥4 wages	25	7.2	29	8.1	
Government Subsidy		n=381		n=369		0.069
	Received	111	29.1	85	23.0	
	Did not receive	270	70.9	284	77.0	
Obstetric profile						
Number of pregnancies		n=379		n=367	%	0.121
	Primigravida	117	28.9	134	36.5	
	Multiparous	262	64.7	233	63.5	
Nº of appointments		n=359		n=357		0.442
	<6 appointments	35	8.6	28	7.8	
	≥6 appointments	324	80	329	92.2	
Comorbidities		n=381		n=369		0.114
	Yes	95	24.9	112	30.4	0.015
	No	286	75.1	257	69.6	

*Minimum wage (2022): R$1.212,00.
Chi-square test

Regarding immunization against influenza (Table 3), the greatest differences found between the regional health departments were in the under-19 age group, education level equal to or greater than 12 years, and higher income, that is, between one and three minimum wages in the tenth regional health department.

In the ninth region, there was statistical significance (p<0.05) for lower schooling (five to 11 years) and lower income (equal to or less than one minimum wage). When comparing the regions in terms of influenza immunization and obstetric profile, there were no statistical differences (Table 3).

Regional health departments were also compared in terms of dTpa immunization (Table 4) and socioeconomic status. The data was similar to the other immunizations, except the receipt of government subsidies. In the tenth regional health department, immunized pregnant women received the subsidy less frequently than pregnant women in the ninth (p<0.031). For the information related to the obstetric profile, there was no statistical significance.

For immunization against COVID-19 (Table 5), in the tenth region, the greatest differences were found for immunized pregnant women aged under 19, with 12 years or more of schooling and an income of between one and three minimum wages, while in the ninth, the statistical relevance was for pregnant women with between five and 11 years of schooling (p=0.001) and an income of one minimum wage or less (p=0.005). Once again, there was no statistical evidence for the obstetric profile (p>0.05).

Table 4 - Socioeconomic characterization and obstetric profile and the relationship with dTpa immunization of pregnant women in the ninth and tenth regional health departments. Western Paraná state, Brazil, 2023

Variables		9th Regional Health Department		10th Regional Health Department		p-value#
		n	%	n	%	
Socioeconomic characterization						#
Age		n=393		n=383		0.016
	<19 years old	18	4.6	38	9.9	
	19 - 34 years old	326	83.0	301	78.6	
	≥35 years old	49	12.5	44	11.5	
Schooling		n=387		n=390		0.001
	0 - 4 years	8	2.1	2	0.5	
	5 - 8 years	68	17.6	32	8.2	
	9 - 11 years	101	26.1	44	11.3	
	≥12 years	210	54.3	312	80.0	
Family income		n=360		n=377		0.001
	<1	71	19.7	25	6.6	
	1 - 3 wages	262	72.8	317	84.1	
	≥4 wages	27	7.5	35	9.3	
Government Subsidy		n=393		n=391		0.031
	Received	115	29.3	87	22.3	
	Did not receive	278	70.7	304	77.7	
Obstetric profile						
Number of pregnancies		n=391		n=389		0.135
	Primigravida	120	30.7	140	36.0	
	Multiparous	271	69.3	249	64.0	
Nº appointments		n=370		n=379		0.265
	<6 appointments	39	10.5	30	7.9	
	≥6 appointments	331	89.5	349	92.1	
Comorbidities		n=393		n=391		0.061
	Yes	98	24.9	122	31.2	
	No	295	75.1	269	68.8	

*Minimum wage (2022): R$1.212,00.
Chi-square test

Table 5 - Socioeconomic characterization and obstetric profile and the relationship with immunization against COVID-19 of pregnant women. Western Paraná state, Brazil, 2023

Variables		9th Regional Health Department		10th Regional Health Department		p-value#
		n	%	n	%	
Socioeconomic characterization						#
Age		n=225		n=322		0.283
	<19 years old	7	3.1	19	5.9	
	19 - 34 years old	189	84.0	258	80.1	
	≥35 years old	29	12.9	45	14.0	
Schooling		n=221		n=328		0.001
	0 - 4 years	4	1.8	2	0.6	
	5 - 8 years	33	14.9	25	7.6	
	9 - 11 years	48	21.7	29	8.8	
	≥12 years	136	61.5	272	82.9	
Family income		n=209		n=317		0.005
	<1	32	15.3	21	6.6	
	1 - 3 wages	163	78.0	271	85.5	
	≥4 wages	14	6.7	25	7.9	
Government Subsidy		n=225		n=329		0.977
	Received	50	22.2	74	22.5	
	Did not receive	175	77.8	255	77.5	
Obstetric profile						
Number of pregnancies		n=223		n=327		0.293
	Primigravida	68	30.5	115	35.2	
	Multiparous	155	69.5	212	64.8	
Nº of appointments		n=213		n=321		0.961
	<6 appointments	14	6.6	22	6.9	
	≥6 appointments	199	93.4	299	93.1	
Comorbidities		n=225		n=329		0.095
	Yes	53	23.6	100	30.4	
	No	172	76.4	229	69.6	

*Minimum wage (2022): R$1,212.00.
Chi-square Test

Among the participants who did not receive the COVID-19 vaccine, the most cited reasons in the tenth region were: fear (27.5%), own choice (23.5%), and medical advice (17.7%). In the ninth region, the reasons were: their own choice (16.8%), medical advice (14.2%), and the desire to wait for their child to be born (15.9%).

Discussion

The vaccination schedule for pregnant women consists of three immunizations: against Hepatitis B, Diphtheria, Tetanus and Pertussis (dTpa) and against Influenza. The results of this study, of more than 80% of pregnant women, corroborate data from a study that assessed prenatal care in the ninth, tenth and seventeenth regional health departments in Paraná prior to the COVID-19 pandemic.[13]

As far as vaccination coverage is concerned, the National Immunization Program (NIP) recommends vaccination rates of 95% for most immunizers, with the aim of protecting the population individually and collectively against vaccine-preventable diseases. In recent years, there has been a significant drop in vaccination for various immunobiologicals in Brazil and around the world, including among pregnant women, intensified by the COVID-19 pandemic.[14-15] In Brazil, vaccination coverage is not homogeneous, implying a risk for the population.[14]

Regarding the COVID-19 vaccine, it was given to a smaller extent than the other immunobiologicals. This data suggests that pregnant women are hesitant to vaccinate themselves with this vaccine in particular, since the reasons for not doing so involved: fear, their own choice, and medical advice, and at no time was the unavailability of doses mentioned. This reinforces the results found in another study carried out in Turkey, whose sample of pregnant women also had low acceptance of the COVID-19 vaccine. The authors found that pregnant women in the first trimester were more interested in receiving the vaccine than pregnant women in the second or third trimesters, and the possibility of damage to the fetus was also included among the reasons for hesitation.[16]

A North American survey showed that before the COVID-19 vaccine became available, between 41% and 47% of pregnant women would like to receive it,[17] a result much higher than that found in Croatia, which identified only 16% of pregnant women.[18]

It was found that having previously refused the influenza vaccine, lack of guidance from a health professional, lower education level, younger age, African-American race and Hispanic ethnicity were factors associated with pregnant women refusing the COVID-19 vaccine.[17]

Even so, the tenth region had better vaccination rates against COVID-19, around 20% more than the ninth region. This may be related to sociodemographic aspects, given that in the tenth region there was a significant difference in higher levels of schooling. It is understood that pregnant women's decisions about immunization, especially against COVID-19, may be influenced by social and family factors or by misconceptions about the vaccine, a practice intensified during the pandemic.[14]

A comparative analysis between the regional health departments shows that the socio-economic data differ. In the tenth region, the greatest significance, for all the immunizations observed, was related to higher schooling, higher income and lower receipt of government subsidies. In the ninth region, there was a lower level of education, lower income and greater receipt of subsidies.

It is known that in Brazil, socioeconomic status and access to health services is a determining factor in achieving a higher vaccination coverage rate among pregnant women. Therefore, it is understood that socioeconomic inequalities can compromise immunization actions.[19] Even so, the ninth region performed better for Hepatitis B, Influenza and dTpa vaccines when compared to the tenth region, even with significance for lower schooling and family income.

One study found that, when compared to pregnant women with no schooling or only elementary schooling, those with higher education were the ones who received the most Anti-Hepatitis B immunizations. It was also observed that having a paid job and a greater number of prenatal consultations were associated with less vaccine absence.[19]

The Hepatitis B vaccine is the most effective preventive method for Hepatitis B virus (HBV) infection. Its vertical transmission is associated with a high risk of the child developing chronic infection. Therefore, the aim of administering this immunizer during pregnancy is not only to protect the pregnant woman from acquiring the virus but also to protect the newborn.[4,12]

Influenza immunization should be administered to all pregnant women, regardless of gestational week, during vaccination campaigns. This study found that the ninth regional health department achieved the best results.

For the 2022 National Influenza Vaccination Campaign, the target was for 90% of priority groups to be vaccinated, which included pregnant women due to their higher risk of complications caused by the influenza virus. The use of this vaccine can reduce the burden on health systems and help prevent new outbreaks of respiratory diseases caused by the influenza virus,[20] information also confirmed by the California Department of Public Health.[10]

The incorporation of the dTpa vaccine into the vaccination schedule for pregnant women in 2014 was due to the significant increase in cases of Pertussis in children under one year old, to offer indirect immunity to the newborn. As a result, there was a decrease in Pertussis cases in children. A study showed that, since the vaccine was introduced, there has been a 63.6% reduction in children aged 0 to 2 months and a 26.6% reduction in children aged 3 months to one year.[21-22] In both regional health departments evaluated, the dTpa vaccine reached more than 90% of pregnant women.

The NIP includes strategies to ensure that vaccination coverage is maintained, such as setting targets, vaccination campaigns, expanding the target population and partnership policies.[23] With the current scenario regarding the drop in vaccinations, it is necessary for these measures to be intensified and associated with the role of the nursing professional, who has the opportunity to intervene in the health-disease process by carrying out activities aimed at updating the vaccination card, using effective communication and carrying out health education with the population and team, providing accessible educational material.[24] A study carried out in prenatal clinics in Winchester, Virginia and Jacksonville, Florida, showed that black pregnant women with lower educational levels received less information about vaccines and, consequently, were less likely to receive immunizations.[25]

In view of the above, vaccination is an important practice for public health, as it helps to reduce morbidity and mortality rates.[23] Therefore, treating the vaccination schedule without seriousness can lead to a number of problems, as well as serious public health problems, because it increases the risk of the population acquiring

vaccine-preventable diseases and new epidemics emerging.[26]

Brazil is among the countries most affected by the COVID-19 pandemic.[27] In epidemiological week 46, the period of data collection for this study, the countries with the highest number of cumulative deaths were the United States, with 771,013 recorded deaths, followed by Brazil, with 612,587.[28] Although the most critical scenario of the pandemic has passed, new cases and deaths from the disease are still being recorded. In the Coronavirus Epidemiological Report for the state of Paraná, between April 17 and 24, 2023 there were 2,097 new reported cases of the disease and 53 deaths.[29]

Another aspect observed is the integration between regional health departments and the importance of keeping targets and actions aligned to achieve higher immunization rates throughout the population, specifically among pregnant women, in order to reduce maternal and infant morbidity and mortality rates.

The limitations of this study are the unprecedented nature of the topic due to the recent pandemic, and the need to investigate the reasons why pregnant women do not get vaccinated in order to propose effective strategies to improve vaccination coverage among pregnant women. This research contributes to the knowledge of the vaccination reality of pregnant women in the ninth and tenth regional health departments of the state of Paraná during the pandemic period, to provide support for the elaboration of actions and public policies that promote the improvement of prenatal care, especially in the guidelines regarding the immunization of pregnant women.

Conclusion

The performance of the regional health departments analyzed was similar, which suggests that both are aligned when it comes to immunizing the population. However, the ninth region achieved higher rates, except for the COVID-19 vaccine. In addition, some of the immunizers did not reach the vaccination coverage established by the NIP.

Although the results obtained are not unsatisfactory for most immunobiologicals, new strategies, and awareness-raising campaigns are needed to increase the vaccination rate of pregnant women, especially about the COVID-19 vaccine. It is important for health professionals, particularly nurses, to address the issue of immunization during prenatal consultations, as well as to check the Pregnant Women's

Handbook for records of vaccinations in order to advise patients on the importance and benefits they bring to both themselves and their children.

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