Access to and utilization of prenatal care services in the Unified Health System of the city of Rio de Janeiro, Brazil

Acesso e utilização de serviços de pré-natal na rede SUS do município do Rio de Janeiro, Brasil

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Abstract

Prenatal care consists of practices considered to be effective for the reduction of adverse perinatal outcomes. However, studies have demonstrated inequities in pregnant women's access to prenatal care, with worse outcomes among those with lower socioeconomic status. The objective of this study is to evaluate access to and utilization of prenatal services in the *Sistema Único de Saúde* (SUS – Unified Health System) in the city of Rio de Janeiro and to verify its association with the characteristics of pregnant women and health services. A cross-sectional study was conducted in 2007-2008, using interviews and the analysis of prenatal care cards of 2.353 pregnant women attending low risk prenatal care services of the SUS. A descriptive analysis of the reasons mentioned by women for the late start of prenatal care and hierarchical logistic regression for the identification of the factors associated with prenatal care use were performed. The absence of a diagnosis of pregnancy and poor access to services were the reasons most often reported for the late start of prenatal care. Earlier access was found among white pregnant women, who had a higher level of education, were primiparous and lived with a partner. The late start of prenatal care was the factor most associated with the inadequate number of consultations, also observed in pregnant adolescents. Black women had a lower level of adequacy of tests performed as well as a lower overall adequacy of prenatal care, considering the *Programa de Humanização do Pré-Natal e Nascimento* (PHPN – Prenatal and Delivery Humanization Program) recommendations. Strategies for the identification of pregnant women at a higher reproductive risk, reduction in organizational barriers to services and increase in access to family planning and early diagnosis of pregnancy should be prioritized.

Keywords: Pregnancy. Prenatal care. Health services accessibility. Equity in access. Program evaluation. Unified Health System.

Resumo

A assistência pré-natal é composta por práticas consideradas efetivas para a redução de desfechos perinatais negativos. Entretanto, estudos têm demonstrado iniquidades no acesso das gestantes aos cuidados pré-natais, com piores resultados para mulheres de menor nível socioeconômico. O objetivo deste estudo é avaliar o acesso e a utilização dos serviços de pré-natal na rede SUS do Município do Rio de Janeiro e verificar sua associação a características das gestantes e dos serviços de saúde. Foi realizado um estudo transversal, no período 2007-2008, por meio de entrevista e análise de cartões de pré-natal de 2.353 gestantes em atendimento em serviços de pré-natal de baixo risco do SUS. Foi feita análise descritiva das razões referidas pelas mulheres para início tardio do pré-natal e regressão logística hierarquizada para identificação dos fatores associados à utilização do pré-natal. A ausência de diagnóstico da gravidez e dificuldades de acesso aos serviços foram as razões mais relatadas para o início tardio do pré-natal. Verificou-se acesso mais precoce de gestantes de cor branca, com maior escolaridade, primigestas e com companheiro. O início tardio foi o fator mais associado ao número inadequado de consultas, também verificado em gestantes adolescentes. Mulheres de cor preta apresentaram menor adequação na realização de exames, bem como menor adequação global do pré-natal, segundo parâmetros do Programa de Humanização do Pré-natal e Nascimento (PHPN). Estratégias para identificação de gestantes de maior risco reprodutivo, redução de barreiras organizacionais nos serviços e ampliação do acesso ao planejamento familiar e ao diagnóstico precoce da gravidez são prioritárias.

Palavras-chave: Gestação. Assistência pré-natal. Acesso aos serviços de saúde. Equidade no acesso. Avaliação de programas e projetos de saúde. Sistema Único de Saúde.

Introduction

Prenatal care coverage has significantly increased in recent years, in Brazil. According to data from the DATASUS (Unified Health System Data Processing Department), the number of pregnant women without any prenatal care consultations decreased from 10.7% in 1995 to only 2% in 2009 (http://www2.datasus.gov.br/DATASUS/index.php, accessed on June 16th, 2011). In the same period, the number of pregnant women with seven or more consultations rose from 49.0% to 58.5%.

It is believed that prenatal care can contribute to more favorable perinatal outcomes and there is scientific evidence of the effectiveness of certain practices routinely used in the follow-up of pregnant women[1].

These effects would be more pronounced in developing countries and in more socially disadvantaged populations, where factors associated with adverse outcomes such as infections, nutritional problems and exposure to harmful substances (tobacco, alcohol and other drugs) are more frequent[2].

However, despite the increase in prenatal care and governmental initiatives that could contribute to better perinatal results[3], health problems associated with pregnancy, delivery and newborn care are still present. Among the causes of death in children aged less than one year that were considered to be preventable by SUS (Unified Health System) interventions[4], those associated with prenatal care were the only ones which did not decrease between 1997 and 2006. Brazilian studies have identified problems related to prenatal care, such as late start of treatment, an inadequate number of consultations and incomplete performance of recommended procedures, which could explain the persistence of adverse outcomes[5].

Some of these studies specifically assessed prenatal care quality according to maternal socioeconomic characteristics and observed inequalities in this type of care, with poorer results among women with a lower income and level of education, who are precisely the ones at the highest risk of experiencing adverse outcomes and who would primarily benefit from prenatal care in theory [6-11].

Although social inequalities in health contexts are mainly determined by factors such as poverty and housing and working conditions, adequate health services can contribute to the reduction in such inequalities through their role in health promotion and disease prevention and treatment[12].

A representative study conducted in the city of Rio de Janeiro in the late 1990s identified a high coverage of prenatal care and the persistence of unfavorable perinatal outcomes[9]. In addition, it was observed that the lower the level of education and income of pregnant women, the higher the "low birth weight" and "perinatal mortality" outcomes[13]. There was evidence of low adequacy of prenatal care, according to the modified Kotelchuck index, and prenatal care service use (time of start of treatment and number of consultations received) was associated with several socioeconomic, demographic and biological characteristics of pregnant women[9].

After almost a decade, the present study aimed to assess the access to and use of prenatal care services of the SUS network in the city of Rio de Janeiro, RJ, Brazil, according to the recommendations of the Ministry of Health's *Programa de Humanização do Pré-Natal e Nascimento* (PHPN – Prenatal and Delivery Humanization Program)[3], which includes other parameters apart from the time of start of prenatal care and number of consultations, observing its association with factors related to pregnant women's characteristics and health services.

Methods

A cross-sectional study was conducted with pregnant women cared for in the SUS health network of the city of Rio de Janeiro, between November 2007 and July 2008.

Two-stage cluster sampling was performed. In the first stage, health establishments providing low-risk prenatal care were selected. In the second stage, pregnant women cared for in each of the selected services were chosen. Primary selection units were stratified per type of unit as follows: Primary Health Centers (PHC), Hospitals/Maternity Hospitals, Delivery Centers (DC) and Family Health Units (FHU). A simple random selection of eligible health units was performed in the city's ten Administrative Areas (PA) for the PHC and Hospital strata, maintaining the same proportional distribution of units per PA in the sample that existed at the time of the study. With regard to the DC stratum, the only unit present in the city was included in this study. FMUs were selected in areas where the family health strategy has been more widely spread and those that most successfully met the criteria established by this study were included (not to be situated in an area with a high risk of violence, to have a higher number of teams available, and to have had a longer length of time of service).

The "adequacy of prenatal care service" outcome was considered to define the sample size, estimated to be 50% with a significance level of 5%. A margin of error of 2.5% was defined for the PHC, hospitals and DC, while that for the FHU was 5.2%. A correction was made for the finite population and the design effect, which was estimated to be 1.5. The final sample totaled 2,187 women in the PHC, Hospital and DC stratum and 230 interviews in the FMU. As there were few refusals, the estimated sample size was obtained, totaling 2,422 pregnant women.

All pregnant women cared for in the health services selected were considered to be eligible for this study, regardless of their age, place of residence and gestational age.

Interviews were conducted with pregnant women and their prenatal record cards were reviewed to obtain the required data.

A standardized questionnaire was used in the interviews, including questions about maternal characteristics and information about the health care received. The entire data collection was performed by health professionals and students who had been previously trained in their own health units.

Prenatal record cards were manually copied or photocopied and relevant information was subsequently obtained, using a manual that standardized data collection and aimed at reducing measurement bias.

All instruments were assessed and pretested in the pilot study. The questionnaires

completed by the pregnant women were reviewed and codified by team members and data were stored using the Access software program and double data entry in all questionnaires.

A prenatal care service use model was designed, based on the theoretical model that considers health service use to be influenced by external contextual factors, health system characteristics and individual factors[12,14]. These are categorized into predisposing factors (existing before the onset of the health problem), capacitating factors (individual or community-level) and health needs.

The following predisposing factors were defined: "maternal age" (in years), "maternal level of education" (incomplete primary education, complete primary education, secondary education and higher), "ethnic group" (white, mixed or black) and "parity" (primiparous or not). Individual capacitating factors were categorized into "economic class" (economic classification from the *Associação Brasileira de Empresas de Pesquisa* (ABEP – Brazilian Association of Market Research Companies)[15]), "maternal paid work" (yes or no) and "marital status" (living with a partner or not), while the community-level capacitating factor was "type of health unit" (hospital, Primary Health Center, Family Health Unit or Delivery Center). The following criterion was used to determine health needs: "history of chronic disease" (arterial hypertension or diabetes mellitus) or "history of obstetric risks", which is defined as the occurrence of any of the following situations in previous pregnancies: number of abortions (three or more), number of deliveries (four or more), number of Cesarean sections (two or more), occurrence of obstetric complications in previous pregnancies (hypertensive disease, gestational diabetes) or unfavorable outcomes (stillbirth, neonatal death, premature birth, low birth weight).

The criterion established by the PHPN was adopted as the prenatal care service use measure[3]. As this study was conducted with pregnant women who were in different gestational stages, the minimum number of consultations and procedures that should have been performed in six distinct gestational periods was defined. The start of prenatal care until the 16th gestational week was considered to be adequate; a minimum number of consultations per gestational age (one consultation in the first gestational trimester, two in the second and three in the third); results of first routine tests from the 22nd gestational week on and of second routine tests from the 34th gestational week on; and anti-tetanus vaccination after the 28th gestational week. In addition to the adequacy of each component, the PHPN's global adequacy was also assessed and all the information used for this assessment was obtained from prenatal record cards.

In the statistical analysis, each element of the sample was weighted by the inverse of its probability of selection and calibrated to recover the known distribution of prenatal consultations. During the analysis, the DCs were included in the FHU stratum to enable the design effect to be included[16].

First of all, the description of pregnant women's characteristics and the problems reported by them when using the health services was made. Bivariate analysis was initially performed to assess the association between the characteristics of pregnant women and services and prenatal care service use, including the global adequacy of PHPN care and its components, with the application of the chi-square test to observe differences in proportions. Multivariate statistical analysis of the factors associated with prenatal care service use was performed using unconditional logistic regression, following the previously established hierarchical model[17] (Figure 1). Variables with a significance level < 0.20 in the bivariate analysis were included in the model and those with a p-value ≤ 0.05 remained in the final model. The dependent variable was again the adequacy of prenatal care according to the PHPN's criterion. However, considering the fact that the time of start of prenatal care may affect the consultations and that both may affect the performance of tests and vaccination, two additional analysis models were defined (models 2 and 3). In these models, the early start of prenatal care (until the 16th gestational

week) and the number of prenatal consultations (adequate or not for the gestational age) were used as explanatory variables for tests and vaccination (Figure 1). The entire data analysis was conducted using the SPSS statistical software, version 16.0.

This research project was approved by the Research Ethics Committees of the *Escola Nacional de Saúde Pública Sérgio Arouca/ Fiocruz* (Oswaldo Cruz Foundation/National School of Public Health) and City of Rio de Janeiro Department of Health. Data collection occurred after participants signed an informed consent form. Close attention was paid to guarantee the anonymity and confidentiality of all information obtained. Authors declared there were no conflicts of interest.

Results

Of all 2,422 pregnant women interviewed, 69 were excluded from the analysis as they did not have a prenatal record card (n = 25) or did not have a defined gestational age (n = 44). These women were not significantly different from the others included in the study and there was only a slightly lower proportion of primiparous women among those excluded (Table 1).

The 2,353 pregnant women analyzed had a mean age of 24.6 years, of which one fourth were adolescents. Approximately one third of them had not achieved a primary education level and the mean level was 8.4 years of school. The majority of pregnant women belonged to socioeconomic class "C" and none of them was

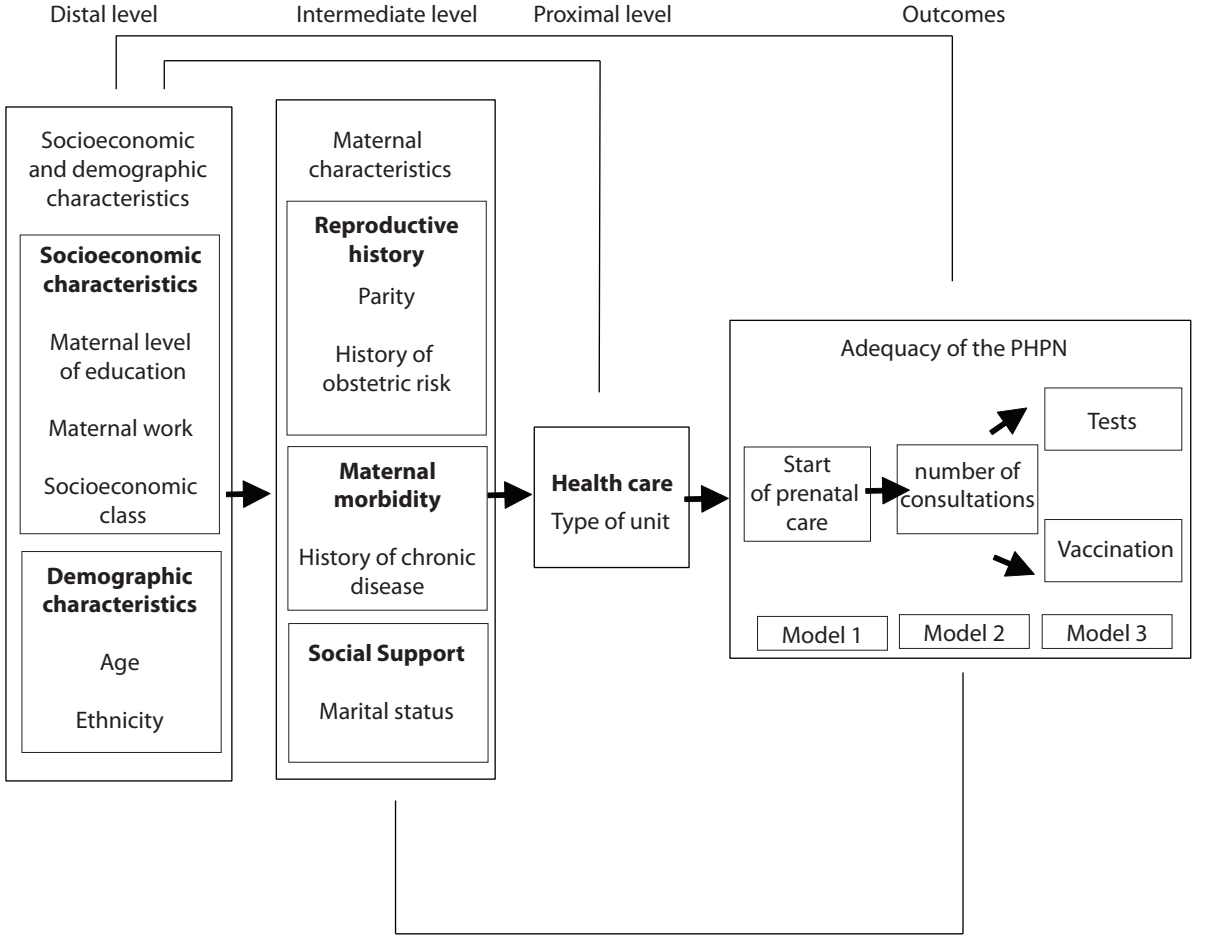

Figure 1 - Hierarchical model for the analysis of prenatal care adequacy.
Figura 1 - *Modelo hierarquizado para análise da adequação da assistência pré-natal.*

Table 1 - Socioeconomic, demographic, reproductive characteristics and prenatal care adequacy of pregnant women included and excluded from the analysis. Rio de Janeiro, RJ, Brazil, 2007 – 2008.

Tabela 1 - *Características socioeconômicas, demográficas, reprodutivas e adequação do pré-natal das gestantes incluídas e excluídas da análise. Município do Rio de Janeiro, Brasil, 2007 – 2008.*

Characteristics	Pregnant women included in the analysis (n = 2.353)	%	Pregnant women excluded from the analysis (n = 69)	%	p-value*
Predisposing factros					
Age (years)					
≤ 19	554	23.6	14	20.1	
20 – 34	1597	67.9	45	65.4	
≥ 35	201	8.5	10	14.5	0.069
Ethnicity					
White	582	24.7	22	31.8	
Mixed	1171	49.8	32	45.9	
Black	542	23.0	15	22.3	
Yellow	45	1.9	0	–	
Indigenous	13	0.5	0	–	0.619
Level of education					
Incomplete primary education	798	33.9	27	38.6	
Complete primary education	754	32.0	21	30.1	
Secondary education or higher	801	34.0	22	31.3	0.668
Primiparous	880	37.4	15	21.3	0.009
Capaciting factors					
Socioeconomic class					
B	175	7.4	4	5.6	
C	1645	69.9	45	65.3	
D	425	18.0	17	24.3	
E	106	4.5	3	4.8	0.508
Paid work	818	34.8	23	34.1	0.907
Living with a partner	1829	77.7	49	71.8	0.285
Type of health service					
Hospital	841	35.8	26	37.1	
Primary Health Center	1327	56.4	36	52.1	
Family Health Unit/Delivery Center	185	7.8	7	10.8	0.839
Health Needs					
History of chronic disease**	190	8.1	9	12.7	0.091
History of obstetric risk*** (n = 1,473)	544	36.9	18	33.4	0.522
Adequacy of prenatal care					
Adequacy of early start	1748	74.3	–	–	
Adequacy of the number of consultations	1863	79.2	–	–	
Adequacy of tests (n = 1,656)****	475	28.7	–	–	
Adequacy of vaccination (n = 1,208)*****	662	54.8	–	–	
Adequacy of global PHPN	905	38.5	–	–	

*chi square test; **Arterial hypertension or diabetes; ***Only for women with previous pregnancies; ****pregnant women with 22 gestational weeks or more; *****pregnant women with 28 gestational weeks or more.

**teste qui-quadrado; **Hipertensão arterial ou diabetes; ***Apenas para mulheres com gestação anterior; ****em gestantes com 22 semanas gestacionais ou mais; *****em gestantes com 28 semanas gestacionais ou mais.*

classified in class "A". Nearly 2% of the pregnant women reported they were Asian-descendants and 0.5% said they were indigenous, both of which were excluded from the subsequent analysis as they represented very small categories. Only one third of the women reported having paid work and more than 70% lived with a partner. PHCs were the primary place of health care, followed by hospitals and maternity hospitals. With regard to obstetric characteristics, 37.4% of participants were primiparous and 36.9% of those who had been pregnant were categorized as having a history of obstetric risks. With regard to history of chronic diseases, 8% reported having arterial hypertension and/or diabetes before the current pregnancy.

Approximately 75% of pregnant women had an early start of prenatal care, which began until the 16th gestational week (Table 1). The main reason for the late start was being unaware of one's pregnancy (40%), followed by difficulties in access to services (27%) and personal reasons (18%), such as being unsure whether to continue the pregnancy or not and having difficulty in informing family members about their pregnancy. Nearly one third of pregnant women reported having sought other health services before obtaining prenatal care where they were, thus delaying its beginning. In approximately 27% of cases, the change was motivated by the fact that they were not provided care in the first service they sought, while 33% were referred to other services, of which 17% were due to gestational risk and 16% for unknown reasons.

The number of prenatal consultations was only adequate among women who were in the beginning of their pregnancy, achieving nearly 80% for all women interviewed (Table 1). More than 95% of all pregnant women reported that the following consultation was always set up at the end of the current one. However, almost one fifth of them had missed a consultation, of which 36% were due to problems in the health service and 30% for unknown reasons. Of all pregnant women who had missed any prenatal consultations, 13% found it difficult to set up a new consultation, of which 80% were due to service-related problems.

A high number of pregnant women (95%) reported that blood and urine tests had been requested and performed. Of all pregnant women who did not have these tests, nearly 70% reported difficulties in having them performed, of which 60% were due to service-related problems; 10%, personal reasons; and 30%, unknown reasons. However, the level of adequacy of tests was low, achieving a maximum value of only 41% in pregnant women with a gestational age of 28 to 33 weeks and close to 30% in those with 22 gestational weeks or more (Table 1). With regard to anti-tetanus vaccination, coverage was also low, totaling 54.8% of pregnant women with a gestational age of more than 28 weeks (Table 1). Considering all the PHPN parameters, only 38.5% of pregnant women were provided adequate prenatal care (Table 1).

In the bivariate analysis (Table 2), the main factors associated with "early start of prenatal care" were higher level of education, living with a partner, being white, and not having had previous pregnancies, of which the two last ones had a borderline significance. The main factor associated with "adequate number of consultations" was early start of prenatal care. Other factors identified were pregnant women's age (lower proportion among adolescents), higher level of education, living with a partner and being primiparous. History of chronic disease and socioeconomic class had a borderline significance and the highest level of adequacy was found in class "B" and in women with a history of chronic diseases. "Adequacy of tests" was closely associated with early start of prenatal care and an adequate number of consultations and its association with "being white" and "higher level of education" was also observed. In addition, "anti-tetanus vaccination" was associated with early start, an adequate number of consultations and the type of health service. In the global assessment of PHPN, level of education, work and history of chronic disease were the variables that maintained significant associations.

In the multivariate analysis (Table 3), being white, having a higher level of education, living with a partner and being primiparous were positively associated with early start of prenatal care. Pregnant women who had a late start of prenatal care and pregnant adolescents had a

Table 2 - Bivariate analysis* of factors associated to adequate prenatal care, considering the PHPN index and its components. Rio de Janeiro, RJ, Brazil, 2007 – 2008.

Tabela 2 - *Análise bivariada* dos fatores associados à adequação da assistência pré-natal segundo o critério PHPN e seus componentes. Município do Rio de Janeiro, Brasil, 2007 – 2008.*

Exposure/outcome	Model 1		Model 2		Model 3				PHPN	p-value
	Adeq. early	p-value	Adeq. consultations	p-value	Adeq. tests**	p-value	Adeq. *VAT****	p-value		
Level of education										
Incomplete primary education	72.5		76.9		25.8		55.6		37.8	
Complete primary edcation	69.6		76.5		26.8		56.1		34.4	
Secondary education or higher	80.8	< 0.001	83.9	< 0.001	33.2	0.040	52.9	0.497	43.1	0.001
Work										
Yes	74.8		81.7		31.5		52.8		42.6	
No	74.1	0.798	77.8	0.080	27.3	0.072	55.8	0.377	36.3	0.026
Socioeconomic class										
E	67.5		69.8		22.1		66.3		26.5	
D	72.9		78.6		28.6		54.7		37.0	
B	74.7		79.4		28.8		53.7		39.4	
C	80.0	0.170	84.4	0.056	32.6	0.408	58.0	0.196	41.3	0.111
Age (years)										
≤ 19	70.5		74.3		27.8		56.1		35.8	
20 – 34	75.4		80.6		29.4		55.7		39.3	
≥ 35	77.6	0.086	81.5	0.009	25.6	0.591	43.6	0.084	39.7	0.377
Ethnicity										
White	77.8		81.7		33.2		50.5		41.8	
Mixed	73.6		78.5		28.5		56.9		37.8	
Black	71.7	0.054	77.3	0.208	23.4	0.012	54.2	0.166	35.7	0.061
Primiparous										
Yes	77.0		82.7		30.9		56.8		40.1	
No	72.8	0.054	77.0	0.002	27.3	0.130	53.6	0.377	37.5	0.113
History of obstetric risk****										
Yes	71.9		76.6		24.3		51.3		37.6	
No	73.4	0.517	77.3	0.798	29.0	0.080	54.8	0.521	37.4	0.950
History of chronic disease										
Yes	78.9		84.5		28.2		55.8		50.6	
No	74.0	0.169	78.7	0.058	28.8	0.917	41.7	0.065	37.4	0.007
Living with a partner										
Yes	77.1		81.6		28.5		53.4		39.2	
No	64.7	< 0.001	70.5	< 0.001	29.2	0.797	59.8	0.156	35.9	0.252
Type of health unit										
Hospital	76.2		82.2		32.0		45.4		37.6	
PHC	73.9		77.3		25.0		60.8		39.2	
PHC/DC	69.5	0.265	78.5	0.178	38.2	0.461	62.2	0.038	37.1	0.812
Early start of prenatal										
Yes			95.6		34.3		57.6			
No	NA		31.7	< 0.001	16.2	< 0.001	49.1	0.006	NA[5]	
Adeq. number of consultations										
Yes					35.1		59.5			
No	NA		NA		9.4	<0.001	39.1	<0.001	NA[5]	

*chi square test; **Only for women with 22 gestational weeks or more (n = 1656); ***VAT: anti-tetanus vaccine, only for women with 28 gestational weeks or more (n = 1208); ****Only for women with prior pregnancy (n = 1473); *****time of initiation of prenatal care and number of appointments are components of PHPN index.

**Teste estatístico Qui-quadrado; **Apenas mulheres com 22 ou mais semanas gestacionais (n = 1656); ***VAT: vacinação antitetânica, apenas em mulheres com 28 ou mais semanas gestacionais (n = 1208); ****Apenas mulheres com gestações anteriores (n = 1473); *****época de início e número de consultas são componentes do PHPN.*

Table 3 - Hierarchical multivariate analysis of factors associated to adequate prenatal care, considering the PHPN index and its components. Rio de Janeiro, RJ, Brazil, 2007 – 2008.

Tabela 3 - *Análise multivariada hierarquizada dos fatores associados à adequação da assistência pré-natal segundo o critério do PHPN e seus componentes. Município do Rio de Janeiro, Brasil, 2007 – 2008.*

Exp./outcome	Model 1		Model 2		Model 3				PHPN	95%CI
	Adeq. early	95%CI	Adeq. consultas	95%CI	Adeq. exame*	95%CI	Adeq. *VAT***	95%CI		
Level of education										
Incomplete primary education	0.695	(0.547 – 0.883)							0.790	(0.650 – 0.959)
Complete primary education	0.605	(0.474 – 0.772)							0.703	(0.581 – 0.851)
Secondary education or higher	1								1	
Age (years)										
≤ 19			0.538	(0.522 – 0.909)						
20 – 34			1							
≥ 35			1.009	(0.600 – 1.312)						
Ethnicity										
White	1				1				1	
Mixed	0.810	(0.700 – 0.939)			0.821	(0.633 – 1.066)			0.854	(0.717 – 1.017)
Black	0.784	(0.584 – 1.051)			0.634	(0.480 – 0.837)			0.784	(0.624 – 0.985)
Primiparous										
Yes	1.355	(1.079 – 1.700)	1.835	(1.179-1.895)						
No	1		1							
History of chronic disease										
Sim									1.709	(1.166 – 2.504)
No									1	
Living with a partner										
Yes	1									
No	0.519	(0.425 – 0.633)								
Type of health unit										
Hospital							1			
PHC							2.014	(1.117 – 3.631)		
PHC/DC							2.069	(1.040 – 4.116)		
Early start										
Yes			1							
No	NA		0.021	(0.051 – 0.098)					NA***	
Adq. number of consultations										
Yes					1		1			
No	NA		NA		0.192	(0.131 – 0.282)	0.404	(0.263 – 0.623)	NA***	

*Only for women with 22 gestational weeks or more (n = 1656), **VAT: anti-tetanus vaccine, only for women with 28 gestational weeks or more (n=1208), ***time of initiation of prenatal care and number of appointments are components of PHPN index.

**Apenas mulheres com 22 ou mais semanas gestacionais (n = 1656); **VAT: vacinação antitetânica, apenas mulheres com 28 ou mais semanas gestacionais (n = 1208); ***época de início e número de consultas são componentes do PHPN.*

less adequate number of consultations, whereas primiparous women had a more adequate number. Having fewer consultations and being black were associated with a lower level of adequacy of tests. A less adequate number of consultations maintained an association with a lower adequacy of anti-tetanus vaccination, whereas having prenatal care in a PHC or FHU/DC doubled the level of adequacy of this vaccination. In the global assessment, the PHPN only maintained a significant association with level of education, ethnicity and history of chronic disease; the lowest level of adequacy was associated with being black and having a lower level of education, while the highest level of adequacy was associated with history of chronic diseases.

Discussion

Several problems related to prenatal care use were identified, considering the parameters recommended by the PHPN. The first one was the late start of prenatal care, found in 25% of the pregnant women. This result was worse than that observed by Leal et al[9] in a study conducted in the city of Rio de Janeiro in 1999. Such difference probably results from the inclusion of pregnant women cared for in the private sector in the previous study, as these women have better socioeconomic level and health service access conditions. Other national studies also found problems related to the early start of prenatal care, with values ranging from 14% to 82%[5].

In the present study, the absence of the diagnosis of pregnancy was the main reason for the late start of prenatal care, which was reported by 40% of the women. To know one is pregnant is the primary condition to seek prenatal care. Although this study did not detail the reasons for the lack of diagnosis, one of the possible factors is the difficulty in access to diagnostic methods to confirm pregnancy. In addition, women with an unplanned pregnancy may have delayed their search for the diagnosis, avoiding the confirmation of such pregnancy.

A large population-based study representative of 29 American states showed that the early diagnosis of pregnancy (until the 6th gestational week) increased the chance of early start of prenatal care by six times, in addition to increasing the chance of having a higher number of prenatal consultations[18]. Authors considered the early diagnosis of pregnancy as one of the factors that may influence women's behavior towards prenatal care use, enabling an earlier start, and this may be improved through educational programs and other means.

Of all pregnant women with a late start of prenatal care, nearly 30% of them reported problems of access to health services[12] as the reason for not beginning prenatal care at an earlier time. Moreover, of all pregnant women who changed health services during prenatal care, nearly 50% reported service-related problems as the reason for this change.

A study conducted in the United States and aimed at assessing the time of start of prenatal care among pregnant adolescents between 1978 and 2003 found an increase in the start of prenatal care during the first gestational trimester. This was associated with the expansion of health care coverage for this group, suggesting that the increase in access promotes the early start of prenatal care[19]. A similar result was found for access to consultations and women with health coverage in the United States had a higher number of prenatal consultations[18]. In the present study, where pregnant women were provided prenatal care by SUS units, the difficulties in access reported are probably associated with the geographic distribution of these units in the city, availability of human resources and organizational barriers when setting up consultations.

In addition to the problems reported, 20% of the pregnant women mentioned personal issues, such as not considering prenatal care to be important or not being sure about continuing the pregnancy, and family problems as reasons for not seeking health services at an earlier time. In a study conducted in Ecuador with low-income women, Paredes[20] found a low proportion of pregnant women who were aware of the meaning of prenatal care and adequate prenatal care and an

even lower proportion among those with inadequate care.

Questions associated with the planning of and satisfaction with the current pregnancy were not assessed in the present study. In a previous study conducted in the city of Rio de Janeiro, maternal satisfaction with the pregnancy was associated with greater prenatal care use, according to the modified Kotelchuck index[9]. Using the Kessner index, Bassani et al. [21] observed that having an unplanned pregnancy and being dissatisfied with the pregnancy were strongly associated with inadequate prenatal care. Paredes[20] also found that inadequate prenatal care was associated with unwanted pregnancies and multiparity. Family planning enables longer interval between pregnancies and can prevent pregnancies in women with a high reproductive risk and unplanned pregnancies. This is one of the measures used to reduce maternal mortality and a possible strategy to achieve more adequate prenatal care.

Living with a partner was positively associated with early start of prenatal care, indicating the importance of social support when caring for a pregnancy. Marital status has been pointed out as a factor associated with inadequate prenatal care in other studies, both in the city of Rio de Janeiro[9,22] and other locations[7,11,18,21]. This is one of the aspects that best explained the difference in inadequacy of prenatal care in cohorts of the cities of Ribeirão Preto and São Luiz do Maranhão[10].

Being primiparous was another factor that promoted early access to prenatal care and the minimum number of consultations recommended by the Brazilian Ministry of Health. Maternal parity has been identified as one of the factors associated with adequate prenatal care and there is a higher proportion of inadequate prenatal care among multiparous women[7,9,10,19,21,22]. The lower prenatal care use by pregnant women who had previous pregnancies could be associated with difficulties in attending the health service due to problems of transportation to this service or lack of social support to care for the other children[20], in addition to adverse experiences with prenatal care during previous pregnancies or with feelings of having sufficient knowledge and experience, thus attributing less importance to such care[7,21].

There was a lower proportion of pregnant women with an adequate number of consultations among adolescents. A lower level of adequacy of prenatal care in adolescents[8,9,10,18], especially the younger ones[19,22], and women aged more than 35 years[7] has been identified in other assessment studies, pointing to the need for different strategies according to specific age groups.

In the present study, the presence of a history of obstetric risks did not promote early access to prenatal care, similarly to what was observed in a study conducted by Leal et al.[9], where the history of previous stillborns was not associated with greater prenatal care use. Lower quality of prenatal care in women with a higher reproductive risk was also evidenced in a study conducted in Southern Brazil[6]. However, a higher level of global adequacy of prenatal care was found among pregnant women with a history of chronic diseases, which could have resulted from the different type of care provided to these women or their greater adherence to prenatal care behavior, due to the perceived need for care. Greater prenatal care service use among women with morbidities during pregnancy was also observed in a previous study conducted in the cities of Rio de Janeiro[9] and São Luis do Maranhão[7].

It should be emphasized that the main factor associated with the inadequate number of consultations was the late start of prenatal care, whereas the inadequate number of consultations was the main factor associated with inadequate tests and vaccination, revealing the importance of early start of prenatal care and continuity of care for the effective access[14] to this type of care.

There was not a significant association between socioeconomic class and the adequacy criteria used. The relative homogeneity of the group studied, with a great concentration of pregnant women in classes C and D could have hindered the identification of these differences. Studies that used family income as a marker of socioeconomic status[6-8,10] found a higher level of inadequacy

of prenatal care, with a later start and lower number of consultations among pregnant women with lower income.

Ethnicity and level of education were found to be associated with several adequacy criteria and they were the only social characteristics that maintained an association with the global adequacy index. There was a lower level of adequacy of prenatal care among women with complete primary education, when compared to those who had not completed primary education. This finding could be the result of the cohort effect, with the newer generations having a wider access to the educational system, as 42% of the women with a complete primary education level were adolescents, so that residual confounding probably remained, even after adjusting for age. The association between level of education and greater access to health practices and services has been shown in several studies[7,9-11].

With regard to ethnicity, Victora et al.[23] observed a lower level of performance of procedures among women who had lower income and were black, although these differences did not remain after adjustments. Thus, the difference in global assessment of quality of prenatal care was attributed to the type of health care provider (public or private). In the present study, where pregnant women were exclusively cared for in public health services, black and mixed women had a lower level of adequacy of tests performed, apart from their difficulties in access to early prenatal care, even after adjusting for the socioeconomic variables included in the model. It should be emphasized that there were no differences in test requests according to the characteristics of pregnant women (data not shown in the tables), which would go against the hypothesis of racial discrimination by professionals. However, the lower number of routine tests performed indicates that these women had more difficulties in receiving the minimum level of prenatal care, when compared to the remaining ones. In a previous study conducted in the city of Rio de Janeiro, Leal et al.[24] identified a lower level of adequacy of prenatal care in black and mixed women, lower use of anesthesia and lower satisfaction with the health service received. Studies conducted in Southern Brazil also found differences in access to health care among black and mixed women, even when they were included in the same services[11,25].

Final considerations

The results found confirm previous findings that women who are white and primiparous, have a higher level of education and live with a partner are those beginning prenatal care at an earlier time. Women with a higher social and reproductive risk, due to their not wanting the pregnancy, not knowing that they are pregnant, not recognizing the importance of prenatal care or having difficulties in access to services, begin prenatal care at a later time. Consequently, they have lower access to consultations and the minimum procedures recommended, which could contribute to the occurrence of new adverse outcomes. These results reveal inequalities in prenatal care, as factors not associated with health needs, such as ethnicity and level of education, determine access to and use of prenatal care services[14].

The following aspects should be prioritized: the increase in access to the diagnosis of pregnancy, enabling the early start of prenatal care; the better organization of the flow of health care in the services, reducing barriers to the access to practices regarded as beneficial to perinatal outcomes; and, probably, the increase in family planning services, preventing unwanted pregnancies. Mechanisms that identify women with a reproductive risk and promote the start of prenatal care should also be encouraged, in addition to educational programs aimed at increasing women's perception of the importance of such care. New studies are required to better understand the reasons for pregnant women not to be present for previously scheduled consultations or for their not having the requested tests performed, serving as the basis for future strategies.

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