



Prevalence and factors associated with carrying out prenatal tests in the COVID-19 pandemic: A cross-sectional study

Prevalência e fatores associados à realização de exames pré-natais na pandemia de COVID-19: um estudo transversal

Prevalencia y factores asociados a la realización de exámenes prenatales en la pandemia de COVID-19: un estudio transversal

Eduarda Rockenbach Fabri¹

Simone Biff Canônico¹

Rosane Meire Munhak da Silva¹

Helder Ferreira¹

Adriana Zilly¹

Ana Paula Contiero¹

1. Universidade Estadual do Oeste do Paraná.
Foz do Iguaçu, PR, Brasil.

ABSTRACT

Objective: To identify the prevalence of prenatal screening and its associated factors during the COVID-19 pandemic in a Brazilian health region. **Method:** A cross-sectional and descriptive research study, carried out with 408 puerperal women in the maternity hospitals from the 9th Health Region, through survey and consultation of the pregnant women's medical records and cards. The Chi-square test was used, assuming a significance level of $p < 0.05$. **Results:** There was low prevalence of prenatal exams: 67% in the first trimester, 59.2% in the second and 48.98% in the third. Non-white race and prenatal care initiation after the 14th week are associated with low performance of serological/biochemical tests. **Conclusion and implications for the practice:** The performance of prenatal tests was not satisfactory during the pandemic period, allowing us to verify the existence of gaps in prenatal care quality. In adverse situations, as was the case in the COVID-19 pandemic, nurses can use strategies that guarantee prenatal care continuity and comprehensiveness, especially among the most vulnerable populations.

Keywords: Pregnancy Complications; COVID-19; Pregnancy; Prevalence; Maternal and Child Health.

RESUMO

Objetivo: Identificar a prevalência da realização dos exames de pré-natal e seus fatores associados, durante a pandemia de COVID-19, em uma regional de saúde brasileira. **Método:** Pesquisa transversal, descritiva, realizada em três maternidades públicas, com 408 puérperas, por meio de inquérito e consulta de prontuários e cartão da gestante. Utilizou-se o teste Qui-quadrado assumindo nível de significância de $p < 0,05$. **Resultados:** Houve baixa prevalência na realização dos exames de pré-natal, sendo 67% no primeiro trimestre, 59,2% no segundo e 48,98% no terceiro. A raça não branca e o início do pré-natal após a 14^a semana estão associados à baixa realização dos testes sorológicos/bioquímicos. **Conclusão e implicações para a prática:** A realização dos exames do pré-natal não ocorreu de forma satisfatória durante o período pandêmico, possibilitando verificar a existência de lacunas na qualidade da assistência pré-natal. Em situações adversas, como ocorrido na pandemia de COVID-19, o enfermeiro pode utilizar de estratégias que garantam a continuidade e integralidade da assistência pré-natal, especialmente entre as populações de maior vulnerabilidade.

Palavras-chave: Complicações na Gravidez; COVID-19; Gestantes; Prevalência; Saúde Materno-Infantil.

RESUMEN

Objetivo: Identificar la prevalencia de la realización de controles prenatales y sus factores asociados, durante la pandemia de COVID-19 en una regional de salud brasileña. **Método:** Investigación transversal y descriptiva, realizada con 408 puérperas en las maternidades de la 9^a Regional de Salud, por medio de indagaciones y consultas en las historias clínicas y cartillas sanitarias de las embarazadas. Se utilizó la prueba de Chi-cuadrado con un nivel de significancia de $p < 0,05$. **Resultados:** Se registró baja prevalencia de controles prenatales: 67% en el primer trimestre, 59,2% en el segundo y 48,98% en el tercero. La raza no blanca y el inicio de la atención prenatal después de la semana 14 se asocian con una escasa realización de las pruebas serológicas/bioquímicas. **Conclusión e implicaciones para la práctica:** Los controles prenatales no se realizaron satisfactoriamente durante el período pandémico, lo que permite comprobar la existencia de brechas en la calidad de la atención prenatal. En situaciones adversas, como ocurrió en la pandemia de COVID-19, los enfermeros pueden utilizar estrategias que garanticen la continuidad e integralidad de la atención prenatal, especialmente entre las poblaciones más vulnerables.

Palabras clave: Complicaciones del Embarazo; COVID-19; Embarazo; Prevalencia; Salud Materno-Infantil.

Corresponding author:

Ana Paula Contiero.
E-mail: ana_contiero@hotmail.com

Submitted on 02/27/2023.

Accepted on 11/03/2023.

DOI: <https://doi.org/10.1590/2177-9465-EAN-2023-0009en>

INTRODUCTION

Prenatal care is crucial for promoting maternal and child health, being directly linked to more favorable perinatal outcomes. Diverse evidence indicates that the maternal health level and that of their newborns are closely linked to the quality of the assistance received during prenatal care.¹

The World Health Organization (WHO) recommends a series of prenatal care qualification interventions, which are effective in preventing maternal and child complications, highlighting early detection of health complications and problems by performing several screening tests, which present strong evidence for reducing maternal and child morbidity and mortality.²

The Brazilian Public Health system has maternal and child morbidity and mortality reduction among its priorities. In this sense, *Rede Cegonha* was established in 2011, which ensures the organization of the maternal and child health care network with actions targeted at guaranteeing access, care and resoluteness in prenatal, delivery and birth care.

In the state of Paraná, *Rede Mãe Paranaense* (RMP) was implemented in 2012, a maternal and child care network that proposes early recruitment of pregnant women and prenatal monitoring, guaranteeing the performance of laboratory and complementary tests at least once in each gestational trimester.³

Failure to carry out prenatal tests represents losing the opportunity to diagnose and treat diseases that can pose risks, whether due to vertical transmission, such as syphilis, HIV, toxoplasmosis, hepatitis B and C, or to the emergence of various complications resulting from urinary infection, diabetes, hypertension and anemia, among others.⁴

The tests offered during prenatal care detect a range of conditions and, therefore, make it possible to identify risk situations so that professionals can act quickly. This helps reduce maternal and child morbidity and mortality. In the state of Paraná, after implementing the RMP network, the Maternal Mortality Ratio (MMR) in 2011, which was 52/100,000, dropped to 31.9/100,000 live births (LBs), representing a 39% reduction in maternal deaths, the lowest coefficient in the last 20 years. However, with the COVID-19 pandemic advent, the MMR was strongly increased throughout Brazil; only in Paraná, MMR was 118.9/100,000 LBs in 2020 and 2021.⁵

Studies carried out in Brazil to evaluate prenatal care quality showed marked regional inequalities, with examination rates varying from 37.3% to 81.4%.⁶⁻⁷ This situation may have been worsened by the emergence of the COVID-19 pandemic, as it was necessary to adopt protective measures against the disease, especially social isolation, which directly affected functioning of the health services, the assistance provided to pregnant women and the promotion of good quality prenatal care.⁸

The high transmissibility of the coronavirus resulted in impactful changes to prenatal care, whether due to the difficulty accessing health services, which prioritized the care of patients with COVID-19, or to the fear of infection, causing many pregnant women to give up on attending regular consultations and proper and continuous monitoring, harming the mothers' and newborns' health.⁹

An ecological study carried out in all Brazilian municipalities with data collection from the Information Systems of the Unified Health System (*Sistema Único de Saúde*, SUS) revealed that, during the pandemic, there was a reduction in the number of prenatal consultations and that diabetic and hypertensive pregnant women failed to undergo adequate tests and follow-up during the pandemic, resulting in worse clinical outcomes and in an increase in infant morbidity and mortality.¹⁰

Another study, carried out in Turkey, found that many pregnant women interrupted regular prenatal care during the pandemic, resulting in greater demand for obstetric emergency services, an increase in premature births, and more newborns diagnosed with low weight for their gestational age and with hypoxic-ischemic encephalopathy.¹¹

Given this context, the need was verified to analyze the prenatal care offered and identify the performance of prenatal tests during the COVID-19 pandemic in a Health Region from the state of Paraná, as this region was heavily impacted by the highest COVID-19 incidence rate of all health regions in the state,¹² which may have contributed to overload of the health services and made it difficult to provide adequate prenatal care. Therefore, the objective of the current research was to identify the prevalence of prenatal tests and their associated factors during the COVID-19 pandemic, in a Brazilian health region.

METHOD

This is a cross-sectional and descriptive study with a quantitative approach, carried out with 408 puerperal women at three reference maternity hospitals in the municipalities belonging to the 9th Health Region (*Regional de Saúde*, RS) from the West region of the state of Paraná, located on the border with Paraguay and Argentina, with an estimated population of 380,000 inhabitants. The city of Foz do Iguaçu shares a direct border with these countries, side by side with Ciudad Del Este, in Paraguay, and Puerto Iguazú, in Argentina.¹³

To select the participants, a sample calculation was carried out, based on the number of births recorded in 2020, obtained from the Live Birth Information System (*Sistema de Informação sobre Nascidos Vivos*, SINASC), considering the following: N as size (number of elements) of the population; n as size (number of elements) of the sample; n⁰ as a first approximation for the sample size; and E0 as tolerable sampling error,¹⁴ through the following expression: $n0 = 1 / (E0)^2 \cdot 0.05 = 400 / n = N \cdot n0 / N + n0$. A 5% research margin error and a 95% confidence level were also considered, resulting in a sample comprised by 408 puerperal women.

Data collection took place from September 2021 to January 2022 and was carried out by undergraduate and MSc students from a public teaching university, who were previously trained. The researchers visited the maternity hospitals daily and approached the puerperal women with 24 postpartum hours and, after their consent by signing the Free and Informed Consent Form (FICF) in two copies, they applied a structured instrument and collected data from the pregnant women's medical charts and health cards.

The data collection instrument was prepared by researchers with expertise in maternal and child health from different Universities, containing questions related to socioeconomic and gestational variables. This instrument was improved after a pilot test, and has already been used in other previous research studies by the same group of researchers, who evaluated maternal and child care in the period before the pandemic.

The following variables were used for this study: 1) Characterization of the women: maternal age; marital status; race/skin color; schooling; occupation; family income; receiving some financial assistance; and place of residence/origin. 2) Prenatal period: prenatal care start date; previous diseases; total number of consultations; risk classification during prenatal care (Usual, Risk – UR; Intermediate Risk – IR; High Risk – HR), laboratory and imaging tests carried out by gestational trimester: 1st, 2nd and 3rd trimesters (ABO typing, blood count, blood glucose, HIV, hepatitis B and C, syphilis, toxoplasmosis IgG and IgM, urine I, urine culture, obstetric and morphological ultrasound, and oncotic cytology collection).

The puerperal women included were those who had given birth in the hospitals/maternity wards under study during the COVID-19 pandemic and who lived in the municipalities of the 9th RS. The exclusion criteria were puerperal women with clinical and/or mental health problems, duly recorded in the medical chart, which prevented their participation in the research.

The data were validated after double entry into an Excel spreadsheet and, subsequently, a descriptive analysis was carried out with calculation of absolute and relative frequencies.

To verify the factors associated with carrying out the exams, the Chi-square test was performed assuming a significance level of $p < 0.05$, using the XLStat2014 program. To perform the association test, the examinations were grouped into two groups, namely: serological/biochemical tests consisting of blood count, blood glucose, ABO/Rh typing and urine tests; and infectious disease tests comprising HIV, hepatitis B and C, syphilis and toxoplasmosis.

This study is an excerpt from a multicenter project, developed in the health regions of Foz do Iguaçu, Cascavel, Maringá, Londrina and Ponta Grossa and entitled: "Coping with COVID-19 and Maternal-Child Care", being approved by the UNIOESTE Committee of Ethics in Research with Human Beings under opinion No. 483,761,714. The research was developed in accordance with the rules set forth in Resolution 466/12 of the National Health Council and was previously authorized by all institutions involved.

RESULTS

Most of the women who participated in the study were young adults, aged between 20 and 39 years old (86.5%); non-white race (54.7%); with at least eight years of study (89.2%); in a relationship with a partner (88.2%); devoting to unpaid occupations (49.8%); with family incomes between R\$ 1,401.00 and R\$ 4,000.00 (62%); and not receiving financial assistance from the government (69.1%).

Table 1 presents the frequency of laboratory tests performed during prenatal care. There was higher prevalence of tests carried out in the first trimester, with 67.0%; 59.2% in the second quarter; and 48.98% in the third.

Table 1. Frequency of tests performed during Prenatal Care. 9th Health Region, PR, Brazil, 2021-2022. (n=408).

Variables	1 st trimester		2 nd trimester		3 rd trimester	
	Yes	No	Yes	No	Yes	No
ABO/Rh typing	346 (86.3)	55 (13.7)	*	*	*	*
Blood count	231 (57.6)	170 (42.4)	221 (55.1)	180 (44.9)	195 (48.6)	205 (51.1)
Blood glucose	216 (53.9)	185 (46.1)	138 (34.4)	263 (65.6)	102 (25.4)	298 (74.3)
HIV	234 (58.4)	77 (19.2)	309 (77.1)	92 (22.9)	273 (68.1)	127 (31.7)
Hepatitis B	255 (63.6)	146 (36.4)	210 (52.4)	191 (47.6)	168 (41.9)	232 (57.9)
Hepatitis C	153 (38.2)	248 (61.8)	152 (37.9)	249 (62.1)	130 (32.4)	270 (67.3)
Syphilis	313 (78.1)	88 (21.9)	295 (73.6)	106 (26.4)	259 (64.6)	141 (35.2)
Toxoplasmosis IgG	315 (78.6)	86 (21.4)	282 (70.3)	119 (29.7)	232 (57.9)	168 (41.9)
Toxoplasmosis IgM	313 (78.1)	88 (21.9)	279 (69.6)	122 (30.4)	231 (57.6)	169 (42.1)
Urine I	301 (75.1)	100 (24.9)	205 (51.1)	196 (48.9)	143 (35.7)	257 (64.1)
Urine culture	284 (70.8)	117 (29.2)	284 (70.8)	117 (29.2)	231 (57.6)	169 (42.1)
Obstetric Ultrasound**	386 (94.6)	22 (5.4)				
Morphological Ultrasound***	108 (26.5)	300 (73.5)				
Oncotic Cytology [#]	160 (40.1)	239 (59.9)				

Source: Research data *Not recommended in this trimester. **Recommended in the 1st and 2nd trimesters. ***Recommended in the 1st and 2nd trimesters. [#]Collected once during Prenatal Care or up to 1 year before pregnancy.

Regarding the serological/biochemical tests, slightly more than half of the women underwent them, with blood/Rh typing as the most performed (86.3%) and fasting blood glucose as the least performed (25.4%).

In relation to the imaging tests, Obstetric Ultrasound was undergone by the vast majority of the women (94.6%); however, Morphological Ultrasound was performed for nearly one-quarter of them. In the case of the cervical-vaginal cytopathological examination, Pap smear, only 40.1% underwent it. There was no completeness in undergoing the tests, that is, none of the examinations listed were carried out in their entirety.

Regarding the variables associated with not performing the tests, it was found that non-white women presented more inadequacy in undergoing serological/biochemical tests (30.4%) than white-skinned women, which is a factor associated with

not performing prenatal exams, with results with statistical evidence ($p < 0.0342$). The other sociodemographic variables did not present any statistical association with failure to perform prenatal tests (Table 2).

When checking the gestational variables, Table 3 shows that initiating prenatal care before the 14th week represents greater adequacy in carrying out serological/biochemical tests (41.9%), with results with statistical evidence ($p < 0.0019$), when compared to the women that started prenatal care in the other trimesters. No associations were found with the other maternal variables.

Finally, regarding the reasons for not undergoing the tests, most of the participants reported that it was not requested (29.4%), followed by that it was not offered due to the pandemic (18.9%), as shown in Table 4.

Table 2. Association between tests performed and socioeconomic variables. 9th Health Region, PR, Brazil, 2021-2022. (n=408).

Variables	Serological/Biochemical tests			Infectious disease tests		
	Adequate	Inadequate	<i>p</i>	Adequate	Inadequate	<i>p</i>
Age (years old)						
≤19	17 (4.2)	23 (5.6)	0.2795	19 (4.7)	21 (5.1)	0.8792
20-39	179 (43.9)	174 (42.6)		158 (38.7)	195 (47.8)	
40+	5 (1.2)	10 (2.5)		6 (1.5)	9 (2.2)	
Marital status						
With a partner	176 (43.1)	184 (45.1)	0.5832	163 (40.0)	197 (48.3)	0.9177
Without a partner	24 (5.9)	20 (4.9)		19 (4.7)	25 (6.1)	
Not reported	1 (0.2)	3 (0.7)		1 (0.2)	3 (0.7)	
Race						
White	102 (25.0)	82 (20.1)	0.0342	81 (19.9)	103 (25.2)	0.8758
Non-white	99 (24.3)	124 (30.4)		101 (24.8)	122 (29.9)	
Not reported		1 (0.2)		1 (0.2)		
Schooling						
Up to 7 years	19 (4.7)	19 (4.7)	0.9668	19 (4.7)	19 (4.7)	0.6337
8+ years	178 (43.6)	186 (45.6)		178 (43.6)	186 (45.6)	
Not reported	4 (1.0)	2 (0.5)		4 (1.0)	2 (0.5)	
Occupation						
Paid	102 (25.0)	97 (23.8)	0.6186	87 (21.3)	112 (27.5)	0.6738
Unpaid	98 (24.0)	105 (25.7)		94 (23.0)	109 (26.7)	
Not reported	1 (0.2)	5 (1.2)		2 (0.5)	4 (1.0)	
Income*						
Up to R\$ 1,400.00	43 (10.5)	41 (10.0)	0.9382	41 (10.0)	43 (10.5)	0.6368
From R\$ 1,401.00 to R\$ 4,000.00	131 (32.1)	122 (29.9)		111 (27.2)	142 (34.8)	
More than R\$ 4,000.00	18 (4.4)	19 (4.7)		15 (3.7)	22 (5.4)	
Not reported	9 (2.2)	25 (6.1)		16 (3.9)	18 (4.4)	
Receiving Financial Aid						
Yes	58 (14.2)	63 (15.4)	0.7362	48 (11.8)	73 (17.9)	0.1996
No	142 (34.8)	140 (34.3)		134 (32.8)	148 (36.3)	
Not reported	1 (0.2)	4 (1.0)		1 (0.2)	4 (1.0)	

Source: Research data *Values according to the minimum wage in force at the time in the state of Paraná

Table 3. Association between tests performed and gestational variables in the 9th Health Region, PR, Brazil, 2021-2022. (n=408).

Variables	Serological/Biochemical tests			Infectious disease tests		
	Adequate	Inadequate	<i>p</i>	Adequate	Inadequate	<i>p</i>
Clinical Background						
Yes	56 (13.7)	47 (11.5)	0.2782	39 (9.6)	64 (15.7)	0.1248
No	145 (35.5)	160 (39.2)		144 (35.3)	161 (39.5)	
Previous Pregnancy						
Primiparous	60 (14.7)	62 (15.2)	0.9826	51 (12.5)	71 (17.4)	0.4875
Multiparous	141 (34.6)	143 (35.0)		131 (32.1)	153 (37.5)	
Does not know/Did not report		2 (0.5)		1 (0.2)	1 (0.2)	
Underwent Prenatal Care						
Yes	199 (48.8)	205 (50.2)	0.6362	181 (44.4)	223 (54.7)	0.7664
No	2 (0.5)	2 (0.5)		2 (0.5)	2 (0.5)	
Risk Classification						
Usual Risk	120 (29.4)	117 (28.7)	0.6786	113 (27.7)	124 (30.4)	0.5199
Intermediate Risk	16 (3.9)	12 (2.9)		14 (3.4)	14 (3.4)	
High Risk	58 (14.2)	48 (11.8)		44 (10.8)	62 (15.2)	
Not reported	7 (1.7)	30 (7.4)		12 (2.9)	25 (6.1)	
Prenatal Care Initiation						
<14 weeks	171 (41.9)	150 (36.8)	0.0019	139 (34.1)	182 (44.6)	0.4782
14-17 weeks	20 (4.9)	44 (10.8)		33 (8.1)	31 (7.6)	
>27 weeks	3 (0.7)	8 (2.0)		5 (1.2)	6 (1.5)	
Not reported	7 (1.7)	5 (1.2)		6 (1.5)	6 (1.5)	
No. of Consultations						
≥7	152 (37.3)	148 (36.3)	0.1019	133 (32.6)	167 (40.9)	0.9753
<7	33 (8.1)	50 (12.3)		36 (8.8)	47 (11.5)	
Not reported	16 (3.9)	9 (2.2)		14 (3.4)	11 (2.7)	

Source: Research data

Table 4. Reasons for not undergoing some test during prenatal care in the 9th Health Region, PR, Brazil, 2021-2022. (n=246).

Reasons	N	%
Not offered due to the pandemic	77	18.9
Late prenatal care	27	6.6
Fear of leaving the house	22	5.4
Not requested	120	29.4

Source: Research data

DISCUSSION

This study revealed that most of the tests were not carried out in all three gestational trimesters, in opposition to the RPM network recommendation, with prevalence below 50%, showing

that the routine prenatal examinations were not carried out in their entirety. For a comparison with other Brazilian regions before the COVID-19 pandemic, in Rio Grande do Norte the test performance rate reached 98.1% completion,¹⁵ as well as in Maranhão and Recife, which presented rates of 94.3% and 95.8%, respectively.¹⁶⁻¹⁷ Even so, an epidemiological study carried out at the national level in all of the country's regions found a lower prevalence than the one herein presented: approximately 37.3%.⁶

The highest prevalence of tests performed was in the 1st gestational trimester; however, the rates were not satisfactory, as slightly more than half of the pregnant women underwent the recommended examinations. Such results may be a reflection of the reorganization of services in some municipalities, which prioritized care for those with respiratory symptoms, suspending or postponing consultations and clinical examinations for pregnant women.¹⁸

During the pandemic period, a study carried out in Canada showed that pregnant women had major interruptions in their prenatal follow-up, where 23% of them had their prenatal appointments canceled and 47.9% had some difficulty accessing prenatal care.¹⁹

In this study, the most common test performed in the 1st trimester was ABO/Rh typing, whereas the Hepatitis C test was the least performed, with more than half of the pregnant women failing to undergo it. The ABO typing test aims at identifying a pregnant woman's blood type, in addition to detecting the Rh factor (Antigen D) since, if the mother is Rh negative and the fetus is Rh positive, Rh immunoglobulin administration is recommended to prevent fetal erythroblastosis in future pregnancies, a complication that can cause fetal death.²⁰

The Hepatitis C test is an important screening tool during pregnancy and, as it is a vertically transmitted infection, these risks extend to the neonates, with intrauterine transmission being rare. Early detection is associated with timely diagnosis and immediate treatment of the newborn.²¹

In relation to third trimester tests, they are undergone by less than half of the pregnant women, corroborating studies that report a reduction in the prevalence of examinations and unsatisfactory coverage of the tests recommended by the Ministry of Health for the third trimester of pregnancy.^{17,22}

The RT to detect the Human Immunodeficiency Virus (HIV) was the most frequently performed test, whereas the fasting blood glucose one was performed less frequently. HIV can be transmitted vertically during pregnancy. Therefore, it is important that it is diagnosed early in pregnancy for better outcomes in controlling maternal infection and, consequently, prophylaxis to prevent transmission to the child.²⁰

The main objective of fasting blood glucose testing is to screen for pre-existing Gestational Diabetes *Mellitus* (GDM) and prevent complications related to this disease.²⁰ It is important to highlight that GDM during pregnancy is associated with higher maternal and fetal morbidity and mortality rates, making it valuable to screen and diagnose it early during follow-up.²³ In addition, according to the WHO, the prevalence of GDM in women over 20 years of age treated in the SUS is 7.6%,²⁴ an important value given the low diagnostic testing level.

In relation to the imaging tests performed, Obstetric Ultrasound was undergone by most of the pregnant women, whereas Morphological Ultrasound was only performed in a small percentage of the pregnant women. Similar results were found in Santa Maria/RS, where the ultrasound examination practice is a worrying factor in prenatal care due to the delay in the Health Department regulation, being the main reason for some pregnant women to undergo the test in clinics from the private network.²⁵ It is recognized that Morphological Ultrasound helps to identify congenital anomalies and evaluate fetal anatomy, and is recommended for all pregnant women in the first and second trimesters.²⁶ It is noted that, in Paraná, it is guaranteed to request a Morphological Ultrasound test at least once for low- and high-risk pregnant women.⁴

As for the cervical-vaginal cytopathological exam, popularly called Pap smear, the non-performance rate during pregnancy or up to one year before exceeds the mean. This is a worrying fact, given that it is the test responsible for early Cervical Cancer (CC) detection, identifying precursor lesions and allowing for early treatment, reducing the possibility of invasive cervical cancer by up to 90%.²⁷ Even so, some studies report that there is low incidence of women undergoing this examination due to lack of knowledge about the test and CC, or for fear of miscarriages and bleeding, and also because it is not requested or offered by health professionals.²⁸

In relation to the factors associated with not undergoing prenatal tests, non-white women were those who underwent the lowest number of prenatal examinations. This can be explained by social vulnerability issues that this population may be exposed to, such as low incomes, low schooling and difficulty accessing health services, when compared to the white-skinned women's situation.²⁹

Although in this study only race was a sociodemographic variable that was associated with not taking exams, other studies show that there is a strong relationship between cultural, social and economic levels.³⁰ In a study conducted in Sergipe, performance of all complementary examinations during prenatal care was concomitant with an increase in age and family income.³¹

In relation to the gestational variables, late prenatal care initiation is directly associated with not undergoing tests. When initiating prenatal care late in time, the opportunity to attend an adequate number of consultations and the period for performing the tests are lost, which can contribute to unfavorable pregnancy outcomes, as they are directly related to the early diagnosis of situations that compromise the mothers' and newborns' health.^{1,17}

The main objective of prenatal care is to welcome women from the beginning, to prevent and identify possible complications during pregnancy early in time, being encouraged to optimize maternal health and screen infectious diseases. Therefore, it is recommended that prenatal care is initiated as early as possible during pregnancy.³²

Finally, when asked about the reasons for not undergoing the tests, most of the participants reported that they did not take them because they were not requested. This shows certain failure in the assistance provided and that the RMP network recommendations are not being addressed. On the other hand, this is a finding that may correlate with the pandemic, as health services had a significant reduction in prenatal care during this period due to care overload, to the large number of people with COVID-19 and, also, to the need for social distancing, which may have reduced the number of appointments.³³⁻³⁴

Although it was necessary to implement COVID-19 containment measures and reorganize health services, these measures may have compromised performance of the recommended tests, given that the participants in this study reported that some tests were not carried out, as they were not offered due to the pandemic.

Fear of leaving the house due to the pandemic, was also cited by the puerperal women as a reason for not undergoing the examinations. Considering the risk of acquiring the coronavirus disease, associated with the uncertainties inherent to the pandemic and maternal fear of vertical transmission of the virus to their fetuses, women preferred not to seek care.⁹⁻³⁵ A survey carried out in China during the pandemic found that nearly 20% of the pregnant women were afraid of any type of hospital appointment and that more than 40% were afraid of prenatal visits. In addition to that, more than half considered or decided to cancel their prenatal hospital appointments and/or postpone them, indicating that pregnant women were anxious.³⁶

The low prevalence of prenatal tests performed during the COVID-19 pandemic may have exerted a negative impact on maternal and child health in the region covered by this study, as the women lost the opportunity for early identification of some infectious diseases and various health problems, which might have received adequate treatment and monitoring.

CONCLUSIONS AND IMPLICATIONS FOR THE PRACTICE

This study evidenced low prevalence of prenatal tests performed during the COVID-19 pandemic, especially in the third trimester of pregnancy. It was verified that the non-white race presents greater inadequacy in undergoing serological/biochemical tests, which shows a vulnerability situation for this population group. Early initiation of prenatal care, that is, before the 14th gestational week, was a protective factor for undergoing serological/biochemical tests. In relation to the reasons for not performing any of the examinations, most of the participants reported that they were not requested or that they did not feel safe to undergo them due to the pandemic.

Therefore, the results obtained in this study evidenced the existence of gaps in hood quality prenatal care as recommended by the RMP network, with the COVID-19 pandemic contributing to this inadequacy. Health managers and professionals need to organize care protocols in adverse situations, considering that new pandemics may emerge and that prenatal care needs to be continued.

Professional nurses are duly trained and qualified to carry out prenatal consultations of UR and can develop strategies in situations like this, through the implementation of remote care and monitoring, early recruitment of pregnant women and active search for those not attending the consultations, among other alternatives, which can be used as a care tool to ensure care continuity and comprehensiveness, especially among the most vulnerable populations, such as the non-white women identified in this research.

As a limitation of this study, non-recording on the pregnant women's health cards can be considered, as some tests might have been performed and go unrecorded. In any case, pregnant women's health cards are a care coordination tool, important to guide health professionals' actions at different women's health care levels during the pregnancy and puerperal cycle.

The need for studies that evaluate the performance of the recommended prenatal tests throughout the national territory is considered, so that actions can be implemented to strengthen the prenatal care provided by the SUS during crisis periods such as in pandemic, evaluating the particularities of each region to map the locations with the greatest weaknesses.

FINANCIAL SUPPORT

It was granted by Fundação Araucária - PPSUS 2020/2021 Edition - Public Call 11/2020 FA/PR. Process No.: SUS2020131000085. The research project is titled Facing with COVID-19 and Maternal-Child Assistance and is coordinated by Adriana Zilly.

AUTHOR'S CONTRIBUTIONS

Study design. Eduarda Rockenbach Fabri. Ana Paula Contiero.

Data collection. Eduarda Rockenbach Fabri. Ana Paula Contiero. Simone Biff Canônico. Rosane Meire Munhak da Silva. Helder Ferreira. Adriana Zilly.

Data analysis. Eduarda Rockenbach Fabri. Ana Paula Contiero. Simone Biff Canônico. Rosane Meire Munhak da Silva. Helder Ferreira. Adriana Zilly.

Interpretation of the results. Eduarda Rockenbach Fabri. Ana Paula Contiero. Simone Biff Canônico. Rosane Meire Munhak da Silva. Helder Ferreira. Adriana Zilly.

Writing and critical review of the manuscript. Eduarda Rockenbach Fabri. Simone Biff Canônico. Rosane Meire Munhak da Silva. Helder Ferreira. Adriana Zilly. Ana Paula Contiero.

Approval of the final version of the article. Eduarda Rockenbach Fabri. Simone Biff Canônico. Rosane Meire Munhak da Silva. Helder Ferreira. Adriana Zilly. Ana Paula Contiero.

Responsibility for all aspects of the content and integrity of the published article. Eduarda Rockenbach Fabri. Simone Biff Canônico. Rosane Meire Munhak da Silva. Helder Ferreira. Adriana Zilly. Ana Paula Contiero.

ASSOCIATE EDITOR

Ana Luiza de Oliveira Carvalho 

SCIENTIFIC EDITOR

Ivone Evangelista Cabral 

REFERENCES

1. Balsells MMD, Oliveira TMF, Bernardo EBR, Aquino PS, Damasceno AKC, Castro RCMB et al. Avaliação do processo na assistência pré-natal de gestantes com risco habitual. *Acta Paul Enferm.* 2018 May/ Jun;31(3):247-54. <http://dx.doi.org/10.1590/1982-0194201800036>.
2. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience [Internet]. Geneva: WHO; 2016 [cited 2023 Aug 18]. Available from: <https://www.who.int/publications/i/item/9789241549912>
3. Vilela MEA, Leal MC, Thomaz EBAF, Gomes MASM, Bittencourt SDA, Gama SGN et al. Assessment of delivery and childbirth care in the maternity units of Rede Cegonha: the methodological paths. *Cien Saude Colet.* 2021 Mar;26(3):789-800. <http://dx.doi.org/10.1590/1413-81232021263.10642020>. PMID:33729337.

4. Secretaria de Estado da Saúde do Paraná (PR). Divisão de Atenção à Saúde da Mulher. Linha guia- atenção materno infantil: gestação [Internet]. Curitiba: SESA; 2022 [cited 2022 Nov 16]. Available from: https://www.saude.pr.gov.br/sites/default/arquivos_restritos/files/documento/2022-03/linha_gui_a_mi_gestacao_8a_ed_em_28.03.22.pdf
5. Santos AA, Cavalcante KOR, Lúcio IML, Silva JMO, Melo DSA, Jacintho KS. Exames de rotina no pré-natal: solução ou problema? *Rev Enferm UPFE On Line*. 2016 Apr;10(3):1415-22. <https://doi.org/10.5205/1981-8963-v10i3a11082p1415-1422-2016>.
6. Luz LAL, Aquino R, Medina MG. Avaliação da qualidade da Atenção Pré-Natal no Brasil. *Saúde Debate*. 2018 Oct;42(Spe2):111-26. <http://dx.doi.org/10.1590/0103-11042018s208>.
7. Flores TR, Neves RG, Mielke GI, Bertoldi AD, Nunes BP. Desigualdades na cobertura da assistência pré-natal no Brasil: um estudo de abrangência nacional. *Cien Saude Colet*. 2021 Feb;26(2):593-600. <http://dx.doi.org/10.1590/1413-81232021262.26792019>. PMID:33605336.
8. Souza ASR, Katz L, Amorim MMR. Esforços para combater a mortalidade materna por COVID-19 no Brasil. *Rev Bras Saúde Mater Infant*. 2022 Apr/Jun;22:451-2. <http://dx.doi.org/10.1590/1806-9304202200020016>.
9. Araújo DS, Sousa IA, Paes JMDC, Nascimento GGO, Rodrigues RLF, Cruz RCM et al. Attention to women's health in prenatal and puerperium in times of COVID-19: a descriptive review. *Res Soc Dev*. 2020 Sep;9(9):e944997644. <http://dx.doi.org/10.33448/rsd-v9i9.7644>.
10. Chisini LA, Castilhos ED, Costa FS, D'Ávila OP. Impact of the COVID-19 pandemic on prenatal, diabetes and medical appointments in the Brazilian National Health System. *Rev Bras Epidemiol*. 2021 May;24:e210013. <http://dx.doi.org/10.1590/1980-549720210013>. PMID:34076088.
11. Hekimoğlu B, Acar FA. Effects of COVID-19 pandemic period on neonatal mortality and morbidity. *Pediatr Neonatol*. 2022 Jan;63(1):78-83. <http://dx.doi.org/10.1016/j.pedneo.2021.08.019>. PMID:34776364.
12. Secretaria de Estado da Saúde do Paraná (PR). Boletim epidemiológico de informe Covid no Paraná. Curitiba: SESA; 2021.
13. Instituto Paranaense de Desenvolvimento Econômico e Social. Secretaria do Planejamento e Projetos Estruturantes. Perfil dos municípios [Internet]. Curitiba: IPARDES; 2024 [cited 2023 Nov 3]. Available from: <https://www.ipardes.pr.gov.br/Pagina/Perfil-dos-municipios-0>
14. Pito ALBS, organizador. Epidemiologia aplicada nos serviços de saúde. São Paulo: Editora Martinari; 2012.
15. Almeida CPF, Silva JA, Araújo JIF, Azevedo ÁCB. Assistência ao pré-natal no Rio Grande do Norte: acesso e qualidade do cuidado na atenção básica. *Rev Ciênc Plur*. 2021 Nov;7(3):61-80. <http://dx.doi.org/10.21680/2446-7286.2021v7n3ID22151>.
16. Guimarães TA, Pinheiro AKB, Silva AA, Castro LRG, Silva MB, Fonseca LMB. Qualidade dos registros da assistência pré-natal na caderneta da gestante. *Rev Baiana Enferm*. 2020 Apr;34:e35099. <http://dx.doi.org/10.18471/rbe.v34.35099>.
17. Dantas DS, Mendes RB, Santos JMJ, Valença TS, Mahl C, Barreiro MSC. Qualidade da assistência pré-natal no Sistema Único de Saúde. *Rev Enferm UPFE On Line*. 2018 May;12(5):1365-71. <http://dx.doi.org/10.5205/1981-8963-v12i5a230531p1365-1371-2018>.
18. Nakamura-Pereira M, Amorim MMR, Pacagnella RC, Takemoto MLS, Penso FCC, Rezende-Filho J et al. COVID-19 and maternal death in Brazil: an invisible tragedy. *Rev Bras Ginecol Obstet*. 2020 Aug;42(8):445-7. <http://dx.doi.org/10.1055/s-0040-1715138>. PMID:32898910.
19. Khoury JE, Atkinson L, Bennett T, Jack SM, Gonzalez A. Prenatal distress, access to services, and birth outcomes during the COVID-19 pandemic: findings from a longitudinal study. *Early Hum Dev*. 2022 Jul;170:105606. <http://dx.doi.org/10.1016/j.earlhumdev.2022.105606>. PMID:35728399.
20. Dal Molin RS, organizador. Saúde da mulher e do recém-nascido. Guarujá: Editora Científica Digital; 2021.
21. Ministério da Saúde (BR). Comissão Nacional de Incorporação de Tecnologias no Sistema Único de Saúde. Testagem universal para hepatite viral C em gestantes no pré-natal. Brasília: Ministério da Saúde; 2020. Relatório de recomendação: procedimento. Nº 545.
22. Camargos LF, Lemos PL, Martins EF, Felisbino-Mendes MS. Avaliação da qualidade dos registros de cartões de pré-natal de mulheres urbanas. *Esc Anna Nery*. 2021 Oct;25(1):e20200166. <http://dx.doi.org/10.1590/2177-9465-ean-2020-0166>.
23. Organização Pan-Americana da Saúde. Ministério da Saúde. Federação Brasileira das Associações de Ginecologia e Obstetrícia. Sociedade Brasileira de Diabetes. Rastreamento e diagnóstico de diabetes mellitus gestacional no Brasil [Internet]. Brasília: OPAS; 2017 [cited 2022 Nov 16]. Available from: https://www.febrasgo.org.br/images/pec/CNE_pdfs/Rastreamento-Diabetes.pdf
24. Ministério da Saúde (BR). Gestação de alto risco: manual técnico. 5th ed. Brasília: Ministério da Saúde; 2000.
25. Tomazetti BM, Hermes L, Martello NV, Schmitt PM, Braz MM, Hoffmann IC. A qualidade da assistência pré-natal sob olhar multiprofissional. *Ciênc Saúde*. 2018 Jan/Mar;11(1):41-50. <http://dx.doi.org/10.15448/1983-652X.2018.1.27078>.
26. Pedraza DF, Gomes AAP. Atenção pré-natal e contexto social de usuárias da Estratégia Saúde da Família em municípios do estado da Paraíba, Brasil. *Rev Ciênc Salud*. 2021 Aug;19(2):55-78. <http://dx.doi.org/10.12804/revistas.urosario.edu.co/revsalud/a.10600>.
27. Rosa ARR, Silva TSL, Carvalho ICS, Sousa ASJ, Rodrigues AB, Penha JC. Exame citopatológico do colo do útero: investigação sobre o conhecimento, atitude e prática de gestantes. *Cogit Enferm*. 2018;23(2):e52589. <http://dx.doi.org/10.5380/ce.v23i2.52589>.
28. Teixeira LM, Santos AAP, Sanches METL, Silva JMO, Cavalcante MV. Exame preventivo para o câncer de colo durante a gravidez: experiências das gestantes. *Rev Baiana Enferm*. 2020 Mar;33:e33698. <http://dx.doi.org/10.18471/rbe.v33.33698>.
29. Silva FS. Mulheres negras e brancas: análise do acesso às consultas de pré-natal no estado do Rio Grande do Sul, 2016 [thesis]. Porto Alegre: Universidade Federal do Rio Grande do Sul; 2018.
30. Saavedra JS, Cesar JA, Linhares AO. Assistência pré-natal no Sul do Brasil: cobertura, tendência e disparidades. *Rev Saude Publica*. 2019 May;53:40. <http://dx.doi.org/10.11606/S1518-8787.2019053000968>. PMID:31066818.
31. Oliveira JS, Cavalcante Fo JB. Avaliação da atenção Pré-natal na Rede Básica de Saúde em Sergipe - Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB). *Rev Rede Cuid Saúde* [Internet]. 2021 Jul [cited 2023 Nov 3];15(1):13-27. Available from: <http://publicacoes.unigranrio.edu.br/index.php/racs/article/view/5750/3451>
32. Serrazina AS, Silva GSV. Captação da gestante para Pré-natal precoce. *Rev Pró-UniversUS*. 2019 Jan/Jun;10(1):29-34. <http://dx.doi.org/10.21727/rpu.v10i1.1621>.
33. Kotlar B, Gerson EM, Petrillo S, Langer A, Tiemeier H. The impact of the COVID-19 pandemic on maternal and perinatal health: a scoping review. *Reprod Health*. 2021 Jan;18(1):10. <http://dx.doi.org/10.1186/s12978-021-01070-6>. PMID:33461593.
34. Francisco RPV, Lacerda L, Rodrigues AS. Obstetric Observatory BRAZIL-COVID-19: 1031 maternal deaths because of COVID-19 and the unequal access to health care services. *Clinics*. 2021 Jun;76:e3120. <http://dx.doi.org/10.6061/clinics/2021/e3120>. PMID:34190858.
35. Estrela FM, Silva KKA, Cruz MA, Gomes NP. Gestantes no contexto da pandemia da Covid-19: reflexões e desafios. *Physis*. 2020 Jul;30(2):e300215. <http://dx.doi.org/10.1590/s0103-73312020300215>.
36. Wu H, Sun W, Huang X, Yu S, Wang H, Bi X et al. Online antenatal care during the COVID-19 pandemic: opportunities and challenges. *J Med Internet Res*. 2020 Jul;22(7):e19916. <http://dx.doi.org/10.2196/19916>. PMID:32658860.